Las Vegas Valley NPDES Municipal Stormwater Discharge Permit

Annual Report 2023-2024

November
2024

REGIONAL FLOOD CONTROL DISTRICT

CLARK COUNTY NEVADA

CITY OF LAS VEGAS NEVADA

CITY OF NORTH LAS VEGAS

HENDERSON

Brown AND Caldwell

HDR

REGIONAL FLOOD CONTROL DISTRICT

November 1, 2024

Kristie Black
Bureau of Water Pollution Control
Nevada Division of Environmental Protection
901 S. Stewart Street, Suite 4001
Carson City NV 89701

RE: 2023 – 2024 Annual Report-Las Vegas Valley NPDES MS4 Permit

Dear Ms. Black:

Please find enclosed a copy of the 2023-2024 Annual Report for the Las Vegas Valley National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit (NV0021911). This report was prepared in cooperation with Brown and Caldwell and HDR, Inc. and is hereby submitted for your review. The Annual Report details compliance activities for the period from July 1, 2023, through June 30, 2024. These activities were performed in accordance with Permit No. NV0021911 and the approved Stormwater Management Plan.

If you should have any questions, please do not hesitate to call.

Sincerely,

Andrew R. Trelease (Sep 25, 2024 09:42 PDT)

Andrew R. Trelease, P.E., CFM
Assistant General Manager

Enclosure

2023-2024
Annual Report

Las Vegas Valley
National Pollutant Discharge Elimination System
Municipal Separate Storm Sewer System Permit

Prepared for:

Las Vegas Valley
Stormwater Quality Management Committee (SQMC)

Clark County Regional Flood Control District
City of Henderson
City of Las Vegas
City of North Las Vegas
Clark County

Prepared by:

HDR   Brown AND Caldwell

November, 2024

LAS VEGAS VALLEY NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM MUNICIPAL SEPARATE STORM SEWER SYSTEM PERMIT

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Acronyms and Abbreviations

ac-ft	Acre-feet
BLM	Bureau of Land Management
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CAMP	Comprehensive Adaptive Management Plan
CC	Clark County
CCPRO	Clark County Public Response Office
CCRFCD	Clark County Regional Flood Control District
CESQG	Conditionally Exempt Small Quantity Generators of Hazardous Waste
CFR	Code of Federal Regulations
CLV	City of Las Vegas
CNLV	City of North Las Vegas
COD	Chemical Oxygen Demand
COH	City of Henderson
conc.	Concentration
CWA	Clean Water Act
DB	Detention Basin
DES	Clark County Department of Environment and Sustainability
E. Coli	*Escherichia coli*
EDB	Extended Detention Basin
EPA	Environmental Protection Agency
GIS	Geographic Information System
GPCD	Gallons per capita per day
IC	Ion Chromatography
ICAP	Inductively Coupled Argon Plasma Spectroscopy
IDDE	Illicit Discharge Detection and Elimination
IR	Nevada 2014 Water Quality Integrated Report
lbs/day	pounds per day
LID	Low Impact Development
LMWQF	Lake Mead Water Quality Forum
LVMC	Las Vegas Municipal Code
LVV	Las Vegas Valley
LVVWAC	Las Vegas Valley Watershed Advisory Committee
LVW	Las Vegas Wash
LVWCC	Las Vegas Wash Coordination Committee
MBAS	Methylene Blue Active Substance (Surfactants)
MEP	Maximum Extent Practicable
MGD	million gallons per day
mg/L	milligrams per liter
µg/L	micrograms per liter
MM-##	Maintenance Measure Best Management Practices
MPU	Master Plan Update

MS4	Municipal Separate Storm Sewer System
MWP	Maintenance Work Program
NA	Not Available / Not Analyzed
NAC	Nevada Administrative Code
NAICS	North American Industry Classification System
ND	Non-detect / Not Detected
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDSR	New Development and Significant Redevelopment
N	Nitrogen
NOI	Notice of Intent
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NPS	Non-Point Source
NTU	Nephelometric Turbidity Units
P	Phosphorus
PE	Professional Engineer
pH	Measure of acidity or alkalinity
PSA	Public Service Announcement
RCRA	Resource Conservation and Recovery Act
RCV	Required Capture Volume
RMHQ	Requirement to Maintain Higher Quality
RTC	Regional Transportation Commission of Southern Nevada
SARA	Superfund Amendments and Reauthorization Act
SC-##	Source Control Best Management Practices
SD-##	Site Design Best Management Practices
SIC	Standard Industrial Classification
SNHD	Southern Nevada Health District
SNWA	Southern Nevada Water Authority
SNWS	Southern Nevada Water System
sq. ft.	square feet
SQMC	Stormwater Quality Management Committee
SVOC	Semivolatile Organic Compound
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TC-##	Treatment Control Best Management Practices
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TM	Technical Memorandum
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TON	Total Organic Nitrogen
TRI	Toxic Release Inventory

TSS	Total Suspended Solids
UDB	Ultimate Development Boundary
USGS	United States Geological Survey
VOC	Volatile Organic Compound
WLA	Wasteload Allocation
WQCV	Water Quality Capture Volume
WQS	Water Quality Standard
WWTP	Wastewater Treatment Plant

Executive Summary

Executive Summary

1 Introduction

The United States Environmental Protection Agency (EPA) has adopted regulations to control pollutants entering the environment through storm drainage facilities associated with the Municipal Separate Storm Sewer System (MS4). In compliance with these regulations, the Nevada Division of Environmental Protection (NDEP) issued National Pollutant Discharge Elimination System (NPDES) MS4 Permit No. NV0021911 jointly to the Clark County Regional Flood Control District (CCRFCD), the City of Las Vegas (CLV), the City of North Las Vegas (CNLV), the City of Henderson (COH), and Clark County (CC), collectively known as the Las Vegas Valley Permittees (Permittees).

According to permit requirements, the Permittees developed a Stormwater Management Plan (SWMP) that described specific activities, responsibilities, and measurable goals adopted to comply with the various permit provisions. This Annual Report highlights the Permittees' compliance with the permit and SWMP requirements for the permit year spanning from July 1, 2023 through June 30, 2024.

2 Area of Coverage

The Las Vegas Valley NPDES MS4 Permit applies to all the urbanized and urbanizing watershed areas that are naturally tributary to the Las Vegas Wash. The permit area of coverage includes the cities of Las Vegas, the majority of North Las Vegas, and Henderson, as well as the portions of unincorporated Clark County that lie within the Las Vegas Valley's Ultimate Development Boundary (UDB). The permit does not apply to federal or state-owned land in the Las Vegas Valley or to sites that have their own NPDES MS4 permit.

3 Water Quality Standards

The Las Vegas Valley NPDES MS4 Permit requires the Permittees to evaluate whether stormwater discharges contribute directly or indirectly to the impairment of waterbodies, according to Section 303(d) of the Clean Water Act. The Permittees identified five 303(d) list impaired waterbodies within the permit area of coverage (Duck Creek, Flamingo Wash, Las Vegas Creek, Las Vegas Wash, and Sloan Channel). The impairments identified included: boron, *E. Coli*, fluoride, iron, selenium, total dissolved solids (TDS), temperature, and Total Suspended Solids (TSS). The NPDES MS4 Permit requires the Permittees to comply with permit Section B.4.2.2 (SWMP) for constituents with established TMDLs. Only phosphorus and ammonia have an established Total Maximum Daily Load (TMDL).

4 Legal Authority

Section B.5.15 of the NPDES MS4 Permit for the Las Vegas Valley requires each of the Permittees to have an ordinance in place to authorize or enable all requirements of the permit. Further, Section B.5.1.6 of the permit requires the Permittees to present a review of legal authority to implement the requirements of the permit and the SWMP, and to identify additional ordinances or regulatory mechanisms to be adopted. During the permit year, each of the municipal Permittees (CLV, CNLV, CC, and COH) was supported by local ordinances that grant them the authority to implement the requirements of the NPDES MS4 Permit. The Permittees reviewed local stormwater ordinances during the 2023-2024 MS4 permit year, with some revisions as noted in Chapter 4.

5 Stormwater Management Approach

The Las Vegas Valley NPDES MS4 Permit required the Permittees to develop a SWMP that was suited to the unique local hydrologic, hydrogeologic, and regional conditions of the Las Vegas Valley, and that was also consistent with local and state laws, regulations, and water resources plans. The Las Vegas Valley SWMP that applies to the 2023-2024 MS4 permit year was approved by NDEP in 2011 and was implemented in November 2013. The SWMP details the BMPs assigned to each of the SWMP Programs and are described in this Annual Report.

6 Source Identification

In compliance with permit Section B.5.2, the Permittees provided updated maps of their stormwater infrastructure systems, including the locations of all major outfalls.

7 Stormwater Monitoring Program

To satisfy the requirements of permit Section B.5.3, the Permittees conducted wet weather monitoring using two automated monitoring stations and sampling protocols as were used in previous years. Wet weather samples were collected from stormwater runoff at The Club at Sunrise and Rainbow Gardens sampling sites, after one significant event in September 2023. The laboratory analysis of wet weather samples did not show evidence of changes in water quality characteristics that would indicate the need to modify the SWMP or improve performance of specific BMPs.

8 Public Outreach and Education Program

The Permittees satisfied the requirements of permit Section B.5.4 through the implementation of seven BMPs directed at educating the public to reduce the discharge of pollutants to the MS4 to the maximum extent practicable. During the permit year, the Permittees maintained the storm drain inlet marking program; disseminated printed educational materials at 65 community events, including materials targeted at reducing pet waste; broadcasted several public service announcements; maintained the collaborative stormwater website (www.LVstormwater.com); as well as presented educational sessions to local elementary school students.

