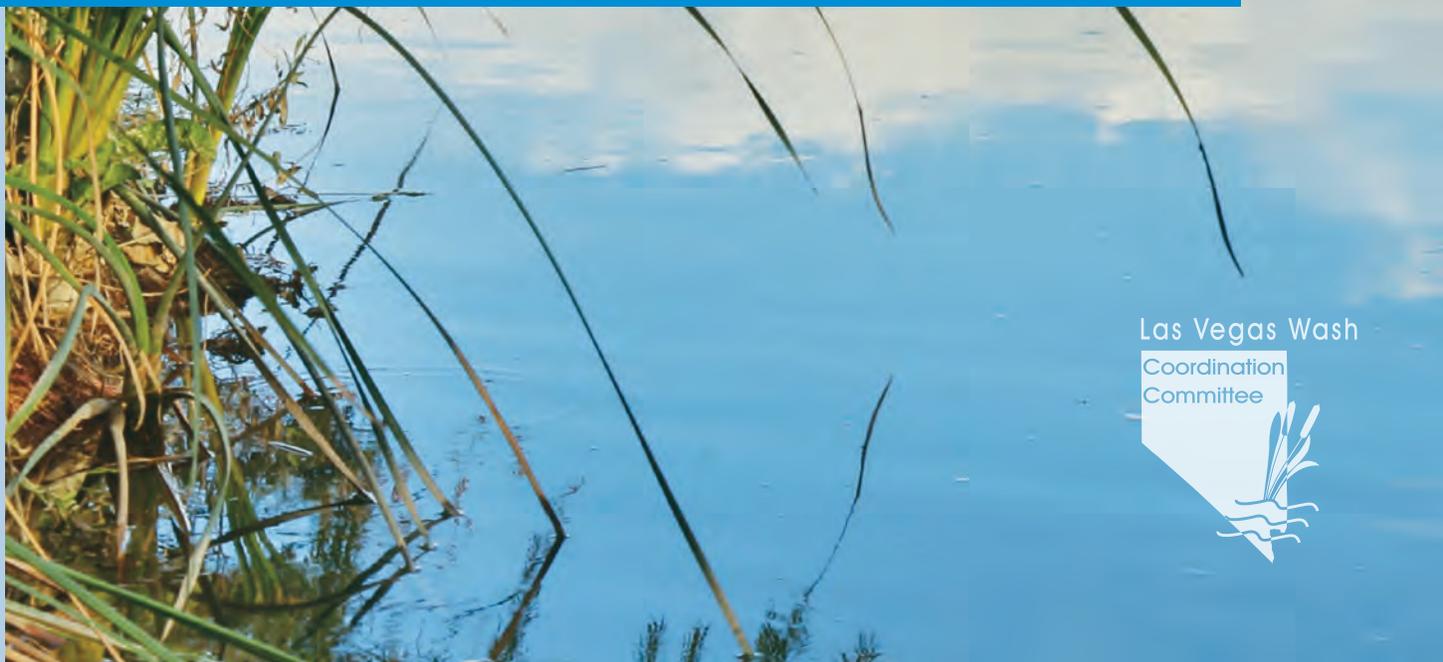




Las Vegas Wash Long-Term Operating Plan



Las Vegas Wash
Coordination
Committee



On the cover: The Las Vegas Wash looking upstream at Upper Diversion Weir and bridge



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Riparian vegetation along the Wash near Bostick Weir

Introduction

The Las Vegas Wash (Wash) is the primary channel through which excess flows from the Las Vegas Valley watershed return to Lake Mead.

It conveys urban runoff, shallow groundwater, stormwater, and highly treated wastewater discharged from the valley's four water reclamation facilities and flows through the 2,900-acre Clark County Wetlands Park (Wetlands Park). A collaborative community effort since 1998 has

stabilized, protected, and enhanced the Wash. This long-term operating plan (LTOP) describes the actions and funding needed to preserve the ecosystem, involve the public, and maintain the capital assets that have been developed along the channel.

LAS VEGAS WASH COORDINATION COMMITTEE

Basic Management, Inc.
Bureau of Reclamation
Citizen Members
City of Henderson
City of Las Vegas
City of North Las Vegas
Clark County Regional Flood Control District
Clark County Water Quality
Clark County Water Reclamation District
Colorado River Commission
Conservation District of Southern Nevada
Desert Wetlands Conservancy
Lake Las Vegas Resort
Las Vegas Boat Harbor
National Park Service
Natural Resources Conservation Service
Nevada Department of Wildlife
Nevada Division of Environmental Protection
Nevada State Health Division
Southern Nevada Health District
Southern Nevada Water Authority
University of Nevada, Las Vegas
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey

LAS VEGAS VALLEY WATERSHED ADVISORY COMMITTEE

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
Las Vegas Valley Water District
Southern Nevada Water Authority



Background

The lower Wash stretches more than 12 miles from the southeast part of the Las Vegas Valley to Lake Mead, entering the lake at Las Vegas Bay. Its once-plentiful wetlands helped polish urban flows on their way to Lake Mead. Decades ago, the flows of the Wash created more than 2,000 acres of wetlands, but by the 1990s, only about 200 acres of wetlands remained. The dramatic loss of vegetation reduced both the Wash's ability to support wildlife and to serve as a natural water filter.

