

LAS VEGAS VALLEY WATERSHED ADVISORY COMMITTEE REGIONAL WATER QUALITY PLAN



Lake Mead, Nevada

2009

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LAS VEGAS VALLEY WATERSHED ADVISORY COMMITTEE REGIONAL WATER QUALITY PLAN

2009

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**LAS VEGAS VALLEY WATERSHED ADVISORY COMMITTEE
MEMBER AGENCIES**

CITY OF HENDERSON

CITY OF LAS VEGAS

CITY OF NORTH LAS VEGAS

CLEAN WATER COALITION

CLARK COUNTY

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

CLARK COUNTY WATER RECLAMATION DISTRICT

LAS VEGAS VALLEY WATER DISTRICT

SOUTHERN NEVADA WATER AUTHORITY



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ACRONYMS

AFY	Acre-feet per year	MS4	Municipal Separate Storm Sewer Systems
BBAMP	Boulder Basin Adaptive Management Plan	NAC	Nevada Administrative Code
CAMP	Las Vegas Wash Comprehensive Adaptive Management Plan	NDEP	Nevada Division of Environmental Protection
CCL	Contaminant Candidate List	NEPA	National Environmental Policy Act
CCRFC	Clark County Regional Flood Control District	NPDES	National Pollutant Discharge Elimination System
CCWRD	Clark County Water Reclamation District	NPS	National Park Service
CMT	Core Management Team	NRS	Nevada Revised Statutes
CWA	Clean Water Act	RMHQ	Requirement to Maintain Existing Higher Quality
CWC	Clean Water Coalition	ROD	Record of Decision
DAQEM	Clark County Department of Air Quality and Environmental Management	SCOP	Systems Conveyance and Operations Program
EIS	Environmental Impact Statement	SDWA	Safe Drinking Water Act
EPA	Environmental Protection Agency	SNWA	Southern Nevada Water Authority
GMP	Las Vegas Valley Groundwater Management Program	SNWS	Southern Nevada Water System
LVVWAC	Las Vegas Valley Watershed Advisory Committee	SQMC	Stormwater Quality Management Committee
LVVWD	Las Vegas Valley Water District	SWAG	Sewage Wastewater Advisory Group
LWCC	Las Vegas Wash Coordination Committee	TMDL	Total Maximum Daily Load
MAC	Las Vegas Wash Management Advisory Committee	TT	Treatment Technique
MCL	Maximum Contaminant Level	USGS	U.S. Geological Survey

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EXECUTIVE SUMMARY



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EXECUTIVE SUMMARY

In 2007, water and wastewater agencies in Southern Nevada came together establishing the Las Vegas Valley Watershed Advisory Committee (LVVWAC). The committee was formed to enhance overall watershed management efforts and to develop a regional water quality plan for the Las Vegas Valley watershed. Members include:

- City of Henderson
- City of Las Vegas
- City of North Las Vegas
- Clark County
- Clark County Regional Flood Control District
- Clark County Water Reclamation District
- Clean Water Coalition
- Las Vegas Valley Water District
- Southern Nevada Water Authority

The 2009 Regional Water Quality Plan represents these efforts and recognizes the dynamic and interrelated nature of human and environmental influences on the valley's watershed. The plan also details the important role water and wastewater agencies have in protecting critical watershed resources including municipal drinking water supplies, wildlife habitat and recreation.

There are a number of state and federal laws that govern water management practices and safeguard important natural resources in Southern Nevada. Some of these include the Clean Water Act, Safe Drinking Water Act, Nevada Administrative Code, Endangered Species Act, National Historical Preservation Act and Migratory Bird Treaty Act.

As it has in the past, meeting these laws will require that water and wastewater agencies coordinate efforts closely for the benefit of the community. This plan serves as a roadmap for continued collaboration among the agencies and establishes goals and strategies to help the LVVWAC meet its mission to:

“Protect, preserve and enhance the quality and quantity of water resources in the Las Vegas Valley Watershed and to sustain economic well-being and protect the environment for present and future generations.”

To achieve its mission, the LVVWAC has developed seven goals (below) and a number of supporting strategies. A detailed discussion on each goal and goal strategies is provided in Chapter 1.

LVVWAC regional watershed goals include the following:

1. Protect Lake Mead as a source of water for Southern Nevada and downstream users.
2. Meet or surpass federal, state and local standards and regulations.
3. Preserve and enhance the natural, cultural, historic and recreational values of the watershed and Lake Mead.
4. Coordinate water resource management.
5. Manage flood risks.
6. Sustain water and energy resources for future generations.
7. Build community awareness and support for regional watershed management.

This Plan details these implementation efforts for these seven goals and associated strategies. The implementation plans will be incorporated into future operation plans of the LVVWAC regional agencies. In addition, this Plan contains candidate policy concepts for evaluation and future action by LVVWAC members.

By working together, the LVVWAC can address watershed management efforts in a more coordinated manner. Doing so will help to protect vital public, environmental and recreational resources and help to ensure these resources are maintained for generations to come.

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CHAPTER ONE

Introduction

Mission, Goals and Strategies

Regional Water Quality Plan



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INTRODUCTION

The Las Vegas Valley Watershed Advisory Committee (LVVWAC) was formed in 2007 among Southern Nevada water and wastewater agencies to develop a regional water quality plan, establish regional water quality goals and coordinate planning efforts among participating agencies. Membership is comprised of the following:

- City of Henderson
- City of Las Vegas
- City of North Las Vegas
- Clark County
- Clark County Regional Flood Control District
- Clark County Water Reclamation District
- Clean Water Coalition
- Las Vegas Valley Water District
- Southern Nevada Water Authority

The LVVWAC serves as a forum for partnering water and wastewater agencies to define and present a unified direction for addressing water quality and its impact on quantity issues in the Las Vegas Valley and Lake Mead, as well as for integrating individual water management approaches into a comprehensive regional plan.

In accordance with the 2007 enabling agreement among participating entities, the LVVWAC assumed all functions of the Las Vegas Wash Management Advisory Committee (MAC), a former stakeholder committee that provided direction on water quality and resource issues associated with the Las Vegas Wash. The LVVWAC will take on this role with an expanded scope, considering the regional watershed as a whole.

The LVVWAC has developed this 2009 Regional Water Quality Plan (Plan) in an effort to coordinate all existing plans, policies, documents and efforts related to water quality in the Las Vegas Valley watershed. The Plan integrates regional water quality goals and strategies that were developed by the LVVWAC during the year following its formation.

These goals set a roadmap for future efforts and guide its members toward developing operating plans necessary to better manage important community water resources for the public.

LVVWAC MEMBERSHIP

Each of the nine LVVWAC members has a responsibility for protecting and preserving regional watershed resources for the community. Specific duties are detailed below.

City of Henderson

The City of Henderson was incorporated in 1953 and is governed by a Mayor and a four-member City Council. The City is responsible to provide water, wastewater and reclaimed water service to its residents, and build infrastructure projects to collect and manage stormwater.

City of Las Vegas

The City of Las Vegas was founded in 1905 and is governed by a Mayor and a six-member City Council. It is responsible for managing wastewater treatment for its residents and parts of North Las Vegas, and building infrastructure projects to collect and manage stormwater. Domestic water service and recycled water distribution are provided by the Las Vegas Valley Water District.

City of North Las Vegas

The City of North Las Vegas was incorporated in 1946 and is governed by a Mayor and a four-member City Council. The City is responsible for providing water and wastewater service to its residents, and building infrastructure projects to collect and manage stormwater. It also provides water service to portions of Las Vegas and unincorporated Clark County.

Clark County

Clark County (County) was formed in 1909 and is governed by a seven-member board of County Commissioners (Commission). The County provides

local and regional services for more than two million residents and approximately 40 million visitors annually.

In accordance with the Clean Water Act, the state of Nevada designated Clark County to serve as the lead agency responsible for all water quality planning activities associated with water pollution and management of regional wastewater treatment plans. In compliance with Clean Water Act planning requirements, Clark County has prepared the Clark County Area-Wide Water Quality Water Management Plan (208 Plan).

Clark County Regional Flood Control District

The Clark County Regional Flood Control District (CCRFCD) was created in 1985 to develop a coordinated and comprehensive master plan to solve flooding problems, regulate land use in flood hazard areas, fund and coordinate the construction of flood control facilities, and develop a maintenance program for master plan flood control facilities. The CCRFCD is named the lead agency for the Las Vegas Valley National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer (MS4) permit. The agency is governed by an eight-member Board of Directors that is comprised of two representatives each from Clark County and the City of Las Vegas, and one representative each from the cities of Boulder City, Henderson, Mesquite and North Las Vegas.

Clark County Water Reclamation District

The Clark County Water Reclamation District (CCWRD) was formed in 1954 and is governed by a seven-member Board of Trustees whose members also serve as the elected Clark County Commission. It is responsible for wastewater treatment and reclamation in all of the unincorporated areas of Clark County, including the outlying areas of Blue Diamond, Indian Springs, Laughlin, Searchlight and Moapa Valley.

Clean Water Coalition

The Clean Water Coalition (CWC) was formed in 2002 among local wastewater agencies to implement the Systems Conveyance and Operations Program (SCOP). When complete, the program will transport highly treated wastewater from point sources to Lake Mead. CWC members include the Clark County Water Reclamation District, City of Las Vegas, City

of Henderson and the City of North Las Vegas. The CWC is governed by a four-member Board of Trustees, comprised of one member from each member agency.

Las Vegas Valley Water District

The Las Vegas Valley Water District (LVVWD) was formed in 1954 and is governed by a seven-member Board of Directors whose members also serve as the elected Clark County Commission. The LVVWD provides water service to the City of Las Vegas and portions of unincorporated Clark County. The agency also serves as the managing entity for the Southern Nevada Water Authority.

Southern Nevada Water Authority

The Southern Nevada Water Authority (SNWA) was formed in 1991 among seven water and wastewater agencies in Southern Nevada to serve as the region's wholesale water provider. Specific functions of the SNWA are to acquire and manage long-term water resources for Southern Nevada, manage existing and future water resources, construct and manage regional facilities and promote water conservation. The agency is governed by a seven-member Board of Directors, comprised of one member from each partnering agency. SNWA members include 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 and Las Vegas Valley Water District.

LAS VEGAS VALLEY WATERSHED

The Las Vegas Valley watershed includes the entire Las Vegas Valley Hydrographic Basin and Lake Mead (see page 22).

Las Vegas Valley Hydrographic Basin

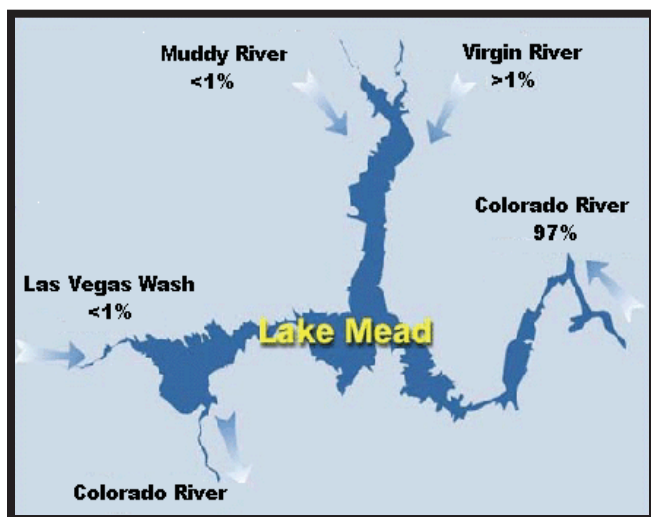
The Las Vegas Valley Hydrographic Basin measures approximately 2,200 square miles. The basin is recharged through precipitation and snowmelt within the surrounding mountain ranges. The basin is bordered by Spring Mountains (West), Frenchman Mountains (East), McCullough Range (South) and the Sheep Range (North). The entire basin is drained by the Las Vegas Wash.

Lake Mead and Associated Inflows

In addition to local groundwater, other watershed sources include the Colorado River, which is primarily

fed by precipitation and snowmelt in the Rocky Mountains. The Colorado River drainage runs through seven western states including Wyoming, Colorado, Utah, New Mexico, Nevada, Arizona and California. Nevada's Colorado River allocation is stored in Lake Mead.¹

For planning purposes, the LVVWAC considers all water sources within the Las Vegas Valley Hydrographic Basin (including groundwater, shallow groundwater, urban runoff, stormwater and treated wastewater flows) as components of the Las Vegas Valley watershed. As described earlier, the Colorado River is included for planning purposes, as well as its tributaries including the Muddy and Virgin Rivers. The Virgin River originates in southwestern Utah, flows through Arizona and into Nevada where it joins the Colorado River at Lake Mead. The Muddy River is a perennial river fed by a series of springs in Southern Nevada. The river originates in Nevada and flows into Lake Mead.



Lake Mead inflows.

The Las Vegas Wash is another tributary to Lake Mead, and primarily serves as an “urban river.” Its flows are comprised of urban runoff, shallow groundwater, recycled water and stormwater. These flows are discharged into Lake Mead where they help to extend Southern Nevada's Colorado River allocation. In Southern Nevada, water that is withdrawn from the system but later returned as treated wastewater flows, is effectively refunded. These “return-flows” allow Southern Nevada to extend the use of its Colorado River apportionment by approximately 70 percent.

The Las Vegas Wash provides wetland habitat for numerous species of wildlife. Clark County manages the Clark County Wetlands Park and Nature Preserve, a comprehensive management effort to enhance wetlands habitat, restore the larger wetlands environment, and provide recreational and educational opportunities for the Las Vegas Valley.

WATER SOURCES

There are three distinct water sources in the Las Vegas Valley watershed. These include the Colorado River, local groundwater and non-point water sources (including urban runoff, shallow groundwater and stormwater).

Colorado River

Under the 1922 Colorado River Compact and associated agreements, Nevada has the right to the consumptive use of 300,000 acre-feet of Colorado River water per year (afy). Agreements among the seven basin states that share the Colorado River have afforded Southern Nevada additional flexibility along the Colorado River. For example, Southern Nevada has the ability to develop specific water resources and convey them to the Colorado River in exchange for credits. In addition, Southern Nevada has received credits in exchange for funding a water system efficiency project on the Colorado River. Southern Nevada also has water banking agreements with California and Arizona to bank Colorado River water in exchange for storage credits for SNWA to withdraw in the future.