9 Source Control and MS4 Maintenance Program

Section B.5.5 of the NPDES MS4 Permit for the Las Vegas Valley includes requirements for a Source Control and MS4 Maintenance Program to reduce pollutants in stormwater runoff from commercial and residential areas. During the permit year, the Permittees continued to implement several maintenance and source control BMPs to meet permit requirements. The municipal Permittees swept curbed-and-paved public city streets once every 30 days; inspected at least 20% of the total number of drop inlets within their jurisdiction and cleaned them as appropriate; inspected detention basins twice annually and cleaned them as needed; as well as reviewed public facility maintenance plans. The Permittees also trained staff on proper application of fertilizers / pesticides and continued to explore the use of alternative products and application procedures. Additionally, the

Permittees maintained and enforced their stormwater ordinances, which resulted in over 5,700 recorded enforcement actions, ranging in severity from verbal warnings to administrative penalties.

Permittee ordinances also supported water conservation measures, with reports from SNWA indicating that the community uses approximately 89 gallons per capita per day in the Las Vegas Valley, while water savings from the Smart Landscapes (“turf conversion”) Program exceeded 702 million gallons during the permit year. Further, Republic Services also continued to serve as a local resource for household hazardous waste collection.

10 Post-Construction Program for New Development and Significant Redevelopment

The Permittees implemented all planned measures to address new development and significant redevelopment (NDSR) in the permit area, in accordance with permit Section B.5.6. NDSR was identified in updated GIS maps of the Las Vegas Valley and included approximately 1,549 acres.

The BMPs that continue to be implemented for the Post-Construction NDSR Program are appropriate for the Las Vegas Valley’s unique hydrologic, hydrogeologic, and regional conditions. During the permit year, all Permittees reviewed development plans for compliance with: open space and landscaping objectives, rural land overlay, hillside development ordinances, standard drainage design criteria, and parking lot Low Impact Development (LID) measures. The Permittees also promoted green building initiatives and other LID measures, when appropriate. It was standard practice to cover and raise fuel areas, as well as provide emergency shut-off switches at all new gas stations. Some Permittees also utilized treatment control BMPs and installed sand / oil separators to further the removal of solids and floatable materials from stormwater.

The Permittees utilize their Watershed Program approach for addressing runoff from areas of new development. The Watershed Program is included in the SWMP, however it is not a specific MS4 permit requirement. As such, it is incorporated into the NDSR discussion. The Permittees rely on the Watershed Program to mitigate potential impacts of stormwater runoff from existing and new development of all kinds. Key elements include: regional detention basin construction, regional channel lining, construction of Las Vegas Wash channel stabilization structures, and installing low-flow features in regional detention basins. During the permit year, two detention basins were upgraded to include low-flow features, Gowan North (53.6 AF) and Oakey (12.5 AF), increasing the total Water Quality Capture Volume (WQCV) of the Las Vegas Valley by 66.1 AF.

11 Illicit Discharge Detection and Elimination Program

The Permittees implemented all planned program elements for detecting and eliminating illicit discharges to the storm drain system, per permit Section B.5.7. Key program elements included twice yearly MS4 system inspections, and sanitary sewer line inspections to minimize sanitary sewer overflows. Storm channel inspections did not indicate a trend of illicit discharge.

12 Industrial Facility Monitoring and Control Program

In compliance with Permit Section B.5.8, the Permittees implemented all planned elements of the Industrial Facility Monitoring and Control Program. During the permit year, the Permittees utilized an industrial facility stormwater inspection checklist to perform annual inspections of all of the Superfund Amendments and Reauthorization Act (SARA) Title III Section 313 facilities and hazardous waste treatment, disposal, and recovery facilities within their jurisdictions. Additional industrial facilities were inspected during the permit year, as indicated in the updated industrial facility inventories. During the permit year, the Permittees continued to perform industrial facility pretreatment inspections and grease interceptor inspections. Training of the Permittees' industrial facility inspectors was conducted on an as needed basis.

13 Construction Site Program

The Permittees satisfied the requirements of permit Sections B.5.9 and B.5.10 by continuing to implement three source control BMPs. During the permit year, construction site inspections were conducted to identify active discharges, as well as to evaluate BMPs for their efficacy at preventing potential discharges and to educate construction site operators. The Permittees inspected construction sites over 100 acres and construction sites deemed a "significant threat" to water quality on a monthly basis, while other construction sites were inspected at least two times during the construction period. The Permittees utilized a construction site stormwater inspection checklist to identify potential violations. When identified, the Permittees responded to 100% of violations in accordance with Standard Operating Procedures. To keep the construction industry informed about local and state stormwater requirements and to minimize violations, the Permittees collectively hosted four training sessions during the permit year, which were attended by over 125 construction professionals.

14 Staff and Resources

According to permit Section B.6.3.3.11, the Permittees provided information on annual expenditures for the major programs identified in the SWMP for the current permit year. Annual program expenditures for the 2023-2024 MS4 permit year were approximately $215 million for all Permittees combined. The budget for the 2024-2025 MS4 permit year is approximately $214 million. Funding mechanisms and staffing for the Las Vegas Valley MS4 Program for the 2024-2025 MS4 permit year are expected to be similar to those of the reporting permit year.

15 Evaluation of Characterization Data

This section evaluates wet weather characterization data previously submitted and collected. This section also evaluates whether existing data collection programs should be modified. The evaluation provides background and historical information, evaluation of wet weather hydrographs, and evaluation of suspended solids, turbidity, nutrients, and dissolved copper, dissolved lead, and dissolved zinc. This informed the evaluation of the effectiveness of the stormwater monitoring program.

The main conclusions of the evaluation of wet weather characterization data were that:

- There are an appropriate number of monitoring stations and they are appropriately located.
- Although the amount of data is limited by the number of sampleable storms, the amount of data collected is sufficient to inform the issues considered in this evaluation.
- Samples collected are representative of conditions in Las Vegas Valley. Samples may not perfectly represent the entirety of all storms, because the trailing end of storms are not sampled. The trailing end of storms are likely to contain lower concentrations than the sampled portions.

16 Conclusion

The Permittees prepared this Annual Report for the 2023-2024 MS4 permit year to report to NDEP on the status of the MS4 program and to highlight compliance with the permit and SWMP. Annual Report requirements in the MS4 permit were satisfied and all program BMP goals were achieved.

Section 1

Introduction

1 Introduction

The United States Environmental Protection Agency (EPA) has adopted regulations to control pollutants entering the environment through storm drainage facilities associated with the Municipal Separate Storm Sewer System (MS4). In compliance with these regulations, on February 5, 2024, the Nevada Division of Environmental Protection (NDEP) issued National Pollutant Discharge Elimination System (NPDES) Permit No. NV0021911 jointly to the Clark County Regional Flood Control District (CCRFCD), the City of Las Vegas (CLV), the City of North Las Vegas (CNLV), the City of Henderson (COH), and Clark County (CC), collectively known as the Las Vegas Valley Permittees (Permittees). The permit authorizes the Permittees to discharge stormwater from outfalls to the Las Vegas Wash and its tributaries. The permit was issued for a period of five years (2024-2029).

1.1 Annual Report Organization

This Annual Report was prepared to verify that the Permittees have complied with the permit requirements and measurable goals identified in the current Stormwater Management Plan (SWMP) for the year from July 1, 2023 through June 30, 2024. The Annual Report is organized to address each of the main programs required by the NPDES MS4 Permit and associated SWMP for the Las Vegas Valley:

- Section 1.0 Introduction
- Section 2.0 Area of Coverage
- Section 3.0 Water Quality Standards
- Section 4.0 Legal Authority
- Section 5.0 Stormwater Management Approach
- Section 6.0 Source Identification
- Section 7.0 Stormwater Monitoring Program
- Section 8.0 Public Outreach and Education Program
- Section 9.0 Source Control and MS4 Maintenance Program
- Section 10.0 Post-Construction Program for New Development and Significant Redevelopment
- Section 11.0 Illicit Discharge Detection and Elimination Program
- Section 12.0 Industrial Facility Monitoring and Control Program
- Section 13.0 Construction Site Program
- Section 14.0 Staff and Resources
- Section 15.0 Conclusion

1.2 Permit Coordination

The CCRFCD has taken the lead for general administration of the permit conditions, preparation of reports, coordination among Permittees, and serving as the liaison with NDEP. In addition, the

CCRFCD provides funding for many of the regional permit compliance efforts. The CCRFCD also retained Brown and Caldwell and HDR to assist with preparation of information required to comply with the conditions of the permit.

Further permit coordination during the permit year was facilitated by the Stormwater Quality Management Committee (SQMC). The SQMC is comprised of representatives from each of the Permittees (Public Works Director or equivalent), who vote on topics critical for permit implementation. Public SQMC meetings were held four times, on August 8, 2023, on November 14, 2023, February 13, 2024, and May 14, 2024.

SQMC meetings were regularly attended by other employees of the Permittees, employees of other local agencies, entities that have an interest in water quality issues (i.e., stakeholders), and members of the general public. Meeting agendas and meeting minutes were made available to the public and time was allowed in each meeting for public comments.

The SQMC Representatives for the 2023-2024 MS4 permit year are shown in Table 1-1.