The Las Vegas Wash Coordination Committee (LVWCC), a 28-member stakeholder group of federal, state, and local agencies, businesses, environmental groups, the University

of Nevada, Las Vegas and private citizens, was formed in 1998 to develop solutions to the problems affecting the Wash. The LVWCC developed the Las Vegas Wash Comprehensive Adaptive Management Plan (CAMP), which identifies 44 action items to achieve long-term stabilization, enhancement, and management of the Wash. These items include engineering solutions to control erosion, as well as actions related to water quality, environmental resources, public outreach, and interagency coordination. The LVWCC also created internal sub-committees or study teams to focus on operations, administration, and research and environmental monitoring.

In 2008, the Las Vegas Valley Watershed Advisory Committee (LVVWAC) was created under an interlocal agreement to expand the focus from the Wash to the entire Las Vegas Valley watershed. In accordance with cooperative and interlocal agreements among local government agencies, the Southern Nevada Water Authority (SNWA) has been designated as the lead agency to implement the CAMP and has established a staff team to coordinate this effort.

The LVWCC and its member agencies have taken significant strides toward completing the action items from the CAMP.

Accomplishments include:

- Constructing all 21 planned erosion control structures or weirs
- Stabilizing more than 13 miles of the Wash's banks with rock riprap, much of it recycled from imploded casinos
- Revegetating more than 500 acres with trees, shrubs, and emergent vegetation
- Implementing an invasive species management program, including removal of more than 550 acres of tamarisk

- Surveying for wildlife and documenting over 350 species of vertebrates and 500 species of invertebrates
- Monitoring water quality and showing a reduction in total suspended solids of more than 60 percent, removing the Wash from the 303(d) list of impaired waters
- Conducting cultural resource investigations, identifying significant historic and prehistoric sites and artifacts, among them the earliest evidence for maize (corn) in the valley.
- Hosting and participating in numerous outreach events, reaching more than 300,000 people

Successful long-term stabilization of the Wash and protection of its valuable environmental and public resources will require maintenance of these facilities and continued implementation of actions recommended under the CAMP.





Core Elements

The CAMP action items were organized into nine general categories or core elements (Table 1). The LVWCC uses an adaptive process to meet its mission of working to stabilize and enhance the valuable environmental resources of the Wash, and progress on each of the CAMP action items is described annually in the LVWCC's year-end report.

Several long-term management and monitoring plans have been developed to achieve the goals of specific components of the CAMP. These plans may be updated in the future as necessary and are incorporated by reference into this LTOR. To date, they include:

- Las Vegas Wash Operations and Maintenance Plan (O&M plan; December 2019) - This plan identifies standards, procedures, and maintenance activities to operate and maintain erosion control facilities.
- Las Vegas Wash Long-Term Revegetation Management Plan (November 2019) - This document describes how revegetation sites will be managed during long-term operations.
- Las Vegas Wash Facilities Inventory and Vegetation Management Plan (October 2019) - This document assesses Wash stabilization facilities and the impact of vegetation on the structures, establishing a plan to manage it.
- Las Vegas Wash 5-Year Maintenance Work Plan (October 2019) - This plan establishes a 5-year schedule to restore stabilization facilities to their benchmark condition and maintain each structure, and also estimates costs and duration of needed activities at each site.

Table 1. CAMP action items

Erosion & Stormwater, administered by the Operations Study Team

1. Install erosion control structures
2. Obtain topography and geophysical data
3. Conduct sediment transport modeling
4. Establish off-stream wetlands with alternate discharge considerations
5. Evaluate stormwater detention/retention basins

Alternate Discharge, administered by the LVVWAC, action items **6 – 10**

Land Use, administered by individual member agencies, action items **11 – 15**

Jurisdictional & Regulatory, administered by the LVVWAC and LVWCC

16. Further investigate and define structure for local oversight of the Las Vegas Wash Comprehensive Adaptive Management Plan
17. Ensure interagency coordination

Public Outreach, administered by the Administrative Study Team

18. Establish a method to continue implementation of the public outreach program
19. Continue implementation of feedback mechanisms and measurements of progress and results
20. Provide updates to elected officials

Funding, administered by the Administrative Study Team

21. Further investigate potential funding sources identified by the team
22. Anticipate future funding needs
23. Work with the Las Vegas Wash management entity to review funding options
24. Develop method to identify specific projects for grant funding
25. Utilize existing resources and staff, whenever possible

Shallow Groundwater, administered by the Research and Environmental Monitoring Study Team

26. Develop a central database
27. Locate and inventory existing shallow monitoring wells
28. Identify issues of concern
29. Develop a long-term monitoring plan
30. Develop a method to identify the potential for future contaminant discovery
31. Develop and implement a notification plan
32. Promote interagency coordination
33. Develop a bibliography

Wetlands Park, administered by Clark County, action items **34 – 39**

Environmental Resources, administered by the Research and Environmental Monitoring Study Team