In 1999 and continuing today, the Colorado River basin began to experience drought conditions that have significantly impacted storage volumes in Lake Powell and Lake Mead, the two primary storage reservoirs on the Colorado River system. Less obvious impacts of the drought include altered Lake Mead water quality. These challenges and interim solutions are discussed in detail later in the chapter.

Local Groundwater

The Las Vegas Valley Water District and the City of North Las Vegas have permanent groundwater rights totaling 40,629 afy and 5,711 afy, respectively. This groundwater is permitted by the Nevada State Engineer and is withdrawn from the principal aquifer in the Las Vegas Valley Hydrographic Basin.

Non-Point Water Sources

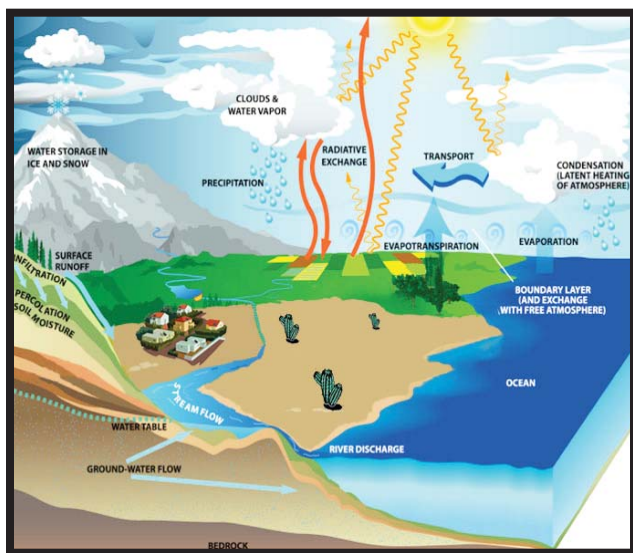
There are three non-point source flow components of the Las Vegas Wash, the primary drainage source for all of Southern Nevada's non-point sources:

- Urban runoff
- Shallow groundwater
- Stormwater

Urban Runoff. Urban runoff is typically associated with water runoff that begins in street gutters, and travels through the storm drain system and enters Lake Mead untreated. A number of conservation programs, including water waste restrictions, adopted in the Las Vegas Valley are designed to reduce urban runoff and the pollutants it transports.

Shallow Groundwater. Shallow groundwater is historically naturally occurring, but is also fed by excess irrigation. Shallow groundwater runoff is trapped near the land surface by an impermeable layer of clay and caliche, and typically lies within 50 feet of land surface. In some areas of the Las Vegas Valley, higher levels in the principal aquifer can contribute to the shallow groundwater system. In the southeast portion of the Valley, the shallow aquifer is near the ground surface and discharges to stream channels.

Stormwater. Rain events in the Las Vegas Valley create stormwater. This water is conveyed untreated through the Las Vegas Valley to the Las Vegas Wash through an extensive network of flood control structures and natural washes. Southern Nevada does not receive return-flow credits for stormwater that enters Lake Mead.



Hydrologic cycle.

WATER QUALITY REGULATIONS

All qualities of water in the Las Vegas Valley – including drinking water, wastewater and stormwater – are regulated by a series of federal and state regulations. These regulations serve to protect drinking water and source water quality, and ensure that the watershed's environmental and recreational uses are preserved. Key water quality regulations in place to safeguard Southern Nevada's water resources include:

- Clean Water Act
- Safe Drinking Water Act
- Nevada law

Clean Water Act

As amended, the 1972 federal Clean Water Act (CWA) regulates water pollution and ensures that surface waters meet certain standards necessary for appropriate beneficial uses, while restoring and maintaining the chemical, physical and biological integrity of the nation's waters.² Discharge of point and non-point sources are covered under the act.

The CWA includes a number of regulatory and non-regulatory tools to manage water pollution. For example, the National Pollutant Discharge Elimination System, or NPDES, is a permitting process to limit the discharges of pollutants to surface waters. The NPDES is managed by the United States Environmental Protection Agency (EPA) in partnership with state environmental agencies to regulate point and non-point sources of pollution. In Nevada, the Nevada Division of Environmental Protection (NDEP) is responsible for implementation and enforcement efforts associated with the Act. In addition to NPDES permitting activities, the NDEP sets water quality standards, identifies impaired water bodies and establishes Total Maximum Daily Loads (TMDLs) for water bodies. NPDES permits must be reviewed and reissued every five years.

Safe Drinking Water Act

As amended, the 1974 federal Safe Drinking Water Act (SDWA) serves as the principal federal law that ensures safe drinking water for the public and applies to all public water systems.³ Pursuant to the SDWA, the EPA is responsible to set drinking water quality standards and oversee implementation.⁴ As part of

this work, the EPA has established regulations for certain contaminants that may cause adverse public health effects. The EPA protects public health by establishing Maximum Contaminant Levels (MCLs) for enforceable contaminants.

The SDWA contains provisions that must be met for both regulated and unregulated organic, inorganic and microbial contaminants, which come from a variety of sources. In addition, there are a number of chemical compounds and organisms on the EPA's Contaminant Candidate List (CCL) that may be regulated in the future, as well as pharmaceuticals and compounds of concern.

Nevada Law

The state of Nevada is responsible for coordinating and implementing federal water quality regulations throughout the state. In addition to federal regulations, Nevada Revised Statutes (NRS)⁵ and Nevada Administrative Code (NAC)⁶ include water quality standards to protect the beneficial uses of waters, including municipal water supply and warm water fisheries in Lake Mead.

The NAC includes anti-degradation standards based on the "Requirement to Maintain Existing Higher Quality" (RMHQ) where existing water quality is higher than the standards required for beneficial uses (such as in Lake Mead).

Other Regulations

Meeting anti-degradation standards also addresses the National Park System's (NPS) non-impairment guidelines for water quality constituents, as well as recreation, fish and wildlife.

The NDEP also regulates remediation programs, which work to oversee cleanup activities and determine mitigation activities for contaminated water bodies throughout the state. Beyond NPDES permits, the NDEP may also issue general or temporary wastewater discharge permits based on the type of discharge, duration and impacted waters.

The Colorado River serves seven western states and the country of Mexico. Water quality in and out of Nevada is regulated by the federal government (EPA). Nevada also works with the states of Arizona and California to set standards that work to protect interstate waters.

WATER QUALITY

This Plan addresses water quality parameters and management efforts of three distinct water types: source water, treated wastewater and non-point water sources (stormwater, urban runoff and shallow groundwater). Below is a description of each, as well as a discussion of treatment issues and management strategies to ensure all water types meet or exceed established federal and state water quality standards.

This section is intended to provide readers with a broad overview of regional water quality issues, as well as a context for enhanced communication and collaboration efforts occurring among partnering water and wastewater agencies in Southern Nevada.

Source Water

Source water is the term used to describe waters that have not been treated for drinking and other domestic uses. In Southern Nevada, source water is comprised of Colorado River system inflows, wastewater returns, urban runoff, shallow groundwater and stormwater.

Ongoing drought conditions in the Colorado River Basin have affected water quality in Lake Mead. For example, concentrations of bromide and total organic carbon, two naturally occurring constituents have increased, primarily due to reduced inflows and concentration from water evaporation. These constituents are relatively harmless by themselves. However, when they undergo mixing with water treatment processes (such as chlorine or ozone) or are influenced by factors such as temperature, undesirable water quality issues arise. Partnering LVVWAC agencies are working together to ensure that long-term drinking water quality is maintained. Some actions include coordinating planned facilities (outfall and intakes) and modifying treatment techniques based on current and future conditions.

Surface Water. Water stored in Lake Mead is treated at the Southern Nevada Water System (SNWS), which has two advanced water treatment facilities designed to provide drinking water that meets all SDWA standards. Water undergoes ozone treatment and multi-stage filtration, and is further disinfected to protect drinking water in the distribution system.

Every month, scientists collect and analyze hundreds of water samples from throughout the Las Vegas

Valley. The SNWS tests more frequently and extensively than the SDWA requires. Water delivered by the SNWS, as well as local groundwater supplies, meet or surpass all state and federal drinking-water standards.



SNWS Water Quality Laboratory.

Groundwater. Because it is naturally filtered, water drawn from the principal groundwater aquifer is simply treated with chlorine as it enters the water distribution system.

In 1997, the Nevada State Legislature directed the SNWA to develop the Las Vegas Valley Groundwater Management Program (GMP) to protect and manage the valley's groundwater resources found within the principal aquifer. The program works to protect the groundwater supply from contamination, improve management of resources to prevent overdrafting and increase cooperation among groundwater users and agencies. In addition, the program works to recharge the principal aquifer by injecting treated surface water from the drinking water distribution system in the Las Vegas Valley into the groundwater aquifer. On behalf of the SNWA member agencies, this large-scale surface water recharge is used to “bank” water for future use and supplement the natural recharge of the aquifer. The surface water that is injected into the principal aquifer is subject to all drinking water standards.

Treated Wastewater

Treated wastewater accounts for 90 percent of Las Vegas Wash flows at Lake Mead. Because Nevada depends on wastewater recycling for return-flow

credits, meeting federal and state regulations for wastewater discharge not only protects Lake Mead water quality, it also extends the region's water resources.

The valley's four wastewater agencies (CCWRD and the cities of Henderson, Las Vegas and North Las Vegas) discharge highly-treated effluent into the Las Vegas Wash where it enters Lake Mead. Wastewater discharge is regulated by federal and state policies. The LVVWAC wastewater agencies are in full compliance with these established regulations for wastewater discharge.

The wastewater treatment process includes biological and chemical treatment systems. Solids are removed from the wastewater stream and then dissolved biological matter is converted into sludge. After wastewater has undergone initial treatment activities, it undergoes tertiary treatment. Tertiary treatment raises the water quality of the effluent before it is discharged to the Las Vegas Wash. There are a number of tertiary treatment processes used in Southern Nevada, including the removal of nitrogen and phosphorus. The wastewater is then filtered and disinfected before being discharged.



City of Henderson water recycling facility expansion.

Wastewater agencies perform more than 100,000 process control and laboratory tests each year to meet strict NDEP regulations and ensure that water quality standards are met or surpassed at all times.

To manage future projected wastewater discharges, the Clean Water Coalition (CWC) was formed to implement the Systems Conveyance and Operations Program (SCOP). The project will reduce wastewater

flows to the Las Vegas Wash and deliver them directly to Lake Mead. As part of this effort, the CWC developed the Boulder Basin Adaptive Management Plan (BBAMP)⁷ to address SCOP operations, water quality monitoring and decision-making processes to protect Lake Mead's water quality. The BBAMP outlines an extensive monitoring program and a comprehensive management process to ensure that project goals related to water quality and resource protection are met. The BBAMP is managed by a core management team consisting of the CWC, SNWA, U.S. Bureau of Reclamation, National Park Service and U.S. Fish and Wildlife Service.

Non-Point Sources

Non-point sources account for approximately 10 percent of Las Vegas Wash flows at Lake Mead on an annual basis. Non-point sources include urban runoff, shallow groundwater and stormwater.

Agencies in Southern Nevada work together to monitor these flows and ensure that they do not adversely impact the environment. The NDEP and the EPA, as authorized by the CWA, regulate non-point source discharges. To support these efforts, the Nevada Division of Environmental Protection (NDEP) manages the NPDES and requires a permit for all entities that discharge water to Lake Mead. NPDES is a permitting mechanism that requires the implementation of controls designed to prevent harmful pollutants from being washed by stormwater runoff into local water bodies.

The Clark County Regional Flood Control District (CCRFCD) is the lead entity for a multi-jurisdictional stormwater permit issued to the cities of North Las Vegas, Las Vegas, Henderson and Clark County. The CCRFCD coordinates permit compliance activities among these stormwater system operators. In addition, the Stormwater Quality Management Committee (SQMC) was formed among Las Vegas Valley stormwater permittees to help manage program development and compliance activities under the state-issued NPDES Municipal Separate Storm Sewer System (MS4) permit. The permit authorizes stormwater discharge to the Las Vegas Wash from storm sewer systems owned and operated by the cities of Las Vegas, North Las Vegas, Henderson and Clark County in return for implementation of certain storm water pollution reducing activities by the permittees.

The following provides an overview of non-point sources and respective water quality challenges.

Urban Runoff. Urban runoff can pose a risk to water quality because of its potential for carrying various pollutants (including bacteria, oil, grease, pesticides, herbicides and nutrients) from the urban landscape into Lake Mead through the storm drain system. In addition, urbanization can increase the quantity and pollutant load of dry weather flows in the drainable system as a result of landscape watering, vehicle washing and other miscellaneous activities.

Shallow Groundwater. Local groundwater sources are known to contain elevated selenium and total dissolved solids (TDS), two watershed contaminants of concern that occur naturally in groundwater sources. Other shallow groundwater flow inputs are affected by sub-surface flows from industrial activities in Henderson, Nevada, and dewatering discharges.