Table 1-1: 2023-2024 Stormwater Quality Management Committee (SQMC) Representatives

SQMC Representatives	Title	Permittee
Steve Parrish, PE (Chair)	General Manager/Chief Engineer	Clark County Regional Flood Control District
Lance Olson, PE	Director of Public Works	City of Henderson
Joey Paskey, PE	Director of Public Works	City of Las Vegas
Mike Hudgeons, PE	Director of Public Works	City of North Las Vegas
Denis Cederburg, PE	Director of Public Works	Clark County
SQMC Alternate Representatives	**Title**	**Permittee**
Andrew Trelease, PE	Assistant General Manager	Clark County Regional Flood Control District
Steven Conner, PE	City Engineer	City of Henderson
Rosa Cortez, PE	City Engineer / Deputy Director	City of Las Vegas
Scott Jarvis, PE	Manager of Engineering	City of North Las Vegas
Jimmy Floyd, PE	Manager of Construction Management	Clark County

Section 2

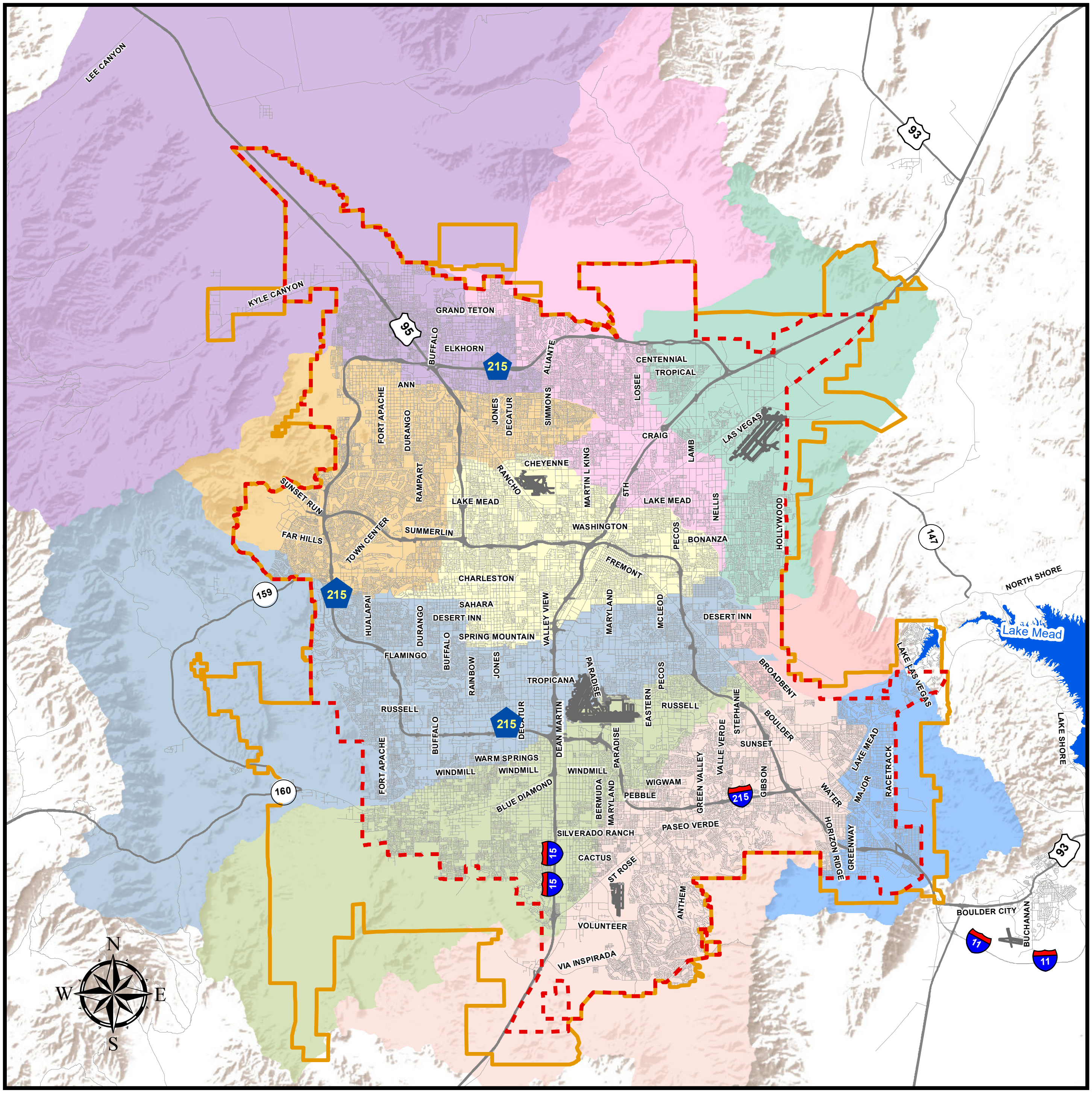
Area of Coverage

2 Area of Coverage

The Las Vegas Valley NPDES MS4 Permit applies to all the urbanized and urbanizing watershed areas that are naturally tributary to the Las Vegas Wash within the UDB. The Las Vegas Wash is upstream of Lake Las Vegas, which is located approximately two miles upstream of Lake Mead. The permit area of coverage includes the cities of Las Vegas, the majority of North Las Vegas, and Henderson, as well as the portions of unincorporated Clark County that lie within the Las Vegas Valley. The permit does not apply to federal or state-owned land in the Las Vegas Valley or to sites that have their own NPDES MS4 Permit (i.e., Nellis Air Force Base, Nevada Department of Transportation [NDOT] facilities).

The CCRFCD established an ultimate development boundary (UDB) in the 2008 Las Vegas Valley Flood Control Master Plan Update (MPU), which was revised in the 2018 MPU. The UDB assumes the full "build out" condition is reached and all available land within the Las Vegas Valley is fully developed. This condition is assumed to ensure that flood control facilities built today will have capacity for future run-off. The development of the UDB is based on the limits of where development is expected to occur in the Las Vegas Valley, using criteria such as location of protected lands and mountain terrain that surround the Valley. The Bureau of Land Management (BLM) manages a "disposal boundary" in the Las Vegas Valley, which designates federally managed lands that could eventually be privatized and potentially developed.

The permit area encompasses the area within the 2018 UDB area within the Las Vegas Valley (LVV) watershed that ultimately contributed to the Las Vegas Wash. The area of coverage for the 2023-2024 MS4 permit year includes the UDB 2018 – Updated for the Las Vegas Valley MS4 Program and the BLM Disposal Boundary, as shown in Figure 2-1.



Legend

Ultimate Development Boundary Updated for the Las Vegas Valley MS4 Program (2018 MPU)

Las Vegas Valley Disposal Boundary

Airport

Street

Watersheds

C1

CENTRAL

DUCK CREEK

FLAMINGO/TROPICANA

GOWAN

LOWER LAS VEGAS WASH

LOWER NORTHERN

PITTMAN

RANGE WASH

UPPER NORTHERN

0 2 4 8 12

Scale in Miles

Service Layer Credits: Sources: Esri, USGS, NOAA

Figure 2-1
Area of Coverage
2023-2024 Annual Report

Section 3

Water Quality Standards

3 Water Quality Standards

Sections B.4.1. and B.4.2. of the 2024-2029 NPDES MS4 Permit for the Las Vegas Valley include requirements relative to potential contributions of stormwater to impaired waters of the United States. In accordance with the requirements of Section 303(d) of the Clean Water Act (CWA), the Permittees must evaluate whether stormwater discharges from any part of the MS4 contribute directly or indirectly to the listing of a waterbody as an impaired waterbody on the 303(d) list. If MS4 discharges are found to contribute to the listing of a waterbody on the 303(d) list, the Permittees must also determine whether a Total Maximum Daily Load (TMDL) has been approved by NDEP for the waterbody, as well as determine compliance with the established TMDL.

3.1 Impaired Waters in the Las Vegas Valley

In accordance with the CWA, every two years the NDEP conducts a comprehensive water quality data analysis concerning Nevada's surface waters to determine compliance with established water quality standards. The Nevada 2020-2022 Water Quality Integrated Report (IR), which assessed data from October 1, 2013 through September 30, 2020, was finalized in February 2022.

Segments of the Las Vegas Wash and selected tributaries were identified in the IR as waterbodies impaired for the following parameters: boron, selenium, total dissolved solids (TDS), total suspended solids (TSS), fluoride, iron, *Escherichia coli* (*E. Coli)*, and temperature, as indicated in Table 3-1.

Table 3-1: 303(d) List of Impaired Waterbodies in the Las Vegas Valley (2022)

Waterbody	Location	Impairment Parameter	Beneficial Use(s)
Duck Creek	From its origin to the Las Vegas Wash	Boron	Irrigation
		Fluoride	Irrigation
		Selenium	Aquatic Life, Irrigation
		Total Dissolved Solids (TDS)	Livestock
		Temperature	Aquatic Life
Flamingo Wash	From its origin to the Las Vegas Wash	Boron	Irrigation
		Iron	Aquatic Life
		Selenium	Aquatic Life, Irrigation
		Total Suspended Solids (TSS)	Aquatic Life
Las Vegas Creek	From its origin to the Las Vegas Wash	Selenium	Aquatic Life
Las Vegas Wash	Above treatment plants	Boron	Irrigation
		E. Coli	Recreation no Contact
		Iron	Aquatic Life
		Selenium	Aquatic Life
		Total Dissolved Solids (TDS)	Livestock
		Total Suspended Solids (TSS)	Aquatic Life
Sloan Channel	From North Las Vegas Blvd to the Las Vegas Wash	Boron	Irrigation
		Fluoride	Irrigation
		Selenium	Aquatic Life, Irrigation

Nevada has revised the standards (NAC 445a), so some impaired parameters will be removed in the future. Sources of constituents causing impairment, as included in the 303(d) list that have the potential for direct or indirect contributions by flows from the MS4 system, are summarized in Table 3-2. As stated in the IR, waterbody impairments are largely due to nonpoint source pollution (e.g., recharge to shallow groundwater aquifers and natural erosion).