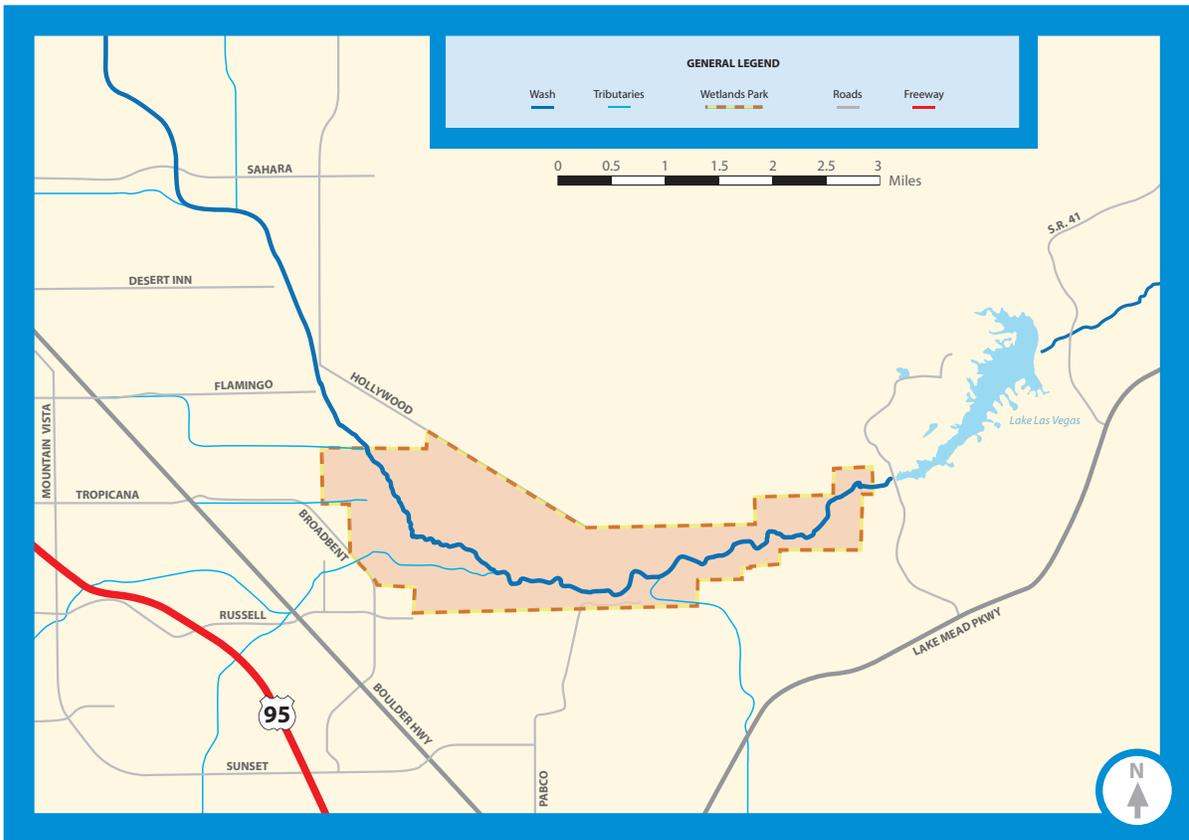
40. Develop long-term management and monitoring plans
41. Conduct additional research
42. Preserve and address cultural resource issues
43. Identify funding needs
44. Facilitate interagency coordination to ensure projects are implemented

- Groundwater Quality Monitoring and Assessment Plan along Las Vegas Wash (January 2015) - This plan creates a framework to characterize shallow groundwater quality along the Wash and address the impacts of groundwater on Wash water quality.
- Las Vegas Wash Outreach Plan, 2013 (October 2013) - This plan lays out goals for the outreach program, establishes core messages to achieve those goals, and describes the strategies, audiences, tactics, and partnerships that will be used to reach the goals.
- Las Vegas Wash Surface Water Quality Monitoring and Assessment Plan (May 2011) - This document describes a coordinated water quality monitoring network among the entities monitoring surface waters in the Wash and is reviewed annually and updated if needed.
- Clark County Wetlands Park Vegetation Maintenance Best Management Practices (June 2010) - This guide provides information to manage invasive and other non-desirable species and practices to establish and maintain native species.
- Las Vegas Wash Wildlife Management Plan (March 2008) - This plan details a strategy for managing vertebrate wildlife of the Wash and describes the technical, environmental, and administrative parameters within which management can be accomplished.
- Las Vegas Wash Revegetation Master Plan (October 2006) - This document provides a roadmap for restoration efforts in the Wash by identifying revegetation sites and priorities and recommending restoration methods and monitoring strategies.
- Integrated Weed Management Plan for the Lower Las Vegas Wash (September 2003) - This plan identifies the significance of invasive plants, weed management priorities, tools available for mapping weeds, management techniques, integrated weed management (techniques or methods that collectively increase efficiency and effectiveness of treatment for weeds), monitoring and evaluation, and how to involve the community and increase their awareness.

The following elements of the CAMP are not addressed in this LTOP:

- Alternate Discharge (CAMP action items 6-10). The Systems Conveyance and Operations Program was deemed unnecessary for the foreseeable future, and is not being pursued at this time.
- Land Use (CAMP action items 11-15). Land use will continue to be administered by individual member agencies, and is not further discussed in this document. Agencies will continue to coordinate on relevant land use issues as needed at stakeholder meetings.
- Wetlands Park (CAMP action items 34-39). Clark County will continue to administer the Wetlands Park and coordinate on relevant issues with the other entities on the Wash as needed at stakeholder meetings.