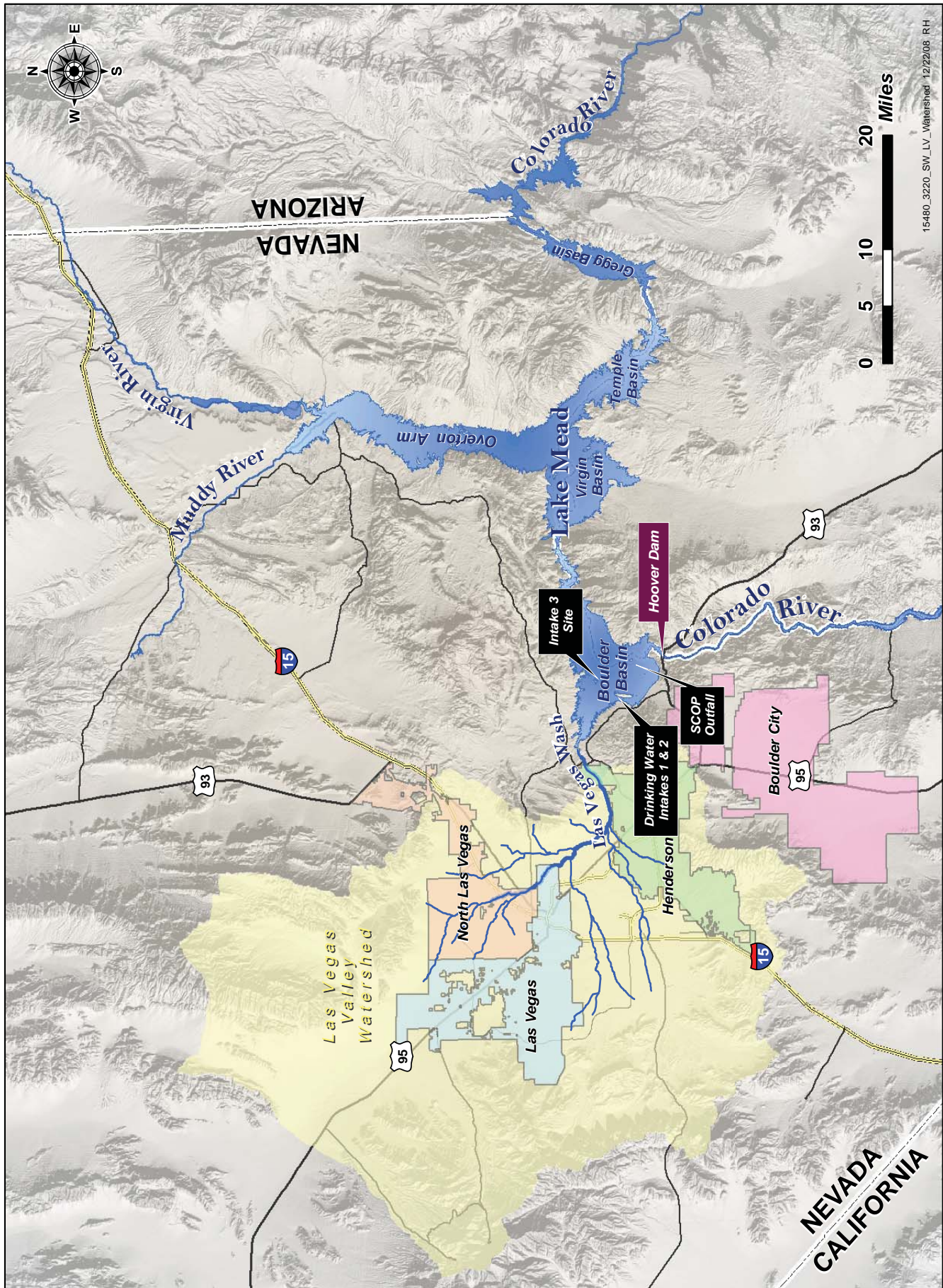
Stormwater. Sediment, debris and bacteria are the most common contaminants found in stormwater. These contaminants are washed into storm drains, which ultimately lead to Lake Mead via the Las Vegas Wash. During rain events, runoff may contain pollutants in quantities that could adversely affect water quality.

CONCLUSION

A host of federal and state regulations exist to protect local source water and drinking water quality for the public. Drought impacts on major water supplies will require even more significant efforts, both in terms of treatment and facilities management, to protect public resources.

Proactive management of the Las Vegas Valley watershed is necessary to ensure that the quality of Southern Nevada's drinking water supply is maintained and to protect regional water resources for environmental, and human and recreational uses. This coordinated effort is critical to protect public health, as well as important water resources for community.

To facilitate the implementation of the goals and strategies set forth in this Plan, the committee's regional members including the SNWA, CWC and CCRFCD will begin development of respective annual work plans. These annual work plans will detail actions taken on behalf of the Committee's member agencies to meet this Plan's prescribed objectives.



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Las Vegas Valley Watershed

FOOTNOTES

1. A series of laws and court cases known as the “Law of the River” governs how and where Colorado River water is used. The 1922 Colorado River Compact and the 1928 Boulder Canyon Project Act defined all apportionments of Colorado River water. The 1964 Supreme Court Decree in *Arizona v. California* verified the lower basin apportionment of 7.5 million acre-feet among Arizona, California and Nevada, including Nevada’s consumptive-use apportionment of 300,000 acre-feet per year (afy) of Colorado River water.
2. 1972 “Clean Water Act,” a primary federal law governing water pollution, gives the states responsibility for setting, reviewing and revising water quality standards. Introduced a permitting system for regulating point sources of pollution.
3. 1974 “Safe Drinking Water Act,” amended in 1986 and 1996; requires actions to protect drinking water and its sources, including rivers, lakes, reservoirs, springs and groundwater wells.
4. *Ibid.* Authorizes United States Environmental Protection Agency (EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water.
5. “Nevada Revised Statutes (NRS).” State of Nevada requirements for water quality standards, NRS 445A.425 and 445A.565.
6. “Nevada Administrative Code (NAC).” Water quality standards for Nevada, NAC 445A.119 through 445A.225.
7. “Boulder Basin Adaptive Management Plan,” March 2008, Clean Water Coalition.

MISSION:

PROTECT, PRESERVE AND ENHANCE THE QUALITY AND QUANTITY OF WATER RESOURCES IN THE LAS VEGAS VALLEY WATERSHED TO SUSTAIN ECONOMIC WELLBEING AND PROTECT THE ENVIRONMENT FOR PRESENT AND FUTURE GENERATIONS.

GOALS AND ASSOCIATED STRATEGIES

- 1. Protect Lake Mead as a source of water for Southern Nevada and downstream users.**
 - Monitor and respond to upstream inflows to Lake Mead.
 - Manage non-point sources from the Las Vegas Valley.
 - Manage the operations and facilities of the System Conveyance and Operations Program (SCOP).
 - Manage, coordinate and optimize water reclamation facilities.
- 2. Meet or surpass federal, state and local standards and regulations.**
 - Endeavor to protect Lake Mead, Las Vegas Wash and tributaries to meet or surpass environmental water quality standards.
 - Continue to ensure drinking water standards are met or surpassed.
- 3. Preserve and enhance the natural, cultural, historic and recreational values of the watershed and Lake Mead.**
 - Manage wildlife and habitats.
 - Minimize impacts to cultural and historic values.
 - Endeavor to prevent and control invasive species.
 - Support recreational uses and the health of fisheries and other water dependant wildlife.
- 4. Coordinate water resource management.**
 - Balance ecosystem, flows and other functions of the Las Vegas Wash and Lake Mead.
 - Optimize the use of reclaimed water.
 - Ensure the development of and compliance with the Clark County 208 Water Quality Management Plan for the Las Vegas Valley watershed.
- 5. Manage flood risks.**
 - Minimize the loss of life and property from the impacts of flooding.
- 6. Sustain water and energy resources for future generations.**
 - Optimize use of renewable energy.
 - Consider the net environmental benefit.
 - Enhance energy and water conservation programs.
- 7. Build community awareness and support for regional watershed management.**
 - Develop communication and education programs.
 - Integrate existing stakeholder programs to specifically address watershed issues.

GOAL ONE: PROTECT LAKE MEAD AS A SOURCE OF WATER FOR SOUTHERN NEVADA AND DOWNSTREAM USERS.

BACKGROUND

The Colorado River is the primary source for Southern Nevada’s overall water resource needs. Nevada receives 300,000 acre-feet for consumptive use each year from the Colorado River.

Other downstream users include Mexico, which receives 1.5 million acre-feet per year (maf), and the states of California and Arizona, which receive 4.4 maf and 2.85 maf, respectively.

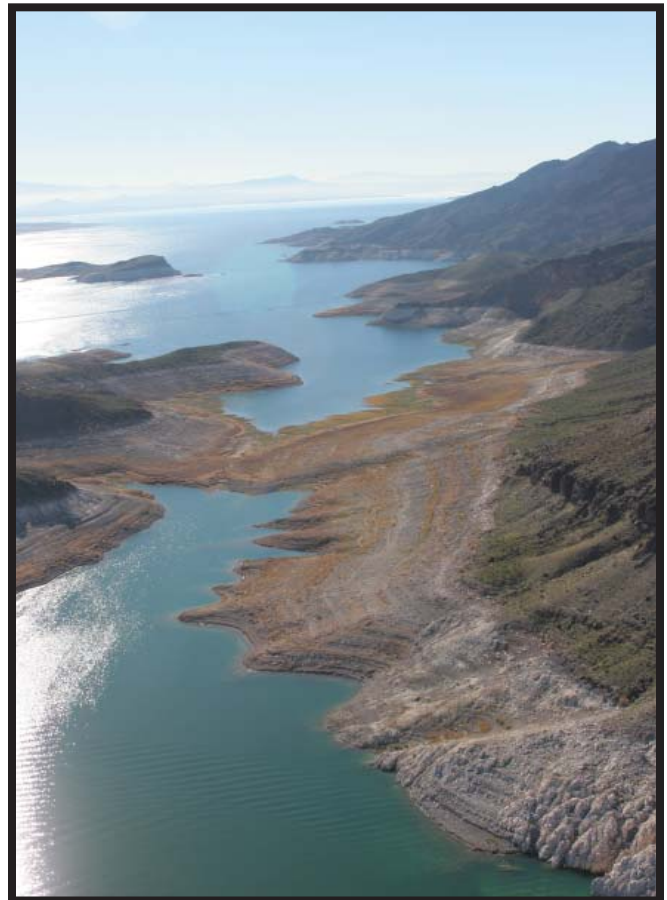
The Las Vegas Valley accesses Nevada’s Colorado River allocation through existing facilities at Lake Mead. Other Lake Mead inflows come from the Muddy River, the Virgin River and the Las Vegas Wash. Las Vegas Wash flows are comprised of wastewater discharge, stormwater runoff, shallow groundwater and urban runoff¹. The latter three are referred to as non-point sources.

There are a number of factors that can and will likely continue to influence water quality in the future, these include:

- Drought conditions in the Colorado River Basin. Reduced inflows limit dilution and mixing of existing storage and contribute to lower surface elevations and associated temperature variations.
- Increased volumes of treated wastewater discharged to Lake Mead.
- New discharges of treated wastewater to the Virgin and Muddy rivers by upstream users such as Southern Utah and other growing Nevada cities.
- Plans by the U.S. Bureau of Reclamation to release warmer water from the Glen Canyon Dam for endangered species recovery.
- Changes to upstream reservoir operations (Lake Powell).
- Imported groundwater from the SNWA’s proposed Clark, Lincoln and White Pine Counties Groundwater Development Project.
- Increased non-point source inflows due to continued development in the watershed.

Climate change is one example of an emerging issue that will warrant monitoring to determine future impacts. Climate change and its resulting impacts will likely influence water resource availability and consequently influence water quality.

The following pages provide an overview of strategies and implementation plans designed to protect Lake Mead as a water source for Southern Nevada and downstream users.



Lake Mead, Nevada.

STRATEGY: MONITOR AND RESPOND TO UPSTREAM INFLOWS TO LAKE MEAD.

BACKGROUND

Monitoring and management of Lake Mead inflows are critical to protecting the region's overall water quality.

Today, wastewater is monitored daily by the wastewater dischargers. In addition, Lake Mead inflows are monitored monthly for nutrients and drinking water contaminants by CWC member agencies, as well as the SNWA and the U.S. Bureau of Reclamation through a contract with the National Park Service (NPS). The U.S. Geological Survey (USGS) also monitors reservoir inflows on a quarterly basis. The CCRFCD, on behalf of the Stormwater Quality Management Committee (SQMC), monitors stormwater flows.

Lake Mead's outflows are monitored monthly for nutrients, drinking water contaminants and endocrine disrupting compounds. These activities are coordinated by the SNWA in cooperation with the CWC. Furthermore, the USGS also monitors the water quality of Lake Mead outflows.

In addition, the NPS, CWC and SNWA have jointly funded the Estuary and Lake Computer Model (ELCOM) three-dimensional model to analyze data collected and to better understand how inflow changes will affect Lake Mead water quality in the future.

Ongoing water monitoring efforts are needed to help ensure that water managers can effectively respond to current and emerging water quality issues.

IMPLEMENTATION PLANS

- Continue to monitor Lake Mead inflows for nutrients and drinking water contaminants.
- Monitor the progress of changes in upstream wastewater discharges and address any water quality impacts resulting from increased wastewater flows.
- Evaluate potential impacts and implement necessary response measures to changes in Las Vegas Wash inflows.
- Monitor and address any potential water quality impacts resulting from SCOP to Lake Mead and downstream users.
- Use the ELCOM model as a tool to inform future water planning and management efforts.
- Continue to utilize the Lake Mead Water Quality Forum to assess issues related to upstream inflows.
- Monitor temperature changes and nutrient loads as a result from changes in Lake Powell and address resulting water quality impacts.



Upstream inflows.

STRATEGY: MANAGE NON-POINT SOURCES FROM THE LAS VEGAS VALLEY.

BACKGROUND

In accordance with the Clean Water Act, the EPA regulates non-point source discharges to storm sewer systems under its NPDES program. The NDEP is responsible for implementing and regulating this program locally. As part of EPA guidelines, NDEP developed three programs that address non-point source pollution in the municipal storm system:

- Construction Site Permit Program²
- Industrial Site Permit Program³
- Municipal Separate Storm Sewer System (MS4) Permit Program⁴

Selenium and total dissolved solids are two natural constituents found in local shallow groundwater. Planned flow reductions in the Las Vegas Wash, as a result of the SCOP project, may increase selenium concentrations. In addition to NDEP regulations, local entities are developing plans to address these constituents. The CWC is in the process of developing a Selenium Management Plan to manage selenium concentrations in the Las Vegas Wash following implementation of SCOP.

In terms of stormwater, preventing contaminant inflow is easier and more cost effective than mitigating impacts. To this end, the cities of Henderson, Las Vegas and North Las Vegas and Clark County, have adopted stormwater management ordinances and discharge controls that prohibit pollutant discharge directly into the storm drain system or local surface water. Through the Stormwater Quality Management Committee, stormwater stakeholders work together to develop and implement stormwater pollution monitoring, control and outreach efforts within the Las Vegas Valley.

As discussed in the Introduction, existing conservation programs work to limit the amount of urban runoff entering the storm drain system.