Table 3-2: Cause and Contribution of Constituents of MS4 Discharges on Impaired Waterbodies in the Las Vegas Valley

Constituent	Cause of Listing	Did Stormwater Cause or Contribute to the Listing?
Boron	Flow through native sub-surface soils; Resurfacing shallow groundwater	No
E. Coli	Attributed to animals/wildlife	No
Fluoride	Flow through native sub-surface soils; Resurfacing shallow groundwater	No
Iron	Sediment transported in stream channels; Soil runoff	No
Selenium	Flow through native sub-surface soils; Resurfacing shallow groundwater	No
TDS	Flow through native sub-surface soils; Resurfacing shallow groundwater;	No
Temperature	Weather conditions	No
TSS	Sediment transported in stream channels Soil runoff	No

3.2 Water Quality Standards

The Nevada Administrative Code (NAC) Section 445A outlines water quality standards designed to protect Nevada's surface waters.

At the Club at Sunrise, the wet weather sample exhibited a concentration higher than the water quality standard (WQS) for iron. At the Rainbow Gardens site, the wet weather sample exhibited a concentration higher than the WQS for iron. Iron is a common and natural constituent of soil. The iron is believed to be from natural erosion.

3.3 Permit Compliance for Constituents with a TMDL

The NPDES MS4 Permit requires the Permittees to comply with permit Section B.4.2.2 for constituents with established TMDLs. The NDEP has approved a TMDL for total phosphorus and total ammonia for the Las Vegas Wash. The total ammonia TMDL is allocated entirely to point source wastewater discharges.

B.4.2.2.1 Determine and report whether the approved TMDL applies to stormwater discharges from the Permittees' MS4;

The approved TMDL does not apply to stormwater discharges from the Permittee's MS4.

B.4.2.2.2 Determine and report whether the TMDL includes a pollutant wasteload allocation ("WLA") or other performance requirements specifically for stormwater discharge from the Permittees' MS4;

The phosphorus and ammonia TMDLs do not include a pollutant WLA or other performance requirements specifically for stormwater discharge from the Permittees' MS4.

B.4.2.2.3 Determine and report whether the TMDL addresses a flow regime likely to occur during periods of stormwater discharge;

The phosphorus and ammonia TMDLs do not address a flow regime likely to occur during periods of stormwater discharge.

B.4.2.2.4 Assess whether applicable WLAs are being met through implementation of existing stormwater control measures and evaluate whether additional or modified control measures are necessary;

The WLAs apply to the wastewater discharges and are being met. The load allocation of 100 lbs/day for total phosphorus is currently being met.

B.4.2.2.5 Document all control measures currently being implemented or planned to be implemented to be consistent with an applicable WLA. Also include a schedule of implementation for all planned controls. Document the calculations or other evidence that shows that the WLA will be met;

Not applicable, however, BMPs adopted in the SWMP address phosphorus and other nutrients.

B.4.2.2.6 Describe a monitoring program to determine whether the stormwater controls are adequate to meet the WLA;

Not applicable.

B.4.2.2.7 If the evaluation shows that additional or modified controls are necessary, describe the type and schedule for the control additions/revisions, and an analysis that demonstrates the overall effectiveness.

No additional or modified BMPs are necessary.

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Section 4

Legal Authority

4 Legal Authority

Section B.5.15 of the NPDES MS4 Permit for the Las Vegas Valley requires each of the Permittees to have an ordinance in place to authorize or enable all requirements of the permit. Further, Section B.5.1.6 of the permit requires the Permittees to present a review of legal authority to implement the requirements of the permit and the SWMP and to identify additional ordinances or regulatory mechanisms to be adopted.

4.1 Ordinances and Revisions to Ordinances

The Cities and Clark County Permittees are supported by local ordinances that grant them the authority to implement the requirements of the NPDES MS4 Permit. The Permittees' existing stormwater ordinances, as well as the status of revisions to ordinances related to stormwater for the permit year, are listed in Table 4-1. When appropriate, modifications to ordinances were adopted within the 12 month target window.

Current stormwater ordinances for each municipal Permittee are found by searching the municode library website by location (https://library.municode.com). The existing legal authority of Permittees is adequate to prohibit illegal discharges to the MS4, to control spills, and to determine and require compliance with all current NPDES MS4 Permit program components.

Table 4-1: Las Vegas Valley MS4 Permittees' Local Stormwater Ordinances and Status of Revisions to Ordinances

Municipal Permittee	Local Stormwater Ordinance(s)	Annual Review Performed	Revisions to Ordinances
City of Henderson	Chapter 13.04 of the City of Henderson Municipal Code: Stormwater Regulations; 19.8.4 COH Hillside Overlay District; 19.14.6 Drainage Design Adoption of the HCCDM; Title 14 Utility Services; Title 15.12 Property Maintenance Code; Title 15.32 International Fire Code	Yes	None
City of Las Vegas	LVMC 6.54 Mobile Car Wash/Auto Detail Business; LVMC 13.04 Use of Streets and Sidewalks; LVMC 14.08 Water Regulations; LVMC 14.11 Water Conservation; LVMC 14.17 Wastewater Collection and Treatment; LVMC 14.18 Stormwater and Stormwater Management; LVMC 20.04 Flood Control Channels Master Plan; LVMC 20.08 Flood Hazard Reduction; LVMC 20.10 Uniform Regulations for the Control of Drainage; Title 19.060.040(F) and Title 19.08.040(F) for Landscaping and Low Impact Development; Title 19.09.080 Open Space Standards; Title 19.10.140 Hillside Overlay; 2050 Master Plan (Land Use/Density/Rural Land Overlay); and Special Area Plans.	Yes	LVMC 14.11 Water Conservation was adopted by City Council on 08/16/23

Table 4-1: Las Vegas Valley MS4 Permittees' Local Stormwater Ordinances and Status of Revisions to Ordinances

Municipal Permittee	Local Stormwater Ordinance(s)	Annual Review Performed	Revisions to Ordinances
City of North Las Vegas	Chapter 8.50 of the City of North Las Vegas Municipal Code (NLVMC): Stormwater Regulations	Yes	None
Clark County	Title 24, Chapter 24.40 Storm Sewer System Discharge / Other related ordinances include: 9.08 - Air Quality & Environmental Management, 10.36 - Animals, noise, waste, restraint, sanitation & dead animals, 10.40 - Enforcement, 11 - Abatement and Nuisances, Title 22 – Building and Construction, 22.02.492 - Storm sewer system inspections, 25.10 – Building Water Conservation, 25.20 – The Energy Conservation, Title 30 – Open Space Requirements including, 30.20.110 - Document Submittal Requirements, 30.24.080 – Design Standards and Guidelines, 30.24.090 – Special Development Standards, 30.32.040 – Grading Permits, 30.32.080 – Improvement Plans, 30.52 - Off-Site Development Requirements, 30.52.050 – Improvement Standards, 30.56 – Development Standards, 30.56.085 - Energy Efficient Lot Configuration and Building Orientation, 30.56.100 – Hillside Development, 30.60.050 - Design and Layout of Parking, 30.64 - Site Landscape and Screening Standards, 30.68 - Site Environmental Standards. Regional Flood Control District's (RFCD) Hydrologic Criteria and Drainage Design Manual (HCDDM).	Yes	A revision of Title 30 was completed and released on January 1, 2024. Title 30 Open Space Landscaping – Increased requirements for street and parking lot trees; Turf is only permissible for parks, cemeteries, and schools; Native plants, 10% more trees, & Water efficient landscaping requirements; Commercial and industrial line signoff for the Landscaping Certificate; Added a Landscaping Installation Guide with information about stormwater BMPs. Title 30 New LID or LEED requirements – 70% roof and 50% parking solar; Cool roofs; On-site solar to generate 100% of project's estimated annual electricity use; Battery backup for critical loads or offset peak grid demand; Low emissivity glass.
SWMP Target	Ordinances provide legal authority to Permittees to conduct SWMP activities		
	Ordinances reviewed annually		
	New or modified ordinances adopted within 12 months		

4.2 Compliance and Enforcement

Each Permittee requires compliance with its stormwater ordinances and regulations, as it does with all local jurisdiction ordinances. The public and business communities are made aware of local stormwater regulations through a variety of outreach measures, including the Las Vegas Valley NPDES MS4 Permit Public Outreach and Education Program (described in Section 8.0 of this Annual Report). Local ordinances and individual standard operating procedures regarding enforcement were reviewed by each Permittee during the permit year.

Regular inspection and monitoring procedures used by the Permittees to track compliance with stormwater ordinances prohibiting illegal dumping and discharges to the MS4 are presented in Section 9.0 and Section 11.0 of this Annual Report. Inspection and monitoring procedures used to track compliance with stormwater ordinances specifically related to industrial sites and construction activities are presented in Section 12.0 and Section 13.0 of this Annual Report, respectively.