The physical scope and remaining six core elements are presented on pages 9-22. Each core element chapter includes a description of the element and a table that summarizes the actions needed for long-term operations and their associated annual costs in 2019 dollars. Both direct and indirect costs are included, with indirect costs calculated as 19 percent on burdened labor.



Physical Scope

The physical scope of this document encompasses the structures, revegetation sites, and other actions and features implemented under the CAMP. While most of these are located or conducted either in or

along the approximately 6-mile reach of the Wash within the boundary of the Wetlands Park (Figure 1), some actions such as water quality monitoring and outreach occur at other locations.



Rainbow Gardens Weir

Erosion & Stormwater

CAMP
action items
1-5

The CAMP identified erosion control and channel stabilization as a high priority for the Wash. To complete the capital projects necessary for long-term enhancement and management of the Wash, the Las Vegas Wash Capital Improvements Plan (Wash CIP) was developed. It has been reviewed and updated annually and was last updated May 23, 2019. The Wash CIP typically describes construction projects including installation of gradient control dams (weirs), channel bank protection, and revegetation. Revegetation normally follows channel stabilization projects, to meet environmental permitting requirements and support water quality and ecosystem goals.

The remaining capital projects under the Wash CIP include stabilization facility benchmarking, flood damage repairs, and revegetation associated with the construction of the final weirs. Completion of Wash CIP projects is currently anticipated in 2022.

In preparation for long-term operations, SNWA had an assessment of stabilization facilities conducted. This assessment concluded that facilities needed extensive work to restore them to design specifications, including removal of vegetation and replacement of riprap.

The assessment also determined that facilities would need to be maintained regularly to keep them functioning as designed. A 5-year work plan was created, with the first three years dedicated to facility benchmarking and the next two years to weir maintenance.

In accordance with the 2012 amended cooperative agreement, SNWA operates and maintains Wash facilities until such time as that ownership is transferred to Clark County. The O&M plan was developed to support the long-term operation and maintenance of Wash CIP facilities and is supplemented by the facilities assessment and the 5-year work plan. The O&M plan is intended to serve as a detailed subsection of the Clark County Regional Flood Control District's (CCRFCD's) Operations and Maintenance Manual, and addresses maintenance standards, procedures, and other facility maintenance actions. The O&M plan provides a detailed description of anticipated maintenance activities, including schedules and performance standards.

The eight long-term operating actions needed to meet the goals of the CAMP for erosion and stormwater are presented in Table 2.

Table 2. LTOP actions for Erosion & Stormwater

Action No.	Description	Labor (hours/year)		Labor Costs	Other Costs		Total Cost
1	Administer the O&M plan, including annual plan review and revision as necessary	Manager	40	\$5,712			\$11,067
		Civil Engineer	20	\$2,380			
		Eng. Technician	30	\$2,321			
		Clerical	10	\$655			
2	Conduct facility inspections semi-annually and during/following flood events as appropriate	Manager	60	\$8,568			\$71,638
		Civil Engineer	280	\$33,320			
		Eng. Technician	40	\$3,094			
		Major Constr. Inspector	280	\$26,656			
3	Identify and prioritize maintenance needs in an annual work plan	Manager	60	\$8,568			\$36,236
		Civil Engineer	80	\$9,520			
		Eng. Technician	100	\$7,735			
		Major Constr. Inspector	30	\$2,856			
		Biologist	30	\$3,035			
		Proj. Coordinator	40	\$4,522			
4	Identify funding sources, prepare funding agreements as necessary, and secure maintenance services either through LVVWAC members, Bureau of Reclamation, or contract services*	Manager	85	\$12,138	Contracts	\$870,000	\$928,161
		Civil Engineer	120	\$14,280			
		Eng. Technician	170	\$13,150			
		Major Constr. Inspector	80	\$7,616			
		Biologist	20	\$2,023			
		Proj. Coordinator	30	\$3,392			
		Clerical	85	\$5,563			
5	Oversee maintenance activities, including permitting and inspection**	Manager	20	\$2,856	Permit fees	\$1,000	\$32,535
		Civil Engineer	30	\$3,570			
		Major Constr. Inspector	240	\$22,848			
		Proj. Coordinator	20	\$2,261			
6	Comply with regulatory and permit conditions for facility O&M, including cultural resources and environmental regulations	Manager	10	\$1,428	Weed control	\$50,000	\$98,969
		Civil Engineer	40	\$4,760			
		Eng. Technician	10	\$774			
		Proj. Coordinator	40	\$4,522			
		Archaeologist	80	\$7,140			
		Biologist	300	\$30,345			
7	Coordinate payments and funding processing in association with O&M	Manager	15	\$2,142			\$3,778
		Clerical	25	\$1,636			
8	Conduct O&M agency coordination and annual status reporting	Manager	40	\$5,712			\$17,225
		Civil Engineer	80	\$9,520			
		Biologist	20	\$2,023			
			2,660	\$278,639	\$921,000	\$1,199,639	

* Each structure will be maintained biennially. The cost presented is an average of the cost to engage a general contractor to maintain all the structures, currently estimated at \$1.74 million for two years. If Bureau of Reclamation crews do the work, the annual cost would decrease by \$200-300 thousand.