IMPLEMENTATION PLANS

- Implement and enforce stormwater ordinances to ensure the storm drain systems are protected from pollutants.
- Continue water waste investigations to limit the amount of polluted urban runoff into surface water systems.
- Continue to support NDEP permit programs through implementation of LVVWAC management programs.
- Complete and implement the Selenium Management Plan.
- Continue to coordinate and manage a stormwater program and outreach efforts in the Las Vegas Valley through the Stormwater Quality Management Committee.
- Complete the Las Vegas Wash Stabilization Plan to minimize erosion in the Las Vegas Wash and sediment transport to the Las Vegas Bay and Lake Mead.



Stormwater pollutants.

STRATEGY: MANAGE THE OPERATIONS AND FACILITIES OF THE SYSTEMS CONVEYANCE AND OPERATIONS PROGRAM (SCOP).

BACKGROUND

In accordance with the National Environmental Policy Act (NEPA), the U.S. Bureau of Reclamation and the National Park Service (NPS) developed an Environmental Impact Statement (EIS) to assess environmental impacts and alternatives associated with SCOP, a regional system that will transport highly-treated wastewater from local wastewater facilities to an outfall location in Lake Mead.

In 2007, these agencies each issued a Record of Decision for the project, accepting the EIS and granting the CWC authority to construct SCOP. The EIS calls for the Boulder Basin Adaptive Management Plan (BBAMP) to monitor and manage operations of SCOP to protect water quality in Boulder Basin in Lake Mead, as well as the lower Colorado River system.

The BBAMP requires the formation of technical and management committees. To this end, a Core Management Team⁵ was formed to oversee the development of long-term efforts outlined in the BBAMP for project operations within Boulder Basin.

The Core Management Team provides a forum for interagency coordination for the overall use of Boulder Basin and works to achieve basic objectives including meeting regulatory requirements, protecting Boulder Basin as a drinking water source and protecting the recreational values in Lake Mead.

All BBAMP stakeholders identified items of concern that warrant additional monitoring and management efforts.

IMPLEMENTATION PLANS

- Utilize the BBAMP as a planning and management tool to coordinate and implement efforts related to water quality.
- Utilize the BBAMP's Core Management Team and other technical and management committees set forth in the document as a clearinghouse for information related to ongoing water quality efforts in Boulder Basin.
- Implement the BBAMP Core Management Team and other technical and management committee decisions.
- Identify items of concern and develop management action plans.
- Manage Boulder Basin inflows, including wastewater inflows and SCOP discharges, with intake operations to control potentially harmful constituents that can affect Lake Mead water quality.



Systems Conveyance and Operations Program project map.

STRATEGY: MANAGE, COORDINATE AND OPTIMIZE WATER RECLAMATION FACILITIES.

BACKGROUND

The Clark County Water Reclamation District and the cities of Henderson and Las Vegas operate and maintain wastewater treatment facilities in Southern Nevada. The City of North Las Vegas also has plans to construct its own facility. Some of these facilities discharge highly-treated wastewater to Lake Mead via the Las Vegas Wash, while others treat water for direct reuse at golf courses, parks, etc.

NPDES permits allow for wastewater discharges to surface water bodies, including Lake Mead. Wastewater agencies must ensure that water quality standards are met, including NPDES limits for effluent flow, Total Suspended Solids, Biochemical Oxygen Demand, pH, fecal coliform and total residual chlorine. NPDES permits also require compliance with Total Maximum Daily Loads (TMDLs), or the maximum amount of a pollutant that a body of water can receive and still safely meet water quality standards. In the Las Vegas Bay, there is a TMDL restriction of phosphorus and ammonia to protect the water quality and support beneficial uses.

Optimizing treatment facilities to surpass water quality standards entails operating at greater removal efficiencies than required while considering costs. Collective optimization may involve individual facilities operating at a higher removal efficiency rate for a particular constituent, such as phosphorus or nitrogen, while meeting the combined allocation. Currently, wastewater facilities discharge significantly below the allowable loads.

The Sewage and Wastewater Advisory Committee (SWAC) is comprised of representatives from water and wastewater agencies or facilities in Clark County. SWAC remains current on issues that affect sewage and wastewater treatment and disposal, and makes recommendations to the Clark County Commissioners.

Coordination and optimization of water reclamation facilities will require purveyors to assess the appropriate balance of operating costs and control of other factors affecting Lake Mead water quality.

IMPLEMENTATION PLANS

- Coordinate the operation of Southern Nevada's water reclamation facilities to meet water quality objectives.
- Coordinate wastewater treatment facility operations to achieve optimization.
- Develop annual operating plans for water reclamation facilities.
- Identify and participate in research efforts related to optimizing treatment.



Clark County Water Reclamation District's main treatment facility.

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GOAL TWO: MEET OR SURPASS FEDERAL, STATE AND LOCAL STANDARDS AND REGULATIONS.

BACKGROUND

As discussed in Chapter 1, all qualities of water in the Las Vegas Valley are regulated by a series of federal, state and local regulations. Key water quality laws in place to safeguard local and regional water sources include the Clean Water Act, the Safe Drinking Water Act and Nevada Administrative Code.

The Nevada Division of Environmental Protection (NDEP) is responsible for implementation and enforcement efforts in Nevada associated with the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA). The CWA generally applies to municipal sources, wastewater, industrial wastewater, urban storm drainage systems and construction site runoff management efforts. The SDWA applies to drinking water sources.

In Nevada, water control standards are regulated by Nevada Administrative Code (NAC). Specific constituents regulated in the Colorado River below Hoover Dam, Lake Mead, inner Las Vegas Bay and the Las Vegas Wash include toxic materials, phosphates, and dissolved oxygen, as well as temperature and pH levels. The NAC has anti-degradation standards to ensure existing water quality is higher than the standards required for beneficial use.

The Nevada Division of Environmental Protection (NDEP) established the Lake Mead Water Quality Forum to protect public health and preserve water quality in the Las Vegas Wash and Las Vegas Bay, as well as Lake Mead. A number of federal, state and local stakeholders are involved in this process and work together to identify issues regarding water quality and impacts on the water supply, coordinate study efforts, disseminate information, serve as a clearinghouse on water quality issues and formulate further study work on water quality issues.

In 1999, the Colorado River Basin began to experience drought conditions that, during the next few years, became the worst drought in the recorded history of the basin. As a result, water levels in the

two primary storage reservoirs on the lower Colorado River (Lake Mead and Lake Powell) declined to levels not observed since Lake Powell began filling in the early 1960s. Due to continued periods of reduced inflow, Lake Mead and Lake Powell water levels have declined substantially. Low water levels affect water temperature, a key variable in drinking water quality management, as well as the concentration of other constituents such as total organic carbon and bromide.

While Southern Nevada's water treatment facilities are capable of addressing many source water quality challenges, proactive management of the Las Vegas Valley watershed remains key to protecting the region's overall supply. To this end, research and monitoring efforts are underway by LVVWAC member agencies to remain current on emerging issues including endocrine disrupting compounds, pharmaceuticals and personal care products. Together, these emerging issues consist of human and veterinary drugs and consumer products, such as fragrances, lotions, sunscreens and household cleaning products. These compounds have been detected in trace amounts in surface water, drinking water and wastewater effluent samples. Although impacts on human health have not been demonstrated, water treatment operators are evaluating the effectiveness of current treatment techniques on their removal.

Moving forward, water managers must be aware of sensitivities towards the existence of emerging chemicals and compounds found in drinking water supplies. Furthermore, these compounds may be regulated in the future, which will impact current treatment techniques and operating costs.

The following pages provide an overview of strategies and implementation plans designed by LVVWAC to meet or surpass federal state and local standards and regulations.

STRATEGY: ENDEAVOR TO PROTECT LAKE MEAD, THE LAS VEGAS WASH AND ASSOCIATED TRIBUTARIES TO MEET OR SURPASS ENVIRONMENTAL QUALITY STANDARDS.

BACKGROUND

The SQMC works to develop best management practices to prevent the mobilization of pollutants from non-point water sources throughout the Las Vegas Valley. Furthermore, the SQMC also works to protect the water quality of the Las Vegas Wash through the coordination of stormwater management efforts.

Existing water quality laws and regulations set standards for effluent discharges for all National Pollutant Discharge Elimination System agencies. These agencies surpass the established limits by providing year-round phosphorus and ammonia reduction. Furthermore, the agencies reduce the levels of pathogens and other pollutants far below established limits.

Other plans to improve water quality include construction of the CWC's Systems Conveyance and Operations Program (SCOP), which will redirect some wastewater flows in the Las Vegas Wash to an alternate discharge point in Lake Mead, near Boulder Island. As part of the permitting process, the CWC developed the Boulder Basin Adaptive Management Plan (BBAMP) to ensure project operations will meet or exceed all environmental water quality standards.

Operations of the CWC's SCOP and SNWA's Intake No. 3 project will be coordinated to protect water quality and ensure drinking water and environmental water quality standards are met.

IMPLEMENTATION PLANS

- Make adjustments to SCOP operations based on research and monitoring efforts required under the BBAMP to ensure all environmental water quality standards are met or exceeded.
- Coordinate all wastewater, urban runoff, shallow groundwater and stormwater inflows from the Las Vegas Valley to avoid water quality impacts to Lake Mead through the operation of SCOP.
- Optimize water quality of SCOP project flows and other flows to protect water quality at Lake Mead intakes.
- Continue to meet or surpass effluent limits.
- Coordinate the operations of SCOP discharges with the operations of SNWA intakes.



Water quality monitoring in Lake Mead.

STRATEGY: CONTINUE TO ENSURE DRINKING STANDARDS ARE MET OR SURPASSED.

BACKGROUND

The Safe Drinking Water Act (SDWA) contains provisions that must be met for regulated and unregulated inorganic, organic and microbial contaminants that come from a variety of sources. In addition, there are a number of chemical compounds and organisms on the Environmental Protection Agency's (EPA) Contaminant Candidate List that may be regulated in the future.

The EPA has established a Maximum Contaminant Level (MCL) for total coliforms, fecal coliforms and *E. coli*. Other microbial constituents are regulated by Treatment Techniques (TT), a required process intended to reduce contaminant levels in drinking water. The TT provide for the reduction of viruses, parasites and bacteria. The SNWA uses filtration, disinfection and disinfection contact time to meet water quality standards for organisms found in source water including Legionella, Heterotrophic Plate Count and enteric viruses.

Ongoing Colorado River drought conditions have impacted Lake Mead water levels and raw water quality. In 2005, the SNWA began implementing plans for a new raw water intake to maintain SNWA's ability to draw Colorado River water even at extremely low Lake Mead elevations (1,000 feet) to protect municipal customers from water quality issues associated with declining lake levels. The project is expected to be complete in 2013.

Proactive management of the Las Vegas Valley watershed remains key to protecting the region's overall water supply. To this end, research and monitoring efforts are underway by LVVWAC member agencies to remain current on emerging issues including endocrine disrupting compounds (EDCs) and pharmaceuticals.

As part of the SDWA, groundwater in the Las Vegas Valley is routinely monitored and tested for drinking water contaminants. Groundwater disinfection occurs at the well site or reservoir facility.

IMPLEMENTATION PLANS

- Conduct extensive monitoring and research to identify existing and future contaminants in Lake Mead, as well as contaminant source and control methods.
- Collect additional phosphorus monitoring data at the Hoover Dam outlet and develop appropriate management actions to maintain levels that protect downstream water quality.
- Analyze current drinking water constituents of concern through water quality monitoring and modeling efforts for future operations and/or management plans.
- Monitor and research emerging contaminants of concern and conduct a triennial review of new information related to emerging contaminants.
- Develop goals to monitor and reach non-detectable concentrations for all chemicals listed on the EPA Contaminant Candidate List.
- Maintain treatment levels to ensure EPA's microbial classification for the drinking water treatment facilities are maintained.
- Continue to research optimization opportunities.
- Continue groundwater disinfection efforts to maintain safe drinking water standards.



Water quality samples.

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GOAL THREE: PRESERVE AND ENHANCE THE NATURAL, CULTURAL, HISTORIC AND RECREATIONAL VALUES OF THE WATERSHED AND LAKE MEAD.

BACKGROUND

The Las Vegas Valley watershed includes the Lake Mead National Recreation Area and the Las Vegas Wash. These water sources and open lands present opportunities for both active and passive recreation, and support important environmental resources including wildlife and habitat.

The Lake Mead National Recreational Area is managed and operated by the National Park Service (NPS). The 1.5 million-acre area was once occupied by early Native American cultures, pioneers and explorers. The area now serves more than seven million annual visitors and supports a variety of recreational activities such as boating, swimming, hiking, fishing and motorized water sports. The area also serves as habitat for a variety of land and aquatic species.

The Las Vegas Wash, as it travels through the Clark County Wetlands Park, offers a number of recreational opportunities for its visitors including hiking, biking, nature walking, bird viewing and equestrian uses. The habitat surrounding the Las Vegas Wash supports a number of migratory birds, including federally listed bird species such as the Yellow-billed cuckoo, Southwestern willow flycatcher and the Yuma clapper rail.

Reductions to Las Vegas Wash flows are planned as part of the Clean Water Coalition's Systems Conveyance and Operations Program (SCOP). Water quality impacts to fish, water dependent birds and other wildlife that are affected by water quality in the Las Vegas Wash and Lake Mead are being considered.

Federal, state and local laws and plans are in place to protect these important resources for the benefit of all users. Federal regulations include:

- Endangered Species Act
- National Historic Preservation Act
- Migratory Bird Treaty Act

Endangered Species Act

Species that are endangered or are likely to be endangered are "listed" by the federal Endangered Species Act (ESA). The act protects listed species and conserves the ecosystems that they depend on for survival. Currently, there are a number of listed species found in Southern Nevada such as the desert tortoise and southwestern willow flycatcher.

Mitigation may be required if a project impacts a listed species or its habitat. The ESA requires federal agencies to consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service on potential impacts.