Stormwater inspectors, law enforcement officers, code enforcement officers, and / or pretreatment officials for the Cities and Clark County have the legal authority to enforce their jurisdiction's stormwater ordinances and other regulations. Municipal/County codes describe enforcement measures that are applied to violators of stormwater ordinances and regulations. Enforcement responses vary in severity from verbal warnings up to fines or judicial actions. The Southern Nevada Health District (SNHD) also enforces ordinances prohibiting dumping of solid waste, semisolid waste, liquid waste, and sewage to the Las Vegas Valley MS4. Members of the SQMC work together to coordinate cross-jurisdictional cooperation and compliance with all stormwater ordinances.

Section 5

Stormwater Management Approach

5 Stormwater Management Approach

The Las Vegas Valley NPDES MS4 Permit requires the Permittees to develop a Stormwater Management Plan (SWMP) that is suited to the unique local hydrologic, hydrogeologic, and regional conditions of the Las Vegas Valley. The SWMP is consistent with local and state laws, regulations, and water resources plans. The Las Vegas Valley SWMP that applies to the 2023-2024 MS4 permit year was approved by NDEP on November 1, 2011 and was implemented in November 2013. A copy of the current SWMP is provided at www.LVstormwater.com.

The Las Vegas Valley SWMP is uniquely tailored to local conditions and relies on a regional management approach. The SWMP framework utilizes common stormwater treatment train principles, which include progressively applied layers of controls from pollution prevention, onsite controls, maintenance measures, and treatment control. The Las Vegas Valley SWMP framework is outlined in Section 3.3 of the SWMP.

5.1 Overview of Best Management Practices

The SWMP provides details on the BMPs that were adopted by the Permittees to address permit requirements. Many BMPs provide benefits to multiple NPDES MS4 programs. However, to simplify tracking and reporting for the SWMP and this Annual Report, BMPs that may provide benefits to multiple programs were only assigned to one. This program was determined based on the primary benefits that these BMPs provide. BMPs implemented in each program to comply with permit requirements are shown in Table 5-1.

Table 5-1: Best Management Practices Organized by Las Vegas Valley Stormwater Management Plan Program

Type	ID No.	Best Management Practices	Stormwater Management Plan Program						
			Public Outreach and Education Program	Source Control and MS4 Maintenance Program	Post-Construction Program for NDSR	Illicit Discharge and Elimination Program	Industrial Facility Monitoring and Control Program	Construction Site Program	Watershed Program
Maintenance Measures	MM-1	Street Sweeping		X					
	MM-2	Local Storm Drain System Maintenance		X					
	MM-3	Regional Detention Basin Maintenance		X					
	MM-4	Maintenance of Public Facilities		X					
Source Control	SC-1	Water Conservation (Drought) Ordinance		X					
	SC-2	Turf Conversion Program		X					
	SC-3	Public Employee Supervisor Fertilizer/ Pesticide Training		X					
	SC-4	Use of Alternate Products and Application Procedures		X					
	SC-5	Household Hazardous Waste Collection		X					
	SC-6	Commercial / Industrial Housekeeping Practices					X		
	SC-7	Ordinances Prohibiting Non-Stormwater Discharges and Littering		X					
	SC-8	Desert Dumping Controls		X					
	SC-9	Grease Interceptor Program					X		
	SC-10	Dust Control Measures		X					
	SC-11	Storm Drain Marking Program	X						
	SC-12	Spill Control Prevention Plan				X			
	SC-13	Industrial Pretreatment Program					X		
	SC-14	Trash Receptacle Enclosures		X					
	SC-15	Southern Nevada Health District Inspections					X		
	SC-16	Regional Water Quality Planning				X			
	SC-17	Pet Waste Management	X						
	SC-18	Stormwater Outfall Map			X				

Note: Cells marked with an “X” indicate the primary program that utilizes the identified BMP. However, the BMP may also be utilized by other MS4 Management Plan Programs.

Table 5-1: Best Management Practices Organized by Las Vegas Valley Stormwater Management Plan Program

Type	ID No.	Best Management Practices	Stormwater Management Plan Program						
			Public Outreach and Education Program	Source Control and MS4 Maintenance Program	Post-Construction Program for NDSR	Illicit Discharge and Elimination Program	Industrial Facility Monitoring and Control Program	Construction Site Program	Watershed Program
Source Control	SC-19	Sanitary Sewer Line Inspection and Replacement Program				X			
	SC-20	Construction Site BMP Guidance Manual						X	
	SC-21	Construction Site Inspections						X	
	SC-22	Construction Site Training Workshops						X	
	SC-23	Industrial Facility Stormwater Inspections					X		
	SC-24	Industrial Facility Stormwater Inventory					X		
	SC-25	Industrial Facility Stormwater Inspection Checklist					X		
	SC-26	Storm Channel Inspections				X			
	SC-27	Dry Weather Monitoring				X			
	SC-28	Industrial Facility Inspector Training Workshops					X		
	SC-29	Stormwater-Related Complaint Response				X			
	SC-30	LVV Stormwater Quality Website	X						
	SC-31	Public Outreach Events	X						
	SC-32	Elementary School Presentations	X						
	SC-33	Public Service Announcements / Flood Channel	X						
	SC-34	Brochures and Printed Material	X						
	SC-35	Stormwater Outfall Map with Areas of NDSR			X				
Site Design	SD-1	Open Space and Landscaping Objectives			X				
	SD-2	Rural Land Overlay			X				
	SD-3	Hillside Development Ordinances			X				

Note: Cells marked with an “X” indicate the primary program that utilizes the identified BMP. However, the BMP may also be utilized by other MS4 Management Plan Programs.

Table 5-1: Best Management Practices Organized by Las Vegas Valley Stormwater Management Plan Program

Type	ID No.	Best Management Practices	Stormwater Management Plan Program						
			Public Outreach and Education Program	Source Control and MS4 Maintenance Program	Post-Construction Program for NDSR	Illicit Discharge and Elimination Program	Industrial Facility Monitoring and Control Program	Construction Site Program	Watershed Program
Site Design	SD-4	Sustainability and Green Building Initiatives			X				
	SD-5	Covered Fuel Areas			X				
	SD-6	Raised Fuel Areas			X				
	SD-7	Emergency Shut-Off Switch and Shear Valve			X				
	SD-8	Standard Drainage Design Criteria			X				
	SD-9	Parking Lot Low Impact Development (LID) Measures			X				
	SD-10	LID Measures			X				
Treatment Control	TC-1	Regional Detention Basins			X				
	TC-2	Regional Channel Lining			X				
	TC-3	Las Vegas Wash Stabilization Structures			X				
	TC-4	Sand / Oil Separator			X				
	TC-5	Sand Filter			X				
	TC-6	Regional Detention Basin Retrofit			X				

Note: Cells marked with an "X" indicate the primary program that utilizes the identified BMP. However, the BMP may also be utilized by other MS4 Management Plan Programs.

Section 6

Source Identification

6 Source Identification

Section B.5.2 of the Las Vegas Valley NPDES MS4 Permit requires the preparation of a map of the existing regional storm drain system to depict major stormwater outfalls in the area of coverage. During the permit year, the stormwater system map was updated to assist Permittees, regulatory agencies, and others in determining where potential stormwater quality problems may exist or originate. The map is based on existing computerized inventory information from the Permittees that defines the existing drainage and flood control system.

The map was prepared using regional information from the CCRFCD Geographic Information System (GIS), which was developed for the Las Vegas Valley Master Plan Update, as well as GIS data available from the individual Permittees. The stormwater system map depicts changes resulting from new development and updates to the flood control infrastructure. Locations of regional detention basins (constructed and under construction), channels (lined and unlined), washes, and outfall locations for the Las Vegas Valley stormwater system are shown in Figure 6-1.

To provide more detail, Figure 6-2 through Figure 6-5 depict sectional areas of the Las Vegas Valley (northwest, northeast, southwest, and southeast, respectively). The overall stormwater system map meets the permit requirements for source identification of major outfalls that discharge into waters of the United States.