** If Bureau of Reclamation crews conduct the maintenance work on the Wash, less oversight would be required, decreasing the cost of this action by approximately \$10,000.



Jurisdictional & Regulatory

CAMP
action items
16-17

Multiple agencies have jurisdictional responsibilities along the Wash, and close coordination and communication facilitates efficient resource management. The LVVWAC, LVWCC, and technical subcommittees

continue to meet routinely to ensure communication and address priority actions. Six actions were developed to continue interagency coordination during long-term operations on the Wash (Table 3).

Table 3. LTOP actions for Jurisdictional & Regulatory

Action No.	Description	Labor (hours/year)		Labor Costs	Other Costs		Total Cost
9	Host at least two LVVWAC meetings annually, including preparation of presentations and detailed meeting minutes	Manager	35	\$4,998	Refreshments	\$150	\$9,730
		Biologist	10	\$1,012			
		Asst. Management Analyst	40	\$3,570			
10	Host at least two LVWCC meetings annually, including preparation of presentations and detailed meeting minutes, and conduct an annual field tour of the Wash for the LVWCC; these tours are open to the public and other stakeholders, and also serve as public outreach	Manager	107	\$15,280	Refreshments	\$300	\$39,035
		Civil Engineer	14	\$1,666			
		Biologist	100	\$10,115			
		Sr. Hydrologist	22	\$2,749			
		Asst. Management Analyst	100	\$8,925			
11	Host at least two meetings annually for each of the study teams (Administrative, Operations, and Research and Environmental Monitoring), with staff updates and presentations, and prepare detailed meeting minutes	Manager	32	\$4,570	Refreshments	\$410	\$22,925
		Biologist	88	\$8,901			
		Civil Engineer	10	\$1,190			
		Sr. Hydrologist	20	\$2,499			
		Asst. Management Analyst	60	\$5,355			
12	Host at least one meeting per year of the Cultural Resources Coordinating Committee and prepare detailed meeting minutes	Manager	4	\$571			
		Archaeologist and/or Biologist	10	\$952			\$1,523
13	Meet with senior managers of each LVVWAC agency at least annually, and brief elected officials periodically as requested	Manager	50	\$7,140			\$7,140
14	Continue to collect relevant documents and references and maintain the Wash members' website	Biologist	10	\$1,012			\$1,012
			712	\$80,504		\$860	\$81,364



A biologist teaches students about fish

Public Outreach

CAMP
action items
18-20

Public outreach will continue to be important to build community awareness and support for the Wash and the LVWCC's activities along the channel. The Las Vegas Wash Outreach Plan, 2013, was developed to help guide outreach efforts, incorporating and building upon components from earlier documents.

The 2013 plan provides a roadmap for the outreach program and includes goals, core messages, strategies, and effectiveness monitoring objectives. Seven actions have been identified to continue public outreach during long-term operations (Table 4).

Table 4. LTOP actions for Public Outreach

Action No.	Description	Labor (hours/year)		Labor Costs	Other Costs		Total Cost
15	Participate in at least four local outreach events annually, including staffing information booths and distributing informative materials and giveaway items to increase program awareness	Biologist	158	\$15,982	Materials, supplies, giveaway items	\$7,500	\$23,482
16	Conduct at least three outreach events annually with Mabel Hoggard Math and Science Magnet School	Biologist	290	\$29,334	Transportation, supplies	\$6,500	\$41,296
		Laboratory Scientist	30	\$3,035			
		Sr. Hydrologist	12	\$1,499			
		Hydro. Technician	12	\$928			
17	Conduct two volunteer events on the Wash annually (plantings, weed pulls, or similar) and facilitate outreach with local schools for World Wetlands Day	Manager	40	\$5,712	Plants, materials, supplies, buses, food	\$40,000	\$182,027
		Biologist	1300	\$131,495			
		Archaeologist	20	\$1,785			
		Laboratory Scientist	10	\$1,012			
		Sr. Hydrologist	10	\$1,250			
18	Conduct at least four tours or field trips of the Wash annually as requested by interested groups, entities, and agencies	Manager	30	\$4,284			\$16,422
		Biologist	120	\$12,138			
19	Provide information to the public by maintaining the lwash.org website, with updates at least quarterly that include posting of documents (agendas, presentations, summaries) related to public meetings, electronically distributing a newsletter quarterly, updating and maintaining the Facebook site once per week, and using other social media tools	Manager	24	\$3,427			\$33,272
		Biologist	168	\$16,993			
		Asst. Management Analyst	16	\$1,428			
		Public Info. Coordinator	120	\$11,424			
20	Prepare a general summary report of activities for the public biennially*	Manager	20	\$2,856	Printing	\$500	\$21,896
		Biologist	120	\$12,138			
		Archaeologist	10	\$893			
		Sr. Hydrologist	4	\$500			
		Hydrologist II	6	\$678			
		Public Info. Coordinator	14	\$1,333			
21	Implement activities related to the increasing awareness component of the wildlife management plan; this includes developing wildlife education and outreach materials and distributing them at local events, participating in collaborative wildlife awareness events such as International Migratory Bird Day, and sharing data	Biologist	184	\$18,612	Pocket Naturalist® guide	\$4,100	\$22,712
			2,764	\$282,506		\$58,600	\$341,106

* The cost presented is the average annual cost to produce the report.