National Historic Preservation Act

The federal National Historic Preservation Act (NHPA) and other state and local laws prescribe certain mandates to preserve cultural and historic sites so that they are not needlessly lost. Among other things, the NHPA created the National Register of Historic Places. There are more than 45 sites near the Las Vegas Wash eligible for listing on the National Register of Historic Places.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act codifies various treaties and conventions between the U.S., Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Nearly every bird species found in Nevada is listed as a migratory bird. Among other things, the act protects migratory birds by prohibiting hunting, capturing, possessing, selling or affecting birds, nests and eggs.

STRATEGY: MANAGE WILDLIFE AND HABITATS.

BACKGROUND

In addition to federal regulations, there are a number of other plans and efforts in place to protect Las Vegas Valley watershed resources. Some of these include the Las Vegas Wash Comprehensive Adaptive Management Plan, Las Vegas Wash Wildlife Management Plan and Clark County Multiple Species Habitat Conservation Plan.

Comprehensive Adaptive Management Plan

The Las Vegas Wash Coordination Committee (LVWCC) was formed in 1998 to develop management solutions for the Las Vegas Wash. The committee's work resulted in the development of the Las Vegas Wash Comprehensive Adaptive Management Plan (CAMP), which identified 44 actions necessary to stabilize, enhance, and provide for long-term management of the Las Vegas Wash. The SNWA was designated as the lead agency for these efforts and continues to work with its member agencies to implement CAMP recommendations.

Wildlife Management Plan

The Las Vegas Wash Wildlife Management Plan was developed to conserve native wildlife species found along the Las Vegas Wash, protect and enhance wildlife habitats and increase environmental awareness of these resources in the community. The plan was approved by the LVVWAC in 2008.

Multiple Species Habitat Conservation Plan

Clark County is responsible for compliance with the federal Endangered Species Act and oversees implementation of the Multiple Species Habitat Conservation Plan (MSHCP) for Clark County and the cities of Las Vegas, Henderson, North Las Vegas, Boulder City, Mesquite and the Nevada Department of Transportation. In this capacity, Clark County manages an incidental take permit, issued by the U.S. Fish and Wildlife Service, which authorizes take of protected species so long as the take is incidental to otherwise lawful activities. The MSHCP outlines the minimization and mitigation measures that will be implemented to offset the impacts of the authorized take.

IMPLEMENTATION PLANS

- Conduct water quality planning efforts in a way that complies with existing local, state and federal policies.
- Coordinate wildlife and habitat management efforts through existing wildlife management plans and documents.
- Share all studies and associated findings related to habitat and wildlife among LVVWAC entities to avoid duplicating efforts and ensure better informed decision-making among member agencies.
- When setting flow rates in the SCOP operations plan, consider wastewater flows that support Las Vegas Wash vegetation and habitat.
- Consider the need to maintain the Las Vegas Wash as a conduit for treated wastewater and stormwater when setting habitat and wildlife goals.



Migratory birds in the Las Vegas Wash.

STRATEGY: MINIMIZE IMPACTS TO CULTURAL AND HISTORIC VALUES.

BACKGROUND

Federal laws and other policies prohibit actions that permanently impair Lake Mead National Recreation Area resources unless specifically and directly authorized by law.

For example, the 1916 National Park Service Organic Act created the National Park Service (NPS) and established its mission to provide for the enjoyment of scenery, natural and historic objects and wildlife in a manner that will leave such resources unimpaired for future generations. In addition, federal legislation enabling the Lake Mead National Recreation Area in 1964 requires that the area be managed to specifically provide for water based recreation in a manner that will preserve the scenic, historic, scientific and other important features of the area.

The National Environmental Policy Act (NEPA) requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. To meet NEPA requirements, federal agencies prepare an Environmental Assessment or an Environmental Impact Statement (EIS). As part of the EIS process, impacts to cultural and historical values are evaluated. The EIS process is a valuable tool to ensure that the resource values of the Lake Mead National Recreational Area will not be impaired. Current and future water and wastewater projects must comply with NEPA requirements for all facilities on public lands.

The National Historic Preservation Act requires that federal agencies take into account the effects of activities and programs on historic resources. Section 106 of the act refers to the review process that is required. The review process can be administered at both the state and federal levels.

IMPLEMENTATION PLANS

- Consider impacts to sites worthy of preservation when developing design, construction and operation plans for future facilities.
- Mitigate lost values through existing and future local, state and federal regulations when complete preservation is not feasible.



Archaeological site in the Las Vegas Wash.

STRATEGY: ENDEAVOR TO PREVENT AND CONTROL INVASIVE SPECIES.

BACKGROUND

Typically, invasive species are not native to an area and cause economic or environmental harm to established ecosystems. In the Las Vegas Valley, several invasive species are affecting the watershed, including quagga mussels and several varieties of weeds.

Quagga Mussels

Quagga mussels are an invasive mussel species that can live deep below the water's surface, and were first discovered in Lake Mead in January 2007. The species can significantly alter water ecosystems by causing toxic algal blooms and a reduction in water oxygen levels, thus killing other aquatic species. Furthermore, the species can clog water delivery infrastructure and poses a number of other issues for municipal water supplies (for example, treatment, cost of treatment, etc.). Because the introduction of the species to Southern Nevada is relatively new, long-term impacts in Lake Mead are unknown.

To prevent the westward spread of invasive mussels found elsewhere in the United States where quagga mussels likely originated from, state, provincial and federal agencies developed the 100th Meridian Initiative to control invasive species.

Invasive Weeds

The Nevada Department of Agriculture maintains a list of invasive or noxious weeds that are found to most likely be detrimental, destructive or difficult to control or eradicate. A number of these noxious weeds are found alongside the Las Vegas Wash and could alter or, if left unmanaged, destroy its fragile ecosystem.

The Las Vegas Wash Weed Partnership was formed in 2002 and developed the Las Vegas Wash Integrated Weed Management Plan. The plan details a process for monitoring and managing weeds along the Las Vegas Wash. To date, the partnership has successfully eradicated the noxious weed, giant reed and has removed hundreds of acres of salt cedar.

IMPLEMENTATION PLANS

- Monitor the effects from quagga mussels on water quality to mitigate the impacts of changes in water quality in Lake Mead.
- Continue to use the Las Vegas Wash Weed Partnership and similar groups to prevent and control invasive species along the Las Vegas Wash.
- Coordinate with the 100th Meridian Initiative to track invasive mussels in Lake Mead.
- Continue investigation of methods to control growth of quagga mussels on infrastructure.



Quagga mussels clogging a grate.

STRATEGY: SUPPORT RECREATIONAL USES AND THE HEALTH OF FISHERIES AND OTHER WATER DEPENDENT WILDLIFE.

BACKGROUND

Protecting Lake Mead water quality is important to maintain its ecosystem and provide for current and future recreational opportunities at the Lake Mead National Recreational Area.

Recreation

To protect the public and maintain opportunities for active recreation in Lake Mead, water quality standards have been established for full body contact recreation. These standards are set by the Nevada Division of Health and other applicable laws.

Fisheries and Wildlife

Lake Mead's native and sport fish populations rely on algal and zooplankton production as food sources. In turn, zooplankton and algal production are dependent upon nutrients in the water. As a result, impacts to these nutrients can ultimately reduce fish populations and weaken Lake Mead's ecosystem.

Current facility plans, such as the SCOP in Lake Mead's Boulder Basin, are being designed and constructed to meet established water quality standards to maintain current recreational and wildlife uses.

The razorback sucker is an endangered fish endemic to the Colorado River basin. The species has suffered substantial population declines across its range due to the introduction of non-native species and construction within the basin. The razorback sucker in Lake Mead have been found near Las Vegas Bay, Echo Bay and the Muddy and Virgin Rivers inflow area of Lake Mead.

IMPLEMENTATION PLANS

- Manage water quality and nutrient inputs to support appropriate levels of algal and zooplankton production to maintain forage production for sport and native fisheries.
- Ensure efforts to maintain or improve Lake Mead's water quality do not come at the expense of water dependent wildlife.
- Continue to meet established water quality standards to maintain recreational water uses that involve full body contact recreation with water.
- Continue to conduct research of water impacts on fish and wildlife populations.



Endangered razorback sucker.

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GOAL FOUR: COORDINATE WATER RESOURCE MANAGEMENT.

BACKGROUND

Each LVVWAC member agency has individual responsibilities that contribute to management of the Las Vegas Valley watershed. For more than a decade, the agencies have worked closely to address a number of specific issues (for example, coordinating the location of future intake and discharge facilities and management of the Las Vegas Wash); however, the LVVWAC recognizes the need for coordination of water, wastewater and non-point source water management efforts on a larger, more comprehensive scale to:

- Reduce duplication of efforts.
- Ensure that individual projects and activities do not cause unintended consequences for other projects and management efforts.
- Ensure that necessary plans and activities are taking place to protect and enhance the Las Vegas Valley watershed.

By working together, the LVVWAC agencies can address watershed management efforts in a more coordinated manner and ensure that all factors and consequences of individual agency actions are fully understood and addressed. The LVVWAC member agencies have committed to working together to achieve the overall goals established through the LVVWAC interagency process, including coordinated resource management.

To support this work, the LVVWAC has developed this Plan to help coordinate all existing plans, policies, documents and efforts related to water quality in the Las Vegas Valley watershed. The next step requires the SNWA, CWC and CCRFCD to develop a work plan on behalf of their member agencies which will outline their respective efforts to meet the goals established in this Plan.



Las Vegas Wash restoration efforts.

STRATEGY: BALANCE ECOSYSTEM, FLOWS AND OTHER FUNCTIONS OF THE LAS VEGAS WASH AND LAKE MEAD.

BACKGROUND

Balancing the ecosystem, flows and functions of the Las Vegas Wash and Lake Mead will require a coordinated effort among the LVVWAC member agencies and other stakeholders.

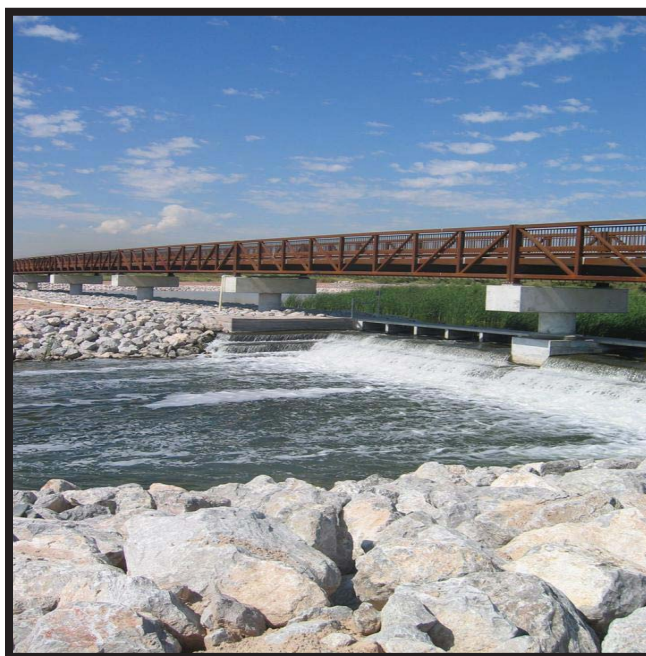
Achieving this goal is necessary to protect plant and animal systems that depend on Las Vegas Wash flows and habitat; maintain discharge water quality standards in the Las Vegas Wash and potable drinking water standards at Lake Mead; protect wastewater flows for reuse; and ensure continued passive and active recreational opportunities at the Las Vegas Wash and Lake Mead.

Specific management efforts underway include water quality monitoring, habitat restoration and enhancements, and development of erosion control structures to stabilize the Las Vegas Wash. These efforts are overseen by the Las Vegas Wash Coordination Committee, which has made substantial progress to stabilize and enhance the ecological function of the Las Vegas Wash, the sole drainage point of the Las Vegas Valley watershed to Lake Mead.

Ongoing efforts are required and will be coordinated among existing stakeholders and the LVVWAC to ensure that specific plans and goals intended to protect these water sources are achieved.

IMPLEMENTATION PLANS

- Balance flows to the Las Vegas Wash and Boulder Basin through coordination of LVVWAC member agencies.
- Maintain the structural integrity of the Las Vegas Wash channel to prevent further erosion.



Upper Division Weir, Las Vegas Wash.

STRATEGY: OPTIMIZE USE OF RECYCLED WATER.

BACKGROUND

In the 1960s, water recycling was first introduced to Southern Nevada when recycled water was used to supply cooling water for local generation facilities and irrigation for a few local golf courses. At that time, recycled water was used when the geographic location of a business was located near major, centralized treatment facilities, which were located in the southeast portion of the Las Vegas Valley.

Since that time, Southern Nevada has developed the ability to recycle a majority of its water through direct and indirect reuse by utilizing existing facilities, such as Colorado River return-flow credits. During the 1990s, construction began on “satellite” water recycling facilities near the west side of the Las Vegas Valley. These facilities save costs associated with moving water to higher elevations in the area.

Collecting and treating Colorado River water for direct reuse does not extend Southern Nevada’s Colorado River allocation. Because Nevada’s rights to the Colorado River are based on “consumptive use,” any water that is withdrawn and later returned to the system, primarily as treated wastewater flows, is effectively refunded. When water is treated and used for direct reuse (for example, a golf course), Southern Nevada does not receive any return-flow credits. However, recycling water for direct reuse can be a better alternative for outlying areas for economic reasons.

In 2000, the cities of Las Vegas, North Las Vegas and Henderson, the Clark County Water Reclamation District and the Las Vegas Valley Water District completed the Southern Nevada Regional Water Recycling Study. The study was updated in 2008 to reflect current conditions and to identify opportunities for additional satellite reuse facilities in the Valley.

IMPLEMENTATION PLANS

- Adopt the Southern Nevada Water Recycling Policy by affected LVVWAC member agencies.
- Implement recommendations set forth in the Southern Nevada Regional Water Recycling Study.
- Continue to utilize existing and planned water reclamation facilities to supply recycled water in the Las Vegas Valley.



Aerial image of Desert Breeze Water Resource Center.

STRATEGY: ENSURE THE DEVELOPMENT OF AND COMPLIANCE WITH THE CLARK COUNTY 208 WATER QUALITY MANAGEMENT PLAN.