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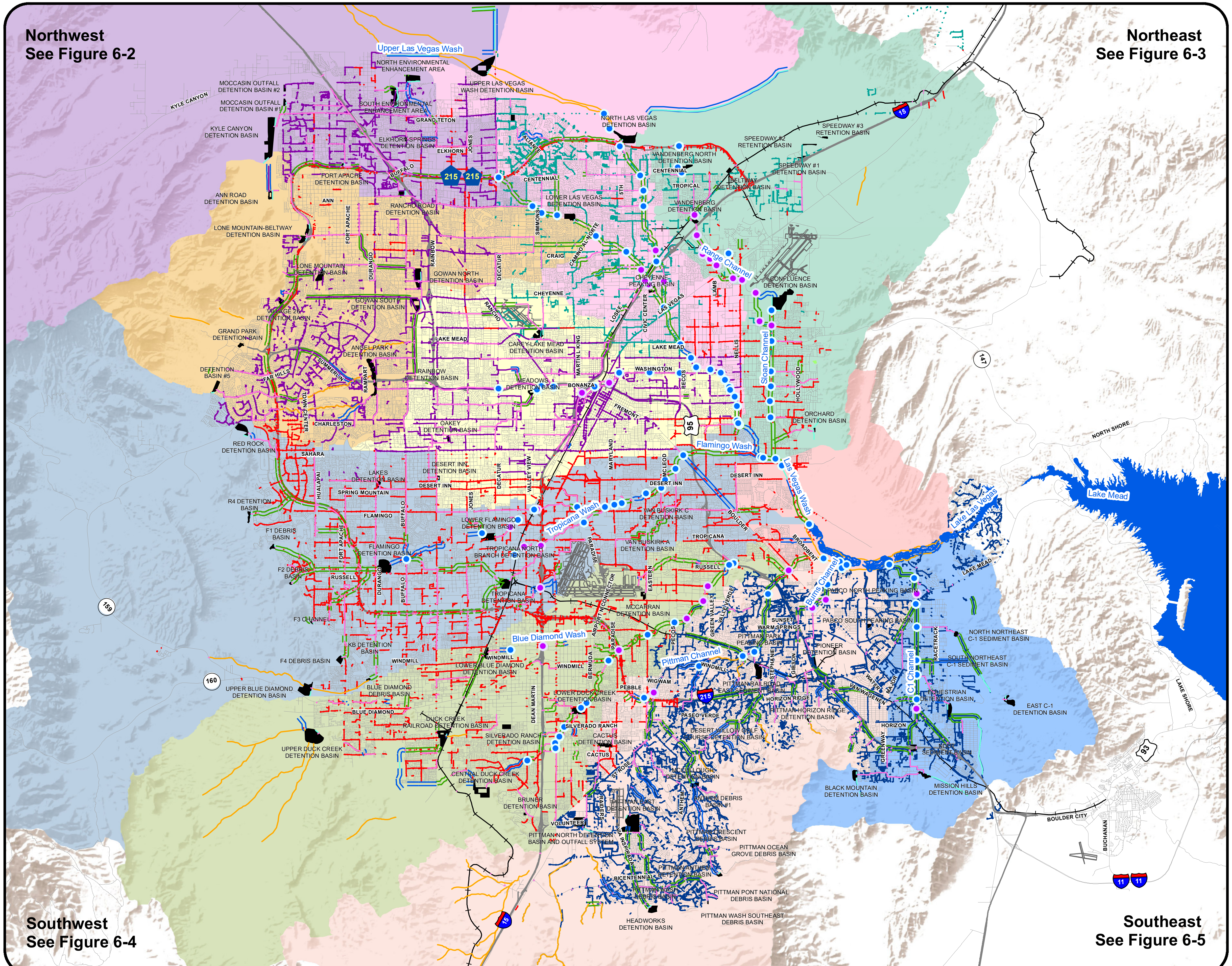
Figure 6-1
Las Vegas Valley Stormwater System: Overview



Legend

- Potential Outfall Location
- Potential Outfall Location in Industrial Area

Regional Facilities

- Natural Channels/Washes
- Unlined Stabilized Channels
- Concrete-Lined Channels
- Levee
- Storm Drains

Local Facilty

- Clark County Stormwater Infrastructure
- City of Las Vegas Stormwater Infrastructure
- City of North Las Vegas Stormwater Infrastructure
- City of Henderson Stormwater Infrastructure

Detention Basins

- Completed
- Under Construction
- Airports
- Streets
- Railroads

Watersheds

- C1
- CENTRAL
- DUCK CREEK
- FLAMINGO/TROPICANA
- GOWAN
- LOWER LAS VEGAS WASH
- LOWER NORTHERN
- PITTMAN
- RANGE WASH
- UPPER NORTHERN

N S E W

0 1 2 4 6

Scale in Miles

Service Layer Credits: Sources: Esri, USGS, NOAA

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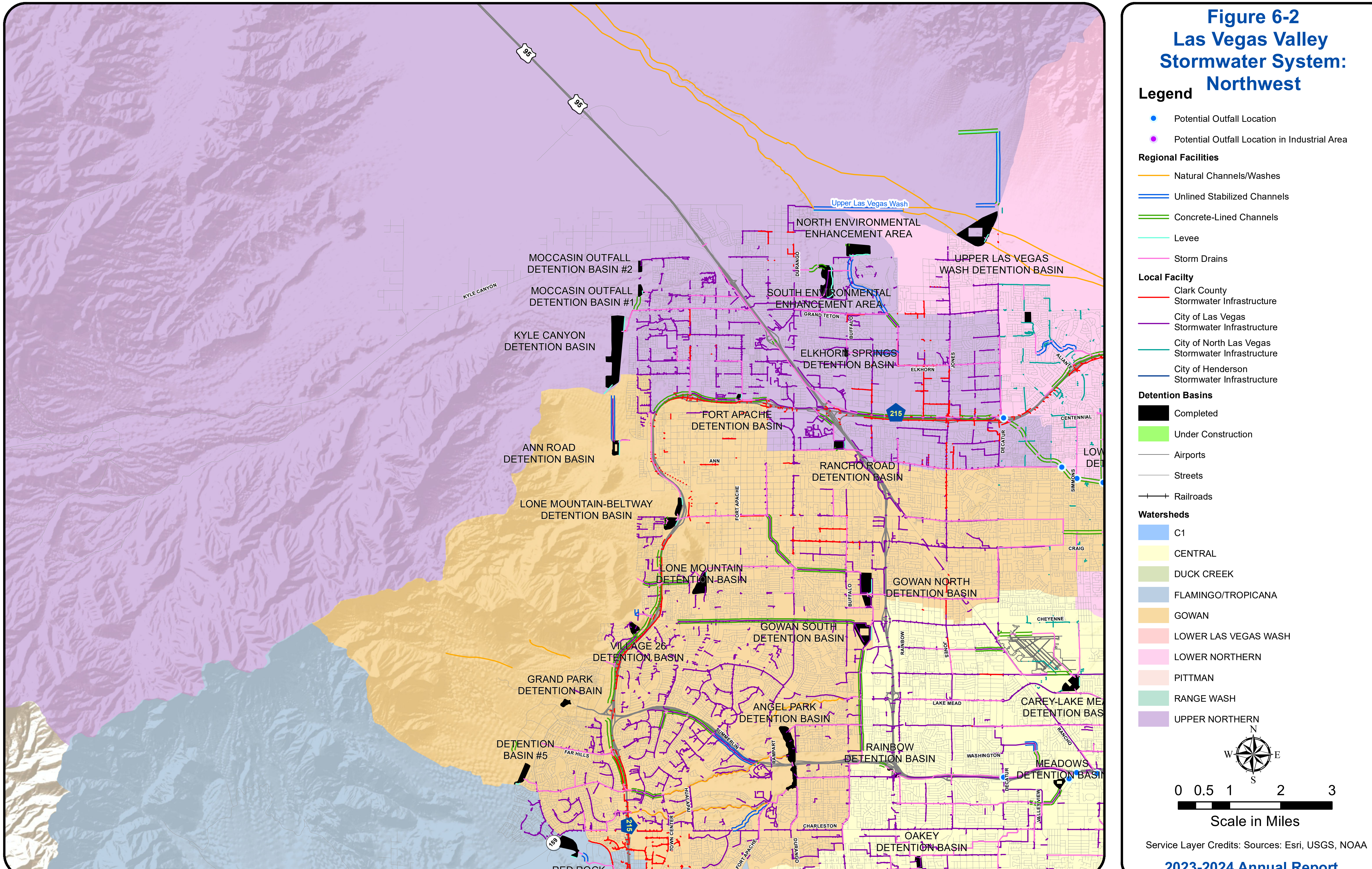
Figure 6-2
Las Vegas Valley Stormwater System: Northwest



Service Layer Credits: Sources: Esri, USGS, NOAA

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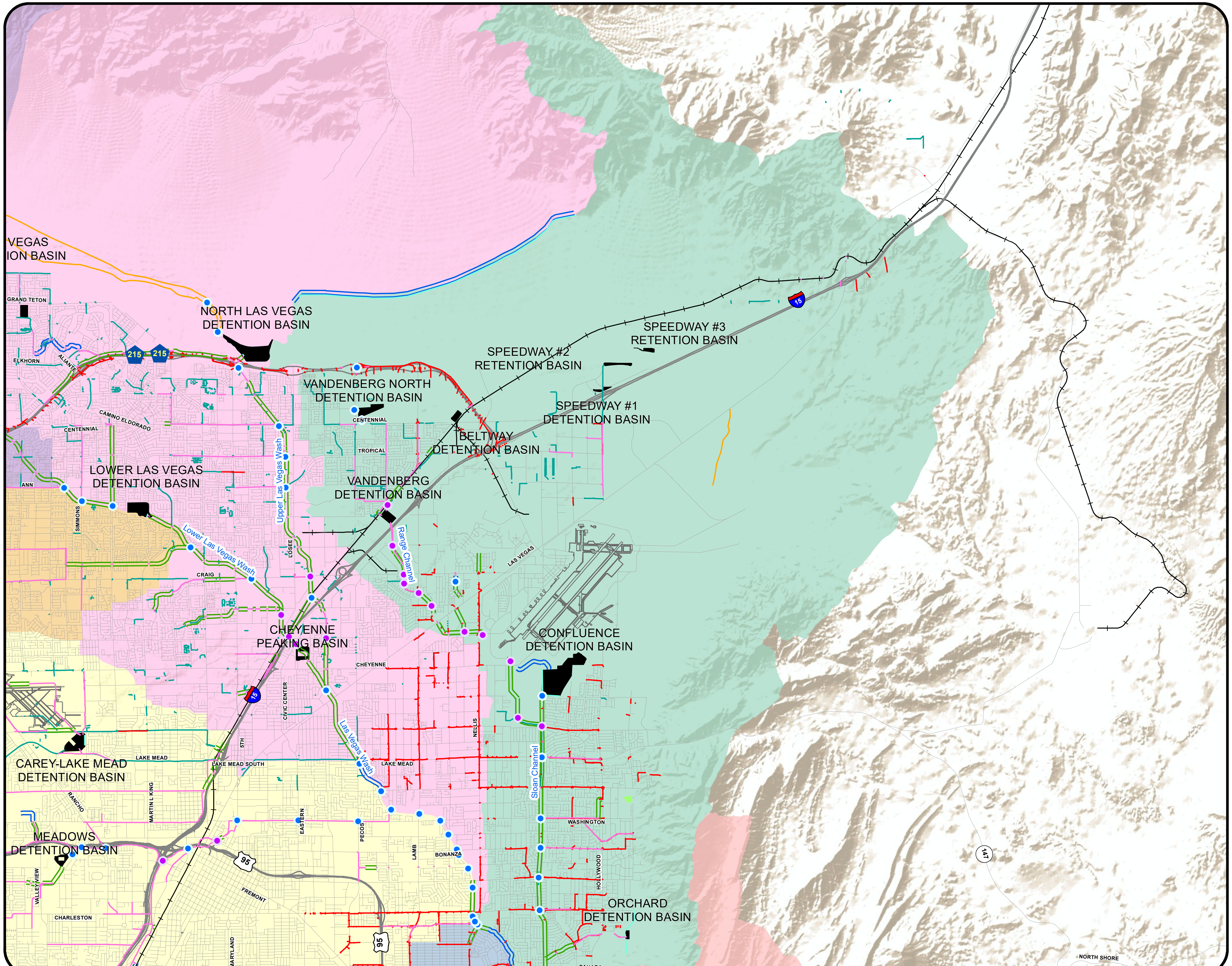