A belted kingfisher looks for fish in the Wash

Funding

CAMP
action items
21-25

Funding sources for implementation of the CAMP have included local, state, federal and private contributions. In accordance with the cooperative agreement between the SNWA, the City of Henderson (COH), the City of Las Vegas (CLV) and Clark County Water Reclamation District (CCWRD), four percent of the quarter-cent sales tax proceeds shared among the entities is allocated to provide a funding source for capital infrastructure associated with the Wash.

In addition to capital infrastructure, the local agencies recognized the need to support the other activities associated with implementing the CAMP, including the general operating expenses. An interlocal agreement has been reviewed and approved annually among the LVVWAC members to fund CAMP activities that are not funded by federal, state, or private grants or the portion of the quarter-cent sales tax proceeds. The funding

allocation outlined in the interlocal agreement has also been reviewed and approved annually by the LVVWAC. The current allocation is:

- Water reclamation dischargers – 40 percent. The contribution for each of the four dischargers (COH, CLV, City of North Las Vegas [CNLV], and CCWRD) is based on the 2-year average flow rates reported by the Sewage and Wastewater Advisory Committee to the state.
- SNWA – 40 percent
- Clark County – 10 percent
- CCRFCD – 10 percent

The CAMP recommended seeking grant funding to help supplement the income stream for Wash activities. Grants have been received from a variety of sources, including the Bureau of Reclamation (Bureau), the Southern Nevada Public Land Management Act, Nevada Division of

Environmental Protection (NDEP) and other state and private funding sources, which have provided millions of dollars for project costs.

Grant funding will continue to be pursued and may be available in the future to offset a portion of the LTOP costs. However, the availability and amount of future grant funding is not currently known, so grants cannot be relied upon as a funding source. Funds that are offset by grants could be placed into a reserve account to handle emergencies or emerging issues.

If additional funding becomes available from grants or other sources, the actions proposed under the LTOP could be expanded as agreed upon by the member agencies. For example, if additional grant funding is available for public outreach, participation in public or school outreach events could be increased.

The capital infrastructure maintenance work identified in Table 2 is based on the 5-year work plan. The necessary

maintenance may vary from year to year and increase in the future as the facilities age. Facility reconstruction, or rehabilitation after major flood events, is not included in Table 2. Budgets and potential funding for maintenance of capital infrastructure will be developed in association with annual maintenance work plans. If facility reconstruction or rehabilitation is of a capital nature, where a facility has ceased to operate as originally intended, funding may be obtained from the Wash apportionment of the quarter-cent sales tax allocation for water and wastewater projects or account loans.

The two actions developed to address funding during long-term operations are presented in Table 5.

Table 5. LTOP actions for Funding

Action No.	Description	Labor (hours/year)		Labor Costs	Other Costs		Total Cost
22	Seek partnerships that will help offset LTOP program costs	Manager	20	\$2,856			\$4,879
		Biologist	20	\$2,023			
23	Seek and manage grant funding to offset LTOP program costs	Manager	60	\$8,568			\$67,901
		Biologist	308	\$31,154			
		Archaeologist	16	\$1,428			
		Sr. Hydrologist	16	\$1,999			
		Management Analyst	260	\$24,752			
		700		\$72,780		N/A	\$72,780



Shallow Groundwater

CAMP
action items
26-33

A network of shallow groundwater monitoring locations along the Wash is sampled or measured by multiple entities rather than by a single entity. The monitoring partners (Bureau, COH, BMI Complex Companies, NDEP, SNWA, and the U.S. Geological Survey) are critical to the success of the Groundwater Quality Monitoring and Assessment Plan along Las Vegas Wash. The plan was developed to collect water quality and hydrogeologic data and limit duplication of effort. As recognized in the CAMP, the scope of this plan includes the following components: measuring water quality, conducting

aquifer testing, identifying the contribution of shallow groundwater inflow, identifying data gaps and the need for additional monitoring wells, developing monitoring timeframes to ensure sufficient data collection, understanding the role of land use practices on shallow groundwater quality, and reviewing historical photos for past land use practices.

To continue to meet the goals of the CAMP, the three actions outlined in Table 6 will be conducted under the LTOP.

Perchlorate in groundwater near the Wash is being monitored by NDEP, using funds from the Nevada Environmental Response Trust. This perchlorate sampling and associated treatment programs are not part of the LTOP.

However, the Wash monitoring will continue to be coordinated with NDEP, and access provided to monitoring wells and well data along the Wash.