BACKGROUND

The Clean Water Act controls all sources of water pollution to meet federally established water quality goals. Section 208 of the act requires that all activities associated with water pollution be planned and managed through an integrated, area-wide program. Clark County has been designated as the lead agency to manage and administer all 208-related water quality planning in Southern Nevada.

In 1978, Clark County developed the Clark County Water Quality Management Plan. As amended, the plan presents objectives, policies and programs for managing water quality in the County, including the Las Vegas Wash. The County's Department of Air Quality and Environmental Management has an active role in plan development and implementation.

The plan considers:

- Population projections
- Wastewater flow projections
- Water quality standards/planning
- Wastewater collection, treatment and disposal
- Water reclamation/reuse
- Point sources
- Non-point sources
- Best Management Practices, alternative treatment methods and disposal
- Wellhead protection
- Colorado River and Lake Mead
- Environmental / integrated planning coordination
- Planning recommendations / implementation

IMPLEMENTATION PLANS

- Continue to coordinate all regional water quality planning and management efforts among regional entities

GOAL FIVE: MANAGE FLOOD RISKS.

BACKGROUND

While the Las Vegas Valley receives an average rainfall of approximately four inches per year, the area often experiences periods of intense rainfall and subsequent flash flood events.

Recorded reports of flooding in Clark County date back more than 100 years.⁶ Between 1905 and 1975, 184 different flood events occurred in Clark County, resulting in damage to private property and public facilities. Since 1960, the area has experienced at least 11 floods that caused more than a million dollars in damages to public and private property each.

While floods can and have occurred in almost every month of the year, the most damaging storms typically occur between July and September. During warm summer months, moist unstable air from the Gulf of Mexico is rapidly forced upward by hot air currents. These weather patterns often cause severe thunderstorms with intense rainfall on steep mountain slopes and armored desert surfaces. The rainwater runs off rapidly and concentrates in the urbanized areas at lower elevations in the valley. Among other things, flood events can adversely impact public safety, the local economy and water quality.

The CCRFCD is responsible for implementing a regional flood control program throughout Clark County to address flood risks, and has developed a master plan to identify infrastructure needed to manage flood risks in Clark County. The agency works together with local entities in the valley, including Clark County and the cities of Las Vegas, North Las Vegas and Henderson, to:

- Establish flood management policies
- Develop flood reduction plans and designs
- Construct and manage regional flood control facilities

Flood control infrastructure is owned and operated by the local entities with funding and oversight provided by the CCRFCD. To date, significant

progress has been made to reduce flood risks including the construction of hundreds of miles of conveyance facilities and several detention and debris basins.

The CCRFCD is required to follow all federal, state and local environmental compliance regulations related to construction and maintenance of flood control facilities in the Las Vegas Valley. To ensure compliance, the CCRFCD has developed regulations and design criteria that identify flooding risk management requirements that meet or surpass these standards.⁷

The following strategies and implementation plans have been developed to minimize the loss of life and property from major flood events.



Flood event in downtown Las Vegas.

STRATEGY: MINIMIZE THE LOSS OF LIFE AND PROPERTY FROM THE IMPACTS OF FLOODING.

BACKGROUND

While preparedness measures have effectively minimized flood hazards, no amount of planning can completely eliminate the risk of impacts to public safety or property.

Rainfall and flood water depths are monitored throughout the Las Vegas Valley through a network of hydrologic gages. This program provides both local entities and the National Weather Service information on rainfall and flood events, which enhances their ability to issue flood warnings or watches.

To manage flood risks in the Las Vegas Valley, the CCRFCD:

- Prepares and updates master plans
- Constructs flood control facilities identified in master plans⁸
- Operates flood control infrastructure
- Develops regulations and design criteria for flood risk management
- Maintains and monitors hydrologic gages
- Coordinates floodplain management activities and participates in the National Flood Insurance Program⁹

The CCRFCD also conducts public education to minimize public risks and to decrease the number of life-threatening flood related emergencies.

IMPLEMENTATION PLANS

- Continue to update and prepare master plans that identify methods needed to minimize flood risks for development.
- Identify future opportunities for the construction of flood control infrastructure.
- Monitor rainfall and flood water depths.
- Maintain current floodplain development ordinances.
- Continue public education.



Stormwater detention basin at Doc Romeo Park, Las Vegas.

GOAL SIX: SUSTAIN WATER AND ENERGY RESOURCES FOR FUTURE GENERATIONS

BACKGROUND

Climate change poses a potential threat of changes in the supply and quality of water in the United States, as well as an increased burden on the infrastructure that supports water management.

To this end, water and energy conservation, and renewable energy development are invaluable tools for extending the valley's natural resources. Sustainable development of water and energy resources in the Las Vegas Valley will help minimize impacts to the environment and sustain these resources for future uses.

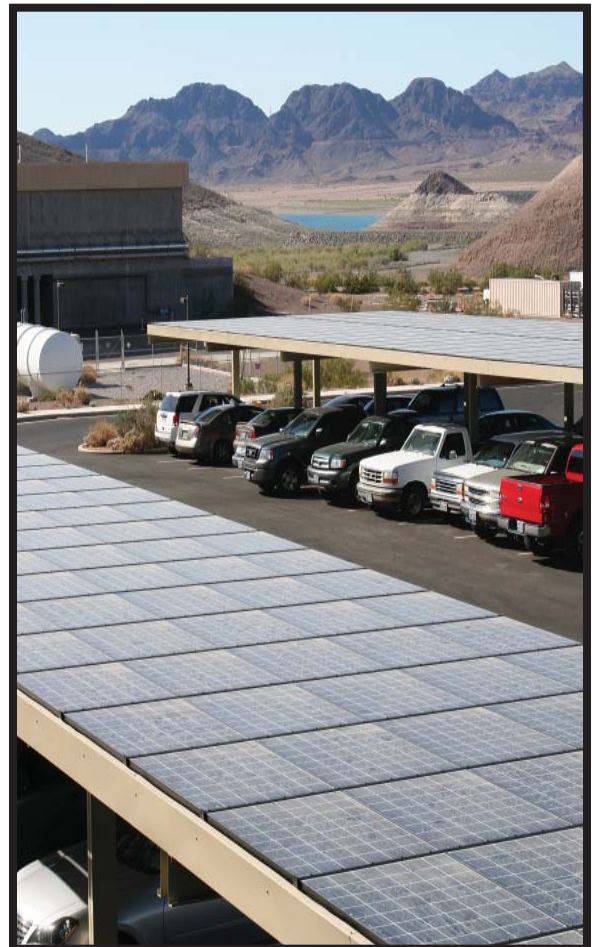
In Southern Nevada, outdoor water use accounts for 60 percent of total water use; much of that is used inefficiently or wasted. In contrast, nearly all indoor water use is collected by the sanitary sewer system where it is treated by wastewater purveyors to meet federal, state and local standards and then recycled to Lake Mead. All of the LVVWAC water purveyors have comprehensive conservation programs to promote water efficiency and reduce water waste.

Renewable energy is generated from natural resources including sunlight, wind, rain, hydropower and geothermal heat, which are naturally replenished through regular weather events. This type of energy can be cost-effective over the long-term. In addition, benefits of using renewable energy sources include reducing regional environmental impacts and reducing energy dependence from foreign sources. Developing renewable energy sources will also help to promote regional economic development through the creation of green jobs.

Hydropower generation is energy derived from the force of moving water. It is extremely efficient because it produces essentially no carbon dioxide or other harmful emissions. The movement of water through Hoover Dam generates significant amounts of hydropower.

Because not all entities have available locations to construct facilities or the resources to develop substantial systems, developing and managing renewable energy resources on a regional scale creates a number of opportunities for renewable energy sharing. Combining efforts and pooling resources can lead to greater efficiencies, both in terms of financial investment and energy gains.

Sustaining these resources will require cooperative efforts among the LVVWAC members and other entities in Southern Nevada. The following strategies identify opportunities for the sustainable use and development of water and energy resources in Nevada.



Solar facilities at Alfred Merritt Smith Water Treatment Facility.

STRATEGY: OPTIMIZE USE OF RENEWABLE ENERGY.

BACKGROUND

The State of Nevada requires that all investor-owned utilities comply with a Renewable Portfolio Standard, which requires that 20 percent of energy sales come from renewable energy by 2015. While not required to do so, many of the LVVWAC entities are complying voluntarily with this standard.

In past years, LVVWAC member agencies have undertaken a number of renewable energy projects that reduce dependence on non-renewable and less efficient energy sources. These include development of hydropower and solar energy facilities, investments in “dry-cooled” power facilities, as well as the use of alternative fuels (diesel, biodiesel, hydrogen) and hybrid technologies.

One example of ongoing efforts to identify and optimize the use of renewable energy includes designs for the Clean Water Coalition’s Systems Conveyance and Operations Program (SCOP). The project design includes a hydropower generating station that will recover energy from wastewater flows carried to Lake Mead.

IMPLEMENTATION PLANS

- Seek opportunities for sharing renewable energy, thereby optimizing the regional development of the resource.
- Seek opportunities for using renewable energy in current and future management and operations activities.
- Develop and maintain renewable energy goals.
- Implement hydropower generating systems when appropriate.
- Consider energy recovery in setting flow rates.



Hydrogen Fueling Station at Las Vegas Valley Water District.

STRATEGY: CONSIDER THE NET ENVIRONMENTAL BENEFIT.

BACKGROUND

Development of energy and water resources are linked for a number of reasons. Water and wastewater treatment and delivery processes require significant energy resources, and higher levels of treatment to meet and surpass water quality objectives requires more energy. This use of some energy resources may cause impacts to air quality and the climate.

Impacts from human activities on the environment can be quantified through a measurement termed a carbon footprint. A carbon footprint is a measurement of all greenhouse gasses that are produced individually (or by entity) in units of kilograms of carbon dioxide equivalent. Many of the LVVWAC agencies are working to calculate and reduce their carbon footprints to reduce impacts to the environment.

IMPLEMENTATION PLANS

- Balance the development of natural resources to minimize environmental impacts.
- Develop a standardized means to quantify carbon footprints, and report progress to reduce carbon footprints on an annual basis.
- Establish an environmental impact baseline for 2009 to track progress.



Solar panels at Las Vegas Valley Water District.

STRATEGY: ENHANCE ENERGY AND WATER CONSERVATION PROGRAMS.

BACKGROUND

The ability to increase the efficient use of water and power resources has a direct impact on the amount of resources that will be needed in the future. To this end, Southern Nevada has taken aggressive steps to conserve these important resources. Moving forward, the Southern Nevada Regional Planning Coalition will coordinate efforts of valley-wide sustainable efforts. Below is a summary of recent accomplishments.

Water Conservation

Water conservation programs in the Las Vegas Valley include policy, pricing, incentives and education. Over the years, city and county governments have adopted a variety of land use codes and water use ordinances to promote effective use of water resources in Southern Nevada. Some of these include watering restrictions; water waste rules; and turf limitations for public facilities, new residential development, golf courses and commercial properties.

In 2007, Southern Nevada consumed approximately 15 billion gallons less water than in 2002, despite the addition of 400,000 new residents and approximately 40 million annual visitors.

Energy Conservation

Because water delivery is energy intensive, the reduction of water use affects the consumption of energy resources. Water conservation efforts in Southern Nevada have saved approximately 188,000 megawatt hours of power. This is significant considering that an acre-foot of water requires approximately 2.1 megawatt hours for treatment and pumping. These energy savings also have allowed Southern Nevada to reduce its discharge into the region by an estimated 116,000 metric tons of carbon.

Currently, wastewater operators track energy usage in their treatment and pumping facilities to optimize energy efficiency.

IMPLEMENTATION PLANS

- Conduct annual reviews of current energy and water consumption.
- Identify methods to reduce consumption of resources and evaluate their associated costs.
- Develop a sustainability plan for each LVVWAC member agency.
- Continue to develop, implement and support water conservation programs.
- Continue to develop, implement and support energy conservation programs.
- Develop an inventory of energy resources to effectively track and utilize energy resources efficiently.



Turf replacement efforts in Southern Nevada.

GOAL SEVEN: BUILD COMMUNITY AWARENESS AND SUPPORT FOR REGIONAL WATERSHED MANAGEMENT.

BACKGROUND

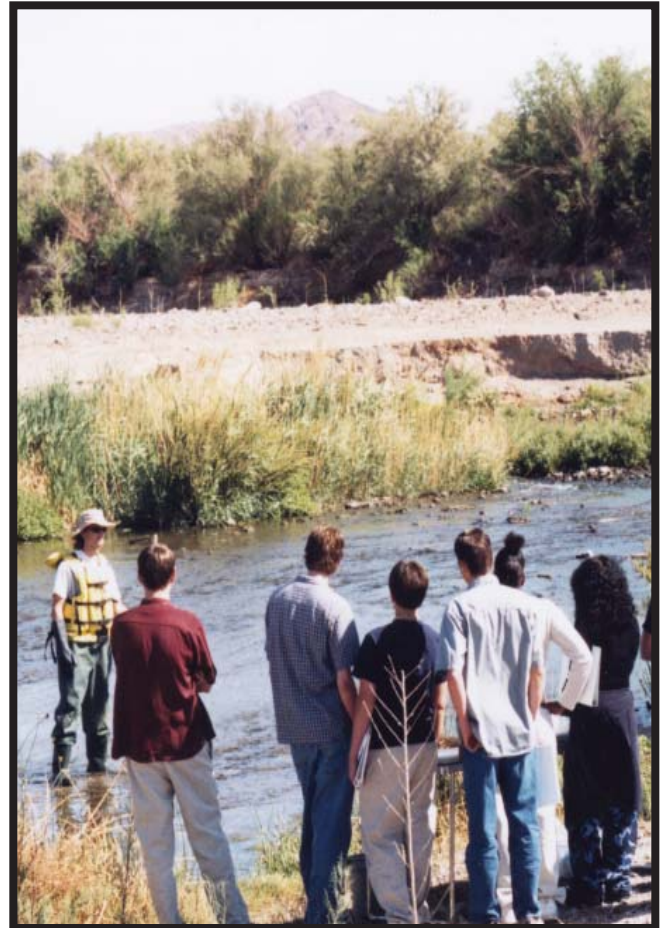
While a number of factors outside public control (such as drought) can exacerbate water quality challenges, in most cases, the public has a direct impact on the overall quality of its watershed resources. For example, salt loads from the use of water softeners, the quality of stormwater flows and even the introduction of the quagga mussel into Lake Mead are all effects that stem from public use.