Figure 6-3
Las Vegas Valley Stormwater System: Northeast

Legend

- Potential Outfall Location
- Potential Outfall Location in Industrial Area

Regional Facilities

- Natural Channels/Washes
- Unlined Stabilized Channels
- Concrete-Lined Channels
- Levee
- Storm Drains

Local Facilty

- Clark County Stormwater Infrastructure
- City of Las Vegas Stormwater Infrastructure
- City of North Las Vegas Stormwater Infrastructure
- City of Henderson Stormwater Infrastructure

Detention Basins

- Completed
- Under Construction
- Airports
- Streets
- Railroads

Watersheds

- C1
- CENTRAL
- DUCK CREEK
- FLAMINGO/TROPICANA
- GOWAN
- LOWER LAS VEGAS WASH
- LOWER NORTHERN
- PITTMAN
- RANGE WASH
- UPPER NORTHERN

N W E S

0 0.5 1 2 3

Scale in Miles

Service Layer Credits: Sources: Esri, USGS, NOAA

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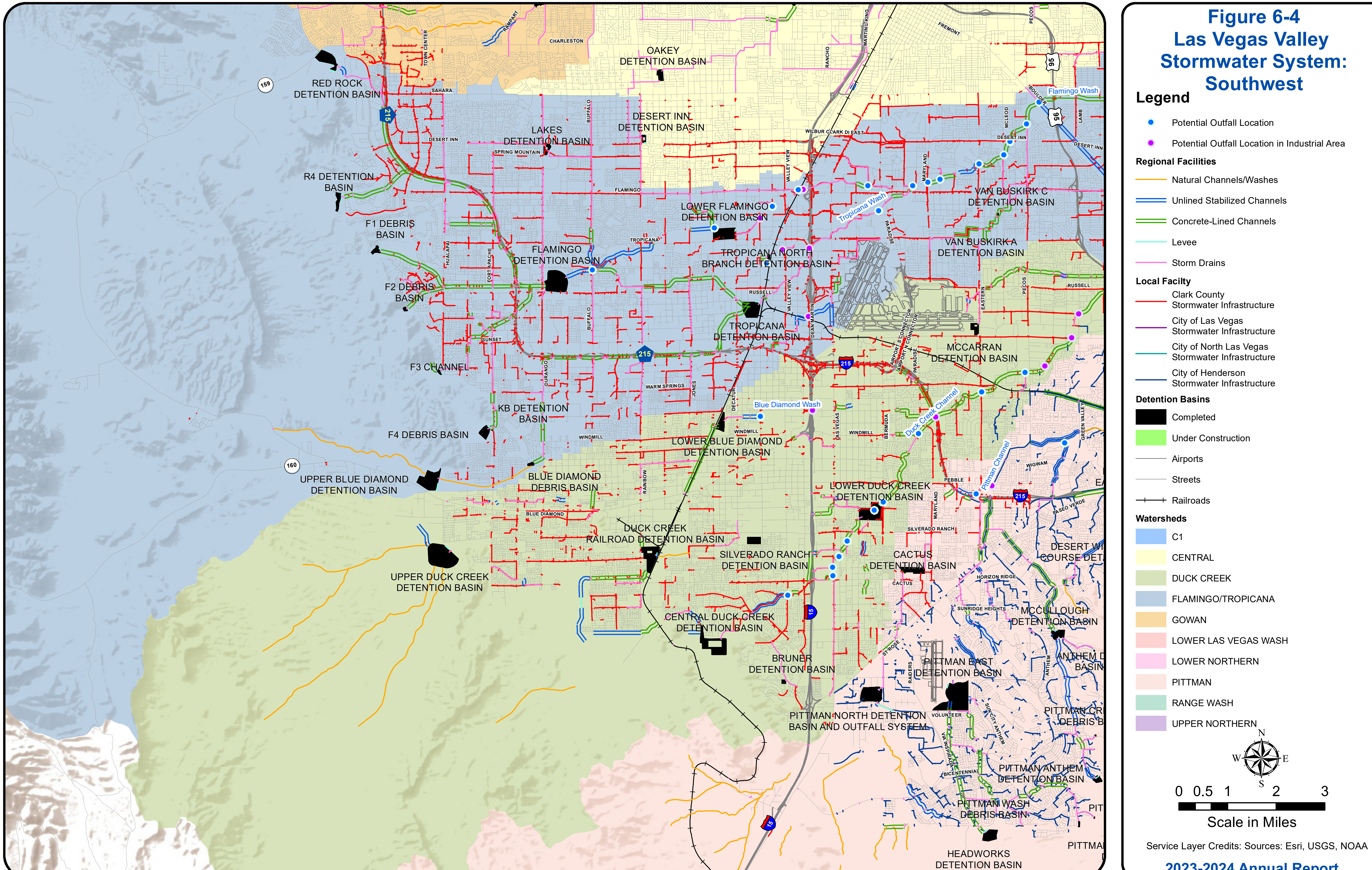
Figure 6-4
Las Vegas Valley Stormwater System: Southwest



Service Layer Credits: Sources: Esri, USGS, NOAA

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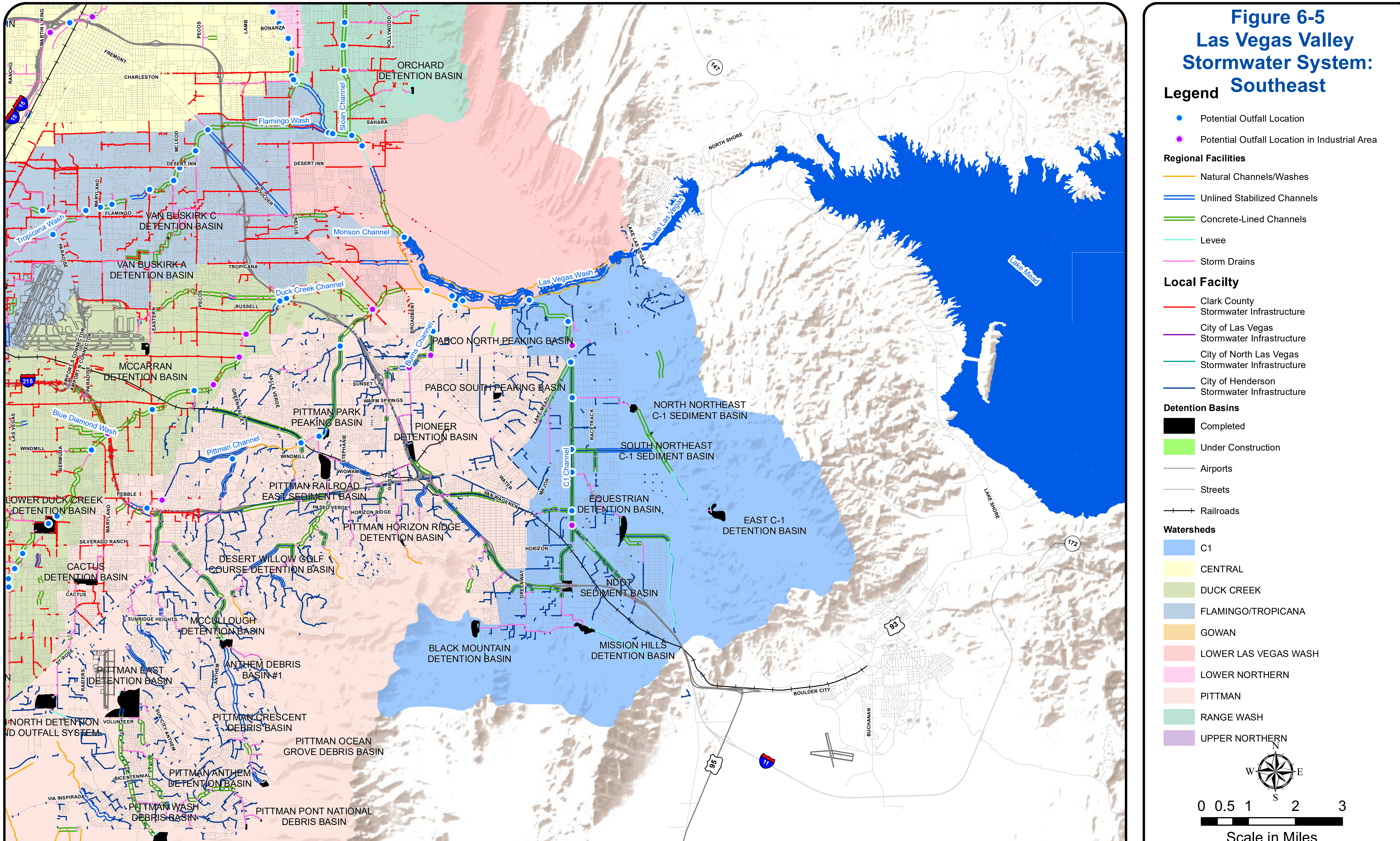
Figure 6-5
Las Vegas Valley Stormwater System: Southeast



Service Layer Credits: Sources: Esri, USGS, NOAA

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Section 7

Stormwater Monitoring Program

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7 Stormwater Monitoring Program

Section B.6.1 of the NPDES MS4 Permit for the Las Vegas Valley describes the requirements for a monitoring program, which includes the evaluation of available water quality characterization data for the permit area. Sections B.6.3.3.5 and B.6.3.3.6 include additional requirements for reporting on the monitoring program. This section of the Annual Report includes data collected from the Wet Weather (Stormwater) Monitoring Program, as required by the MS4 permit year 2023-2024.