Table 6. LTOP actions for Shallow Groundwater

Action No.	Description	Labor (hours/year)		Labor Costs	Other Costs		Total Cost
24	Monitor shallow groundwater and collect field water quality parameters including temperature, pH, dissolved oxygen, and electrical conductance	Hydrologist II	80	\$9,044	Analytical	\$35,000	\$44,044
25	Collect water level data from 16 wells on a quarterly basis	Hydro. Technician	80	\$6,188	Materials, supplies	\$1,000	\$7,188
26	Coordinate with local, state, and federal agencies on water quality issues and regulatory compliance relevant to the Wash	Manager	44	\$6,283			\$11,281
		Sr. Hydrologist	40	\$4,998			
			244	\$26,513		\$36,000	\$62,513



Monitoring Wash flows

Environmental Resources

CAMP
action items
40-44

The Wash is home to hundreds of species of vertebrate and invertebrate wildlife, important wetland, riparian, and desert habitats, and sensitive cultural resources. The LVWCC members acknowledged the importance of these resources by including action items in the CAMP for protection of environmental resources. This includes the development of long-term management and monitoring plans, which have been described in the Core Elements chapter.

Long-term water quality monitoring in the Wash, its tributaries, and Lake

Mead provides a comprehensive understanding of Wash flows and potential impacts to drinking water supplies. In 2011, the Las Vegas Wash Surface Water Quality Monitoring and Assessment Plan was created to coordinate water quality monitoring in the watershed. Monitoring of the mainstream Wash is used to evaluate baseline conditions, detect variations over time, and provide a long-term history of data that can be used to make watershed-based decisions. Tributary sampling monitors the effects of urban runoff on the Wash, providing important information on non-point

sources of contamination. Sample locations, frequencies, and analyses may change as agencies continue to work together to prevent duplication of sampling, while ensuring all monitoring needs are met. While extensive water quality sampling of Lake Mead is conducted, those efforts are not part of the LTOP.

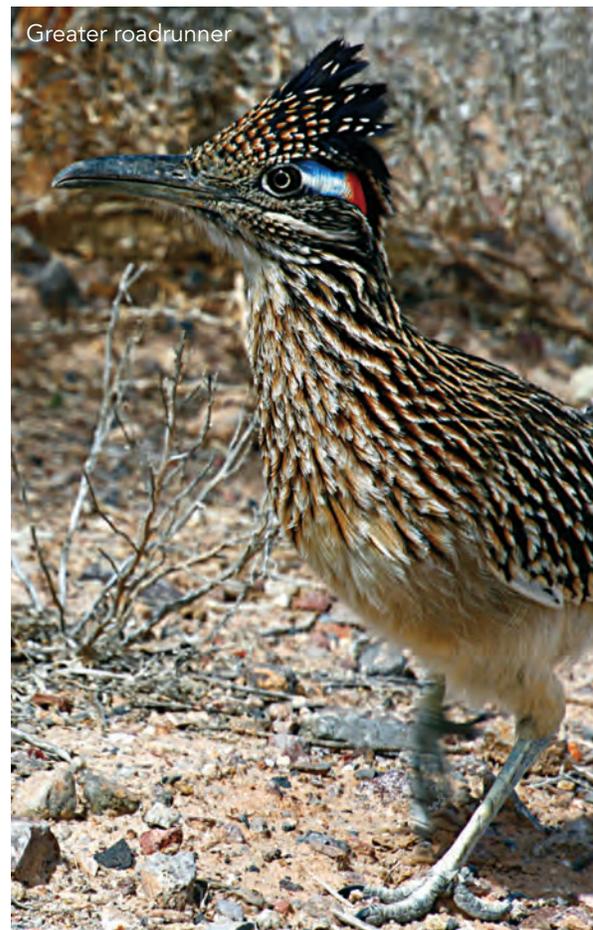
Wildlife in and along the Wash was studied for more than a decade to establish baseline inventories and monitor changes over time. This information was used to develop the Las Vegas Wash Wildlife Management Plan. Management objectives include conserving native species that have been found in the Wash, protecting and enhancing their habitats, and increasing environmental awareness of these resources in the community. Of the 31 recommended actions in the plan, 29 have been implemented. Under this LTOP, continuing activities may include bird and other species surveys, revegetation, and weed management in areas beyond the footprints of capital facilities (addressed above under the O&M plan in the Erosion & Stormwater chapter).

Monitoring and other activities will continue for the federally threatened desert tortoise as required under the biological opinion for facilities on the Wash to comply with the Endangered Species Act. Additionally, the Las Vegas bearpoppy (currently listed by the state of Nevada as a critically endangered plant) will be surveyed for to ensure activities do not impact populations. These efforts are accounted for in the Erosion & Stormwater chapter as they are compliance for the stabilization program. Informal consultations for federally threatened and endangered bird species have been concluded. However, annual surveys for these species will continue to help project activities avoid take of listed species.

Evidence indicates that people have lived along the Wash for more than 2,500 years. Because of this rich history, the Wash was designated as an archaeological district in 1977. In 2011, a programmatic agreement was implemented between the Bureau, Clark County, SNWA, and other stakeholders to

comply with National Historic Preservation Act Section 106 for cultural resources within the Wetlands Park. The programmatic agreement outlined the process for cultural resources coordination and clearance for ground-disturbance activities, including construction and maintenance of weirs and other erosion control facilities. The Cultural Resources Coordinating Committee established under the programmatic agreement meets periodically to review construction developments, research questions, and exchange information. The current programmatic agreement expires in 2021, and partners are discussing whether a new one is needed.