Managing, maintaining and improving water quality in the Las Vegas Valley's watershed requires the public to better understand its direct impacts on the water system and to participate in efforts to ensure a safe and reliable water supply for the future. Education and outreach are critical components of meeting water quality goals for these reasons.

The public's perception of the risk and aesthetics of drinking water are significant issues faced by most water suppliers. While there are a number of existing water quality controls in place (such as local, state and federal water quality regulations), these controls need to be closely coordinated among water managers and water users to ensure that water quality is maintained for the benefit of the public and the environment.

The Southern Nevada Water Authority, Clean Water Coalition and the Clark County Regional Flood Control District have each utilized citizen advisory committee processes to solicit public input on facilities, treatment and cost issues associated with water quality in Southern Nevada. The LVVWAC will continue to engage the community to enhance awareness and support for regional watershed management.

Strategies for building community awareness and support for regional watershed management are discussed on the following pages.



Students visit the Las Vegas Wash.

STRATEGY: DEVELOP COMMUNICATION AND EDUCATION PROGRAMS.

BACKGROUND

Most of the individual LVVWAC member agencies conduct extensive public education and outreach programs associated with their respective water quality management efforts. However, the LVVWAC recognizes the value in presenting a unified public education program that will support these individual efforts.

To this end, the LVVWAC will develop and maintain a comprehensive education and outreach program for the community and has formed a public information subcommittee to support these efforts.

The LVVWAC will identify critical stakeholders and other interested parties to share information and progress relating to this LVVWAC Plan. The LVVWAC invites the public to participate in the development of an implementation plan for these water quality goals and strategies.

IMPLEMENTATION PLANS

- Identify appropriate communication tools to complement specific phases of regional water quality planning efforts.
- Coordinate regional education programs among LVVWAC entities.



Outreach programming at the City of Henderson.

STRATEGY: INTEGRATE EXISTING STAKEHOLDER PROGRAMS TO SPECIFICALLY ADDRESS WATERSHED ISSUES.

BACKGROUND

Most of the LVVWAC agencies maintain public information offices responsible for disseminating information to the community on their respective duties and issues. The LVVWAC agencies will continue to utilize these vehicles to communicate with their respective stakeholders, as well as to develop materials necessary to support LVVWAC's overall regional water quality goals and management plans.

When possible, the LVVWAC member agencies will utilize existing reporting structures to communicate progress on the LVVWAC's Regional Water Quality Plan goals. This includes presentations to the Lake Mead Water Quality Forum, Las Vegas Wash Coordination Committee and similar committees, boards of directors, city councils, town advisory boards and others. The agencies will also share this information with their employees to achieve broad dissemination of information among the public in the communities that they serve.

IMPLEMENTATION PLANS

- Identify opportunities for stakeholder input throughout the development and approval phases of this Plan.
- Utilize existing stakeholder groups for information sharing.
- Disseminate information to employees to ensure they remain informed about current issues.



Water conservation outreach presentation.

FOOTNOTES

1. During regular weather events, Las Vegas Wash inflows are comprised of wastewater (85%), shallow groundwater (7-8%) and urban runoff (7-8%). During storm events, stormwater runoff greatly influences this distribution of inflows.
2. The “Construction Site Permit Program” addresses discharge of pollutants from construction sites; requires owners/operators of construction sites that disturb over one acre to obtain a general construction permit. Special provisions require development and implementation of a Stormwater Pollution Prevention Plan.
3. The “Industrial Site Permit Program” addresses the discharge of pollutants from industrial sites; requires specific owners/operators of businesses (as determined by the EPA to have a substantial potential to discharge pollutants without proper controls) to obtain a general industrial permit. Special provisions require development and implementation of a Storm Water Pollution Prevention Plan.
4. The “Municipal Separate Storm Sewer System (MS4) Permit Program” addresses general discharges of pollutants to the storm water system in the Las Vegas Valley. The MS4 permit designates the Clark County Regional Flood Control District as the lead agency and Clark County and the cities of Henderson, Las Vegas and North Las Vegas as co-permittees. The permit authorizes the discharge of storm water to flow to the Las Vegas Wash from storm sewer systems owned and operated by the co-permittees in return for implementation of specific stormwater pollution reduction activities. These activities include limiting the amount of discharge of pollutants to storm drains when possible, reducing discharges to the Las Vegas Wash that would affect water quality standards, monitoring stormwater to characterize the quality of wet weather and dry weather flows in the Las Vegas Wash and its major tributaries and develop, implement and enforce a Stormwater Management Plan that will reduce the discharge of pollutants and satisfy water quality requirements of the Clean Water Act.
5. The “Core Management Team” is comprised of representatives of the National Park Service, U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, Southern Nevada Water Authority and the Clean Water Coalition.
6. “History of Flooding,” Clark County, Nevada, 1905-1975, U.S. Soil Conservation Service.
7. Clark County Regional Flood Control District (CCRFCDD), “Uniform Regulations for the Control of Drainage” and “Hydrologic Criteria and Drainage Design Manual.”
8. Las Vegas Valley Master Plan Update, July 2008; identifies approximately 745 miles of existing and proposed conveyance facilities and 94 existing and proposed detention basins.
9. “National Flood Insurance Program,” administered by the Federal Emergency Management Agency (FEMA) which makes the communities responsible for adopting and enforcing a floodplain development ordinance designed to prevent unsafe development in flood-prone areas.

CHAPTER TWO

Policy Direction

Economic and Social Impacts



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POLICY DIRECTION

This Plan is intended to serve as a forward-looking document. It contains projections and recommends policy direction on emerging water quality and quantity issues, as well as constituent treatment options.

The LVVWAC has identified a number of issues that require further consideration and may warrant policy development in the future.

In addition to the following candidate policy concepts, sustainability continues to be an effort that all LVVWAC members are working to address. Implementation of this Plan and sustainability concepts will be considered when implementing the goals and strategies outlined in this Plan.

The LVVWAC will continue to discuss and research these candidate policy issues, and may present them in future updates to its Regional Water Quality Plan.

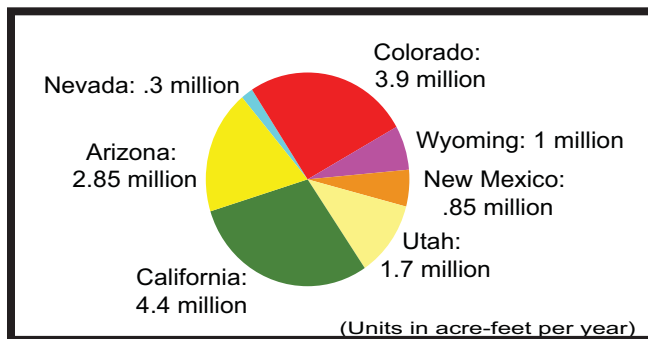
CANDIDATE POLICY CONCEPTS

CANDIDATE WATER RESOURCES POLICIES	
Groundwater	<ul style="list-style-type: none"> • Groundwater quality (principal aquifer) protection • Groundwater uses and management • Imported water effects on Las Vegas Valley watershed water quality • Low quality, shallow groundwater resources uses and effects
Colorado River Water	<ul style="list-style-type: none"> • Responses to water quality effects from upstream sources
Recycled Water	<ul style="list-style-type: none"> • Out-valley recycling • In-valley recycling • Groundwater injection • Return flows to Colorado River • Graywater uses • Salt management
Water Conservation	<ul style="list-style-type: none"> • Water conservation program implementation • Recycled water opportunities for wasted water (water that is being lost from percolation, evaporation, etc.)

CANDIDATE ENVIRONMENTAL RESOURCES POLICIES	
Environment and Wildlife	<ul style="list-style-type: none"> • Balance wildlife goals, and water quality and quantity goals • Cooperative opportunities to control and eradicate invasive species
Sustainability	<ul style="list-style-type: none"> • Balance economic, social, cultural and environmental goals
CANDIDATE OPERATIONS POLICIES	
Water and wastewater treatment optimization	<ul style="list-style-type: none"> • Agreements for wastewater optimization • Water treatment goals that surpass regulatory requirements • Coordinated water management efforts • Water quality protection through stormwater management
Water quality monitoring and modeling	<ul style="list-style-type: none"> • Coordinated monitoring and modeling efforts among agencies • Sharing costs and data for research opportunities among agencies
CANDIDATE PUBLIC OUTREACH POLICIES	
Agency Programs	<ul style="list-style-type: none"> • Downstream users communication efforts • Regional Water Quality Plan public input • Las Vegas Valley watershed user outreach

ECONOMIC AND SOCIAL IMPACTS

The Colorado River serves as a lifeblood supply to the seven basin states it serves including Wyoming, Utah, New Mexico, Colorado, Nevada, Arizona and California and the country of Mexico. Together, the states rely on the river to meet a portion of their industrial, municipal and agricultural needs. Nevada diverts a majority of its Colorado River apportionment from Lake Mead. Protecting Lake Mead's water quality is essential to ensure a safe drinking water supply and other water supply needs for the reservoir's downstream users.



Colorado River apportionments among basin states.

There are a number of emerging issues that will likely affect water quality and water resources in the future. These issues include the control and management of invasive species, increased water quality regulations, economic conditions and climate change. Moving forward, these issues will be closely monitored and any resulting economic and social impacts will be appropriately addressed.

The LVVWAC provides a forum for water managers to coordinate planning and funding efforts. This communication and coordination will likely yield significant economic opportunities in the future.

This section discusses current and future economic and social impacts associated with the implementation of this Regional Water Quality Plan.

ECONOMIC IMPACTS

Las Vegas Wash

- In response to public health concerns over downstream water quality in Lake Mead, there has been significant efforts in the Las Vegas Wash. Furthermore, improving the Las Vegas Wash provides critical habitats to a number of native species in Southern Nevada. To date, activities in the Las Vegas Wash include the construction of 11 erosion control structures, over 5 miles of bank stabilization and nearly 200 acres of wetlands revegetation. Total expenditures to date associated with these activities is \$69,723,000. Projected expenditures through 2017 is estimated to be \$99,424,000.

Invasive Species Control

- The SNWA will spend over \$24 million in capital expenditures to control quagga mussel impacts on new water infrastructure at Lake Mead. Annual operating expenses are also expected to rise by \$500,000 to reduce impacts through chemical treatment.
- Downstream users are also affected. For example, the Metropolitan Water District of Southern California is currently investing several million dollars in infrastructure improvements for invasive species management.

Water Quality

- Salinity control has been an integral part of Colorado River management for over thirty years. A minute to the bi-national treaty between the U.S. and Mexico was established in 1973 to limit Colorado River salinity levels for Mexico deliveries. One factor that contributes to higher salinity concentrations in Southern Nevada is the use of residential water softeners. These have gained popularity over the last decade as a method to reduce the naturally high mineral hardness in Colorado River water supplies. Local municipalities are responsible for costs associated

with salinity control.

- The production of total organic carbon from algae growth can also elevate treatment costs. For example, it would cost between \$200 million and \$400 million to treat an accelerated algae growth at Lake Mead to control total organic carbon concentrations. An estimated \$10 million would be required for annual operations.
- Recent technology improvements have allowed water managers to detect certain constituents at extremely low concentrations. For example, Southern Nevada has been able to identify trace levels of pharmaceuticals and endocrine disrupting compounds found within the water supply. Although these constituents are not currently regulated by the EPA, they may be in the future. If these constituents are regulated and water treatment is required, water treatment operators will incur additional costs.
- Approximately \$800 million will be spent on the design and construction of the SCOP project, a 19-mile pipeline connecting infrastructure for the region's four wastewater treatment agencies. Development of the SCOP project will provide wastewater agencies with improved flexibility in treatment and discharge methodologies. The project is being funded through a combination of user fees (rates) and connection charges.
- A new intake is being constructed near Boulder Basin to protect municipal water customers from water quality issues and declining Lake Mead water levels. Intake No. 3 will maintain the SNWA's ability to draw upon Colorado River water at lake elevations above 1,000 feet above sea level. This will help ensure system capacity is maintained even if Intake No. 1 is not operational. This project is estimated to cost \$843 million.

Monitoring Efforts

- The Southern Nevada Public Lands Management Act (SNPLMA) provides for the orderly disposal of federal lands in the Las Vegas Valley and uses proceeds from those sales to perform conservation actions within the state. Over \$3 million of land sales proceeds was awarded to the National Park Service (NPS) for water quality monitoring efforts in Lake Mead. This funding is available through

2009. Recent economic changes will likely affect future land sales in Southern Nevada, therefore reducing available SNPLMA funding. Without SNPLMA funding, participating water and wastewater agencies will be asked to cover costs related to current monitoring efforts. The benefits of ongoing water quality monitoring and resulting fiscal impacts will require evaluation.

Planning Efforts

- In accordance with the Clean Water Act, the state of Nevada designated Clark County to serve as the lead agency responsible for all water quality planning activities associated with water pollution and management of regional wastewater treatment plans. Costs associated with the planning efforts are between \$500,000 and \$550,000. In the future, these costs are proposed to be shared by local jurisdictions based on population.

Renewable Energy Efforts

- An element of the SCOP project includes development of the largest hydropower project in Southern Nevada since the construction of Hoover Dam. A pressure reduction/power generation station will be located near the end of the outfall pipeline to capture energy and generate 10-15 megawatts of electrical power each day. The retail value of this power and associated green energy credits will cover the operation and maintenance cost of the entire SCOP project, and also help pay the debt service for the capital associated with the program.

Flood Control

In March 1999, the Clark County Regional Flood Control District (CCRFCD) performed its first region-wide cost analysis to determine the benefit of regional drainage facilities in Clark County. The report concluded the benefit to cost ratio was 2.2 to 1. Since then, various updates to the CCRFCD Master Plan have been adopted. The 2005 analysis validated the benefits versus cost factor of 2 to 1 for economic benefits of building flood control infrastructure in the Las Vegas Valley. Findings of this report include:

- For each public dollar expended to improve flood protection, a public benefit of \$2.00 has been realized.