The LTOP addresses water quality sampling and research, and monitoring and management of plants, wildlife, and cultural resources within the Wash and surrounding area to meet the objectives of the CAMP. The ten actions that will be conducted are described in Table 7.



Greater roadrunner

Table 7. LTOP actions for Environmental Resources

Action No.	Description	Labor (hours/year)		Labor Costs	Other Costs		Total Cost
27	Collect quarterly Wash water quality samples and summarize the results in an annual report	Hydro. Technician	120	\$9,282	Analytical	\$18,000	\$41,324
		Hydrologist II	80	\$9,044			
		Sr. Hydrologist	40	\$4,998			
28	Maintain real-time water quality stations weekly	Hydro. Technician	500	\$38,675	Hydrolab® probes, supplies, replacement	\$4,500	\$43,175
29	Collect quarterly dry weather data on Wash tributaries to support MS-4 permit	Hydro. Technician	40	\$3,094	Analytical	\$52,000	\$64,614
		Hydrologist II	40	\$4,522			
		Sr. Hydrologist	40	\$4,998			
30	Measure water flow at four sites in the Wash to monitor and evaluate status and trends	Hydrologist II	120	\$13,566	Materials, supplies	\$2,000	\$15,566
31	Upload water quality data to the Lower Colorado River Water Quality Database within 30 days of receiving laboratory reports	Hydrologist II	120	\$13,566			\$13,566
32	Analyze water quality data for contaminants of potential concern (e.g., selenium, perchlorate) and alert management and stakeholders of issues	Sr. Hydrologist	60	\$7,497			\$7,497
33	Track regulations, rules, and legislation relevant to the Wash by searching the Federal Register and other news sources weekly	Biologist	52	\$5,260			\$5,260
34	Implement activities related to the weed management plan, revegetation master plan, and the species and habitat components of the wildlife management plan	Biologist	2120	\$214,438	Revegetation activities, trash removal, bird point counts, materials, supplies	\$200,000	\$414,438
35	Track the status and trends of cultural sites in coordination with the Cultural Resources Coordinating Committee	Archaeologist and/or Biologist	40	\$3,808	Materials, supplies	\$1,000	\$4,808
36	Conduct archaeological research and investigations to further knowledge about Contracts along the Wash and to facilitate better protection and preservation	Archaeologist and/or Biologist	200	\$19,040	Cultural resources	\$5,500	\$24,540
			3,572	\$351,788		\$283,000	\$634,788





Planting at a Wash Green-Up

Annual Cost of LTOP

The annual cost of implementing the 36 actions of the LTOP is \$2,392,189 in 2019 dollars (Table 8). An increase

of 2.5 percent will be applied each year to address cost of living adjustments and inflation.

Table 8. Total annual cost to implement the LTOP

Core Element	Action No.	Labor Costs	Other Costs	Total Cost
Erosion & Stormwater	1-8	\$278,639	\$921,000	\$1,199,639
Jurisdictional & Regulatory	9-14	\$80,504	\$860	\$81,364
Public Outreach	15-21	\$282,506	\$58,600	\$341,106
Funding	22-23	\$72,780	N/A	\$72,780
Shallow Groundwater	24-26	\$26,513	\$36,000	\$62,513
Environmental Resources	27-36	\$351,788	\$283,000	\$634,788
		\$1,092,729	\$1,299,460	\$2,392,189

Funding Scenario

Table 9 presents the funding scenario chosen by LVVWAC members to pay for the implementation of the LTOP.

The budget is presented in total, with no grants or other offsets that may decrease the overall cost.

Table 9. Funding scenario for implementation of the LTOP, with no offsets, in 2019 dollars

Agency	CCRFCD	Clark County	CCWRD	CLV	CNLV	COH	SNWA *	Total
Description of Allocation	50% of Erosion & Stormwater budget (\$1,199,639)	13% of total remaining budget (\$1,792,370)	43% of total remaining budget (\$1,792,370) multiplied by the percentage of total flow that each wastewater agency discharges to the Wash (percentages shown are based on fiscal year 2019/2020 budget)			44% of total remaining budget (\$1,792,370)		
Basic share (\$)	\$599,819	\$233,008	\$422,354	\$179,578	\$70,906	\$97,881	\$788,643	\$2,392,189
Basic share (%)	25%	10%	18%	7%	3%	4%	33%	100%

* Includes the Las Vegas Valley Water District.



Program Implementation

The LTOP will be implemented in fiscal year 2022/2023, once Wash CIP projects have been completed. Once initiated, study team, LVWCC, and LVVWAC members will continue to meet to identify any changes in funding or priorities not identified in the LTOP. Financial assistance and in-kind services will also continue to be sought to aid in the implementation of actions highlighted in this document.

The 36 actions described in the LTOP are critical to the continued success of Wash stabilization and enhancement.

In closing, the following are also recommended:

- Continue with SNWA as the lead agency
- Maximize use of available grant funding
- Maintain a sinking fund of \$300,000 for emergency needs
- Continue to use wholesale delivery charge revenue to fund SNWA share

Mission:

**Working to stabilize and enhance
the valuable environmental resources
of the Las Vegas Wash**

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