- Historically, less than 10 percent of the CCRFCD's expenditures have been dedicated to administrative and operating costs.
- Public benefits associated with the CCRFCD's capital program include both quantifiable and non-quantifiable benefits. Quantifiable benefits include inundation reduction, savings in floodproofing costs, transportation cost savings, and flood insurance overhead savings. Benefits that are more difficult to quantify include reductions in flood-related injuries and deaths, protection of Southern Nevada's tourism industry, direct and indirect economic benefits arising from the CCRFCD's construction program, protection and enhancement of property value, and economic opportunities arising from alternative land planning and usage.
- Capital projects undertaken by the CCRFCD's have resulted in removing land from federally identified Federal Emergency Management Agency (FEMA) flood zones (for example, residential dwellings and non-residential land such as commercial, manufacturing, gaming, schools and religious establishments, etc.). Removing property from the floodplain can provide for increased property value, savings in flood insurance premiums, the creation of enhanced land use planning opportunities and a broader tax base.

Stormwater Quality Management

- Most costs for stormwater quality management are borne by public agencies that are the permittees under the MS4 stormwater permit program. Costs include: stormwater monitoring, construction and industrial site inspections, staff training, street sweeping, drainage system maintenance, public outreach and program administration.
- Proposed expansion of programs for construction and industrial site inspection and enforcement, as required by NDEP, will increase staff and financial resources required by the MS4 permittees to implement these programs.
- The development community is responsible for funding Best Management Practices (BMP) installation at construction sites and contractor

training. The development community and contractors will be subject to increased local inspection and enforcement.

- The industrial community is responsible for funding BMP installation on private industrial properties within certain business types identified by NDEP.
- The State of Nevada has permit programs for construction and industrial sites that parallel those of the local entities. State costs for these permit programs are covered primarily by permit fees paid by developers and industrial site owners.

SOCIAL IMPACTS

Pharmaceuticals

- Improved technologies have allowed researchers to detect constituents at levels that could not previously be detected using older technology. Despite the lack of known impacts, the presence of pharmaceuticals and endocrine disrupting compounds in the drinking water supply has created national media coverage. To date, there has not been any demonstrated impacts to human health at existing concentrations. Despite the lack of impacts, the general public remains wary of their presence in the drinking water supply. This demonstrated concern may pressure water quality regulators to require additional treatments by water and wastewater treatment operators. Research studies related to these impacts on human health, the environment and water quality are preliminary and ongoing.

Stormwater

- Social changes could occur as a result of public outreach activities that are designed to change behaviors that may adversely impact non-point source water quality. These include managing pet waste, pesticide/herbicide use, vehicle maintenance, household hazardous waste disposal, over-watering of landscaped areas, and proper pool maintenance.

Flood Control

- Implementation of floodplain management policies to reduce flood risks can affect land uses on public and private properties adjacent to the

Las Vegas Wash and its major tributaries.

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APPENDIX

References

Glossary



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www.usbr.gov

Clark County, Nevada (Area-Wide Water Quality Management Plan and Multiple Species Habitat Conservation Plan)

www.accessclarkcounty.com

Clark County Regional Flood Control District (Flood Control Master Plans)

www.ccrfcd.org

Clean Water Coalition (Systems Conveyance and Operations Program: Boulder Basin Adaptive Management Plan)

www.cleanwatercoalition.com

Las Vegas Wash Coordination Committee (Las Vegas Comprehensive Adaptive Management Plan and Las Vegas Wash Wildlife Management Plan)

www.lvwash.org

Las Vegas Wash Weed Partnership (Las Vegas Wash Integrated Weed Management Plan)

www.lvwash.org

Nevada Division of Environmental Protection, State of Nevada (Source Water Assessment Plan)

ndep.nv.gov

Southern Nevada Water Authority (Southern Nevada Water System Annual Operating Plan and 2008 Southern Nevada Water Authority Water Resource Plan)

www.snwa.com

Southern Nevada Regional Water Recycling Study

www.cleanwatercoalition.com

Stormwater Quality Management Committee (NPDES Municipal Separate Storm Sewer System - MS4 permit)

www.lvstormwater.org

United States Geological Survey (Real Time Water Quality Monitoring and Water Quality Monitoring Quality Assurance Plan)

nevada.usgs.gov

LWWAC MEMBER WEBSITES

City of Henderson

www.cityofhenderson.com

City of Las Vegas

www.lasvegasnevada.gov

City of North Las Vegas

www.cityofnorthlasvegas.com

Clean Water Coalition

www.cleanwatercoalition.com

Clark County

www.accesclarkcounty.com

Clark County Regional Flood Control District

www.regionalflood.org

Clark County Water Reclamation District

www.cleanwaterteam.com

Las Vegas Valley Water District

www.lvvwd.com

Southern Nevada Water Authority

www.snwa.com

GLOSSARY

ALFRED MERRITT SMITH WATER TREATMENT FACILITY

One of the Southern Nevada Water System's two raw water treatment facility.

BIOCHEMICAL OXYGEN DEMAND

A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water.

BOULDER BASIN ADAPTIVE MANAGEMENT PLAN (BBAMP)

Management document for Systems Conveyance and Operations Program (SCOP) and coordinates activities to protect drinking water, recreation and wildlife in Lake Mead and downstream.

BOULDER CITY

Local governmental entity located southeast of the Las Vegas Valley.

BROMIDE

Any compound of bromine with another element or radical. Can form bromate, a SDWA-regulated contaminant in the presence of ozone.

BUREAU OF RECLAMATION (BOR)

A Department of the Interior bureau, which works to manage, develop and protect water and related resources.

CARBON FOOTPRINT

Measure of the impact caused by human activities on the environment, measured in units of carbon dioxide.

CITY OF HENDERSON (COH)

Local government entity that provides water, wastewater and reclaimed water services to the Henderson community.

CITY OF LAS VEGAS

Maintains city public use facilities, roadway and traffic network, wastewater and stormwater management systems and regulates private development.

CITY OF NORTH LAS VEGAS

Local government entity that provides water and sewer service to the City of North Las Vegas.

CLARK COUNTY

Regional government entity responsible for economic, recreational and social services for Southern Nevada residents.

CLARK COUNTY DEPARTMENT OF AIR QUALITY AND ENVIRONMENTAL MANAGEMENT (DAQEM)

Monitors and maintains air quality and develops programs for the protection of natural resources in Southern Nevada.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (CCRFCD)

Local government entity responsible for the regional management and comprehensive planning of flood activities.

CLARK COUNTY WATER RECLAMATION DISTRICT (CCWRD)

Regional government entity responsible for treating wastewater in areas of Clark County.

CLEAN WATER ACT (CWA)

The primary federal law in the United States governing water pollution.

CLEAN WATER COALITION (CWC)

A joint powers authority responsible for implementing the Systems Conveyance and Operations Program.

COLORADO RIVER

A 1,400 mile-long river that supplies approximately 90% of Southern Nevada's drinking water supplies.

CONSUMPTIVE USE

Water that is used, and not available for return to the Colorado River.

CONTAMINANT CANDIDATE LIST (CCL)

List of water contaminants published by the Environmental Protection Agency.

CRYPTOSPORIDIUM

A microscopic organism found in untreated surface water.

EFFLUENT

Another term for wastewater.

ENDANGERED SPECIES ACT

Federal act which protects animal and plant species from extinction, and identifies those species that are threatened or endangered.

ENVIRONMENTAL PROTECTION AGENCY

Leads the nation's environmental science, research, education and assessment efforts to protect the environment and human health.

FECAL COLIFORM

Bacteria found in the intestinal tracts of mammals. Their presence in water is an indicator of pollution.

GIARDIA LAMBLIA

A microscopic organism found in untreated surface water.

HETEROTROPHIC PLATE COUNT

A procedure for estimating the number of live Heterotrophic bacteria in water. It may be used to measure the changes in water treatment, in swimming pools, or as a monitoring method for treatment efficiency in bottled water plants.

HOOVER DAM

A concrete arch-gravity dam in the Black Canyon of the Colorado River. The construction of Hoover Dam created the Lake Mead reservoir.

INVASIVE SPECIES

A species not naturally occurring in a specific area and whose introduction does or is likely to cause economic or environmental harm to human health.

INVASIVE WEEDS

Weeds that are found to be detrimental, destructive or difficult to control or eradicate.

LAKE MEAD

The largest man-made reservoir in the U.S. It stores Colorado River water and has a storing capacity of 26 million acre-feet.

LAKE MEAD NATIONAL RECREATION AREA

Recreational area containing Lake Mead and Lake

Mojave. The area is managed under a cooperative agreement between the National Park Service and the Bureau of Land Management.

LAKE MEAD WATER QUALITY FORUM

Supports the protection of human health and the environment and preserves and improves water quality in the Las Vegas Wash, Las Vegas Bay and Lake Mead.

LAS VEGAS VALLEY GROUNDWATER MANAGEMENT PROGRAM

Works to protect the valley's groundwater supply from contamination, improve management of resources to prevent overdrafting and increase cooperation among groundwater users and agencies.

LAS VEGAS VALLEY WATER DISTRICT

Provides water to Las Vegas Valley residents and also services Big Bend Water District (Laughlin), Blue Diamond, Coyote Springs, Searchlight, Kyle Canyon and Jean.

LAS VEGAS VALLEY WATERSHED ADVISORY COMMITTEE

Forum for partnering water and wastewater agencies to address water quality and its impact on quantity issues in the Las Vegas Valley and Lake Mead.

LAS VEGAS WASH

The primary channel through which the Las Vegas Valley's excess water returns to Lake Mead.

LAS VEGAS WASH COMPREHENSIVE ADAPTIVE MANAGEMENT PLAN

A document produced by the Las Vegas Wash Coordination Committee designed to outline long-term stabilization, enhancement and management of the Wash.

LAS VEGAS WASH COORDINATION COMMITTEE

A 29-member committee working to bring together all interested parties to address issues related to the Las Vegas Wash.

LAS VEGAS WASH MANAGEMENT ADVISORY COMMITTEE

A former collection of key stakeholders that provided

direction on issues associated with the Las Vegas Wash.

LAS VEGAS WASH WILDLIFE MANAGEMENT PLAN (LVWMP)

Comprehensive management plan that addresses wildlife along the Wash and describes the technical, environmental and administrative parameters within which management can be accomplished.

MAXIMUM CONTAMINANT LEVELS (MCL)

Highest allowable concentration of certain contaminants in water delivered to a user of public drinking water supply.

MIGRATORY BIRD TREATY ACT

Federal legislation that protects specific birds.

NATIONAL HISTORIC PRESERVATION ACT

Federal legislation intended to preserve historical and archaeological sites in the U.S. and created the National Register of Historic Places.

NATIONAL PARK SERVICE ORGANIC ACT (1916)

Federal legislation through which the National Park Service was created.

NATIONAL PARK SERVICE

Department of Interior bureau responsible for the care and management of national parks.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

Regulations that control water pollution by regulating point sources that discharge pollutants into U.S. waters.

NATIONAL REGISTER OF HISTORIC PLACES

A federal list of districts, sites, buildings, structures and objects deemed worthy of preservation.

NEVADA ADMINISTRATIVE CODE (NAC)

Administrative regulations of the Nevada State government, which regulates water pollution.

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP)

Division of the Nevada Department of Conservation and Natural Resources that maintains programs for water quality, water pollution and safe drinking water. Responsible for the implementation and enforcement efforts of the Clean Water Act.

NEVADA REVISED STATUTES (NRS)

Nevada State laws, some which govern water pollution and water quality.

NON-POINT SOURCE FLOWS

A source of water pollution that cannot be traced to a specific source, such as stormwater or urban runoff.

PHOSPHORUS

An essential plant nutrient that is commonly found in wastewater treatment plant effluent and urban runoff. It can limit algal growth in Lake Mead.

POINT SOURCES

A source of water pollution that can be traced back to its source, such as a stream or pipe.

POTABLE WATER

Water that is free of pollution, harmful organisms and impurities and is therefore safe to drink.

QUAGGA MUSSELS

Invasive mussels that inhabit depths of Lake Mead. The species can quickly colonize, causing harm to water quality and infrastructure.

RENEWABLE PORTFOLIO STANDARD

Nevada standard requiring that 20 percent of energy sales come from renewable energy by 2015.

REQUIREMENT TO MAINTAIN EXISTING HIGHER WATER QUALITY (RMWQ)

Requirement established when monitoring data show that existing water quality for individual parameters is significantly better than the standard necessary to protect the beneficial uses.

RETURN-FLOW CREDITS

Colorado River water returned to the Colorado River, primarily consisting of highly-treated wastewater returns.

RIVER MOUNTAINS WATER TREATMENT FACILITY

One of the Southern Nevada Water System's two raw water treatment facility, located on Lake Mead.

SAFE DRINKING WATER ACT (SDWA)

The main federal law that protects and mandates the quality of America's drinking water.

SELENIUM

A metal found in natural deposits and ores. It is toxic in large amounts, but trace amounts of the metal are necessary for cellular function in animals.

SOUTHERN NEVADA WATER SYSTEM (SNWS)

System of treatment and transmission facilities that divert Colorado River water from Lake Mead and delivers treated and raw water to municipal water purveyors

SOUTHERN NEVADA WATER AUTHORITY (SNWA)

A cooperative agency formed to address Southern Nevada's water needs on a regional basis.

TOTAL COLIFORM

E-coli and similar gram negative bacteria that are normal inhabitants of fecal discharges.

TOTAL DISSOLVED SOLIDS (TDS)

A measure of inorganic and organic materials dissolved in water.

TOTAL MAXIMUM DAILY LOAD (TMDL)

A calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards.

TOTAL ORGANIC CARBON (TOC)

The entire quantity of carbon that exists in a measured sample, and is used as a measure of the amount of organic pollution in a water sample.

TOTAL SUSPENDED SOLIDS (TSS)

A measure of solid pollutants in wastewater, effluent or water bodies.

TREATMENT TECHNIQUE (TT)

A required process intended to reduce the level of a contaminant in drinking water.

U.S. GEOLOGICAL SURVEY (USGS)

A federal agency that develops and researches sciences, including natural disasters, water, energy and mineral resources.