7.1 Wet Weather Monitoring

Wet weather (stormwater) monitoring for the Las Vegas Valley NPDES MS4 Permit has two primary objectives:

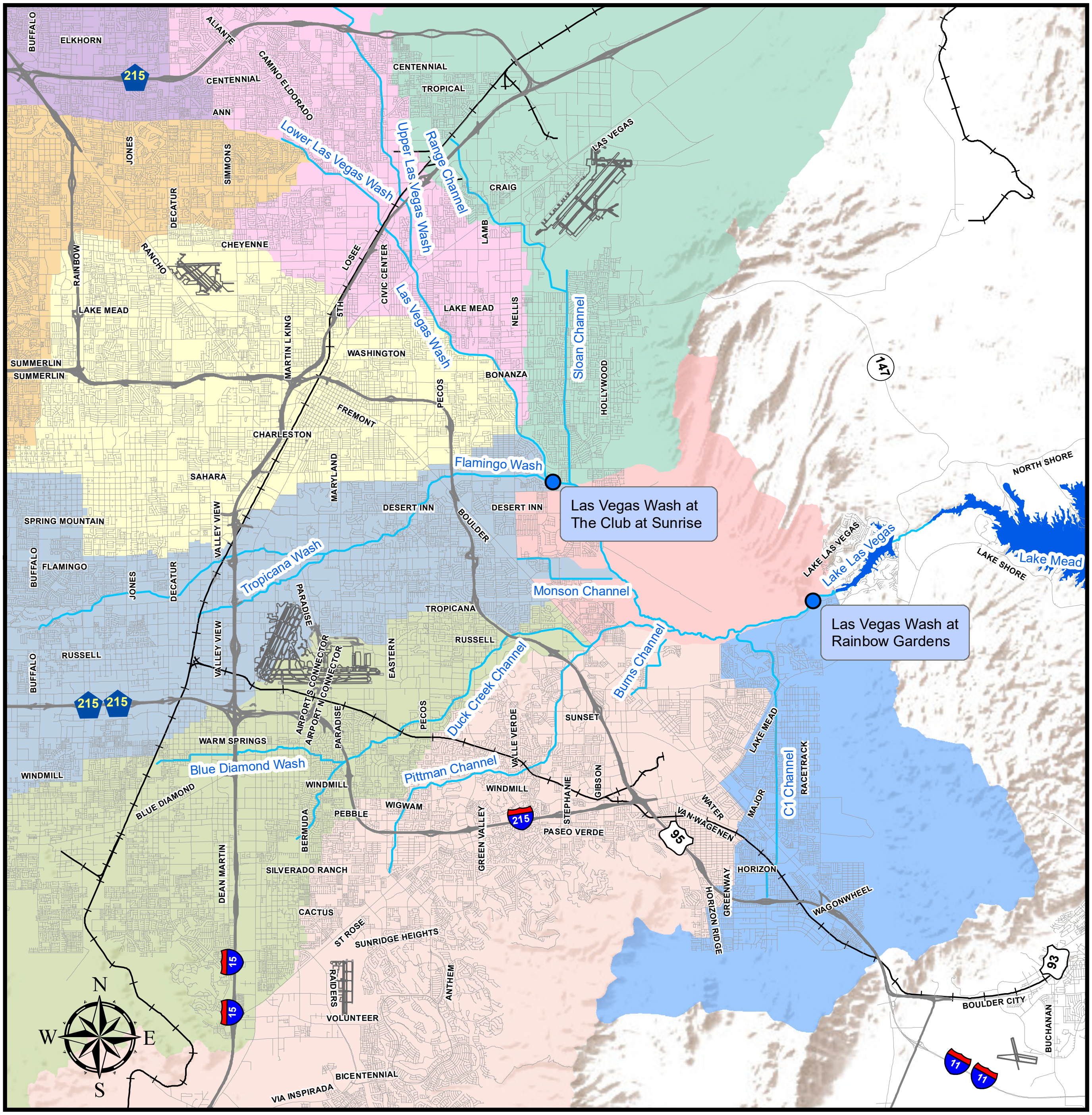
1. To characterize the water quality of stormwater discharges.
2. To assess the appropriateness of existing BMPs.

7.1.1 Wet Weather Sampling Procedures

The wet weather monitoring program for MS4 permit year 2023-2024 followed the same protocols used in previous years. All samples were properly preserved and analyzed using approved methods in accordance with 40 CFR 136 and were analyzed within the maximum allowable holding times. Sampling is conducted at the following locations, as displayed in Figure 7-1:

- Las Vegas Wash at The Club at Sunrise (The Club at Sunrise)
- Las Vegas Wash at Rainbow Gardens (Rainbow Gardens)

The wet weather sampling procedure for the 2023-2024 MS4 permit year included collecting three samples per year, with a maximum of ten samples per year weather dependent, from each of the two sample sites during significant storm events. A significant storm event was defined as having a total rainfall depth of 0.16 inches at any rain gauge within the drainage area tributary to a monitoring station. To generate sufficient runoff for sampling, a storm depth of at least 0.16 inches was required, based on past experience. The sampling team used both the CCRFCD website (https://www.regionalflood.org) and the USGS website (http://waterdata.usgs.gov/nv/nwis/current/?type=flow) to view rainfall maps and stream gauge water levels in the Las Vegas Valley in real time. This data helped determine if the storm was likely to meet the stormwater sampling criteria. During the 2023-2024 MS4 permit year this level of rain event occurred one time at The Club at Sunrise site and the Rainbow Gardens site. Sampling crews were mobilized when available data indicated the potential for runoff producing storm events. Storm events of a significant size trigger the actuators, installed at both sampling sites, to collect samples.



Legend

- Wet Weather Sampling Point
- Airports
- Streets
- Railroads
- Lakes
- Washes

Watersheds

- C1
- CENTRAL
- DUCK CREEK
- FLAMINGO/TROPICANA
- GOWAN
- LOWER LAS VEGAS WASH
- LOWER NORTHERN
- PITTMAN
- RANGE WASH
- UPPER NORTHERN

Service Layer Credits: Sources: Esri, USGS, NOAA

Figure 7-1
Wet Weather Monitoring Sites
2023-2024 Annual Report

The collected stormwater samples were brought back to the in-office laboratory for preparation. Composite samples were prepared for each site by either combining approximately equal volumes from each bottle, where variable stormwater volumes were included in the composite sample. For each sample in the 2023-2024 MS4 permit year, composite samples were prepared, and volumes were individually extracted into laboratory sample bottles and preserved, according to laboratory/method requirements. Samples were then delivered to Silver State Analytical Laboratories, a laboratory certified by the State of Nevada for each constituent analyzed.

7.1.2 Wet Weather Constituents

The wet weather program identified two separate suites of constituents for laboratory analysis – the “long list” and a condensed “short list”. The “long list” of constituents is analyzed for the first three storm events of each permit year, and the "short list" is analyzed for any remaining sampling events. The constituents for the 2023-2024 MS4 permit year are shown in Table 7-1. The “short list” of constituents is included in the table and are indicated in bold text.

Table 7-1: Constituents and Analytical Methods in Wet Weather Samples for the Current MS4 Permit Year (2023-2024)

Analytical Method	Constituents Analyzed
8260B	2-chloroethyl vinyl ether
SM 2320B	Alkalinity, bicarbonate, carbonate
SM 4500NH3D	**Ammonia**
SM 5210B	**Biological Oxygen Demand (BOD)**
531 / 632	Carbamate pesticides
SM 5220D	**Chemical Oxygen Demand (COD)**
SM 4500CNE	Cyanide
SM 2510B	Electrical conductivity
SM 9223B	***E. Coli***
Colilert-18	**Fecal coliform**
Enterolert	**Fecal *Streptococcus***
SM 2340B	Hardness
8151A	Herbicides
200.7	Magnesium, sodium, iron, aluminum
SM 5540C	**Methylene Blue Active Substances (MBAS) (Surfactants)**
245.2	**Mercury**
300	**Nitrate-N, nitrite-N**, bromide, sulfate, fluoride
1664A	**Oil and grease**
525.2, 531.2, 551.1, 556, 625, 8081A, 8082, 8270D	Organics
556	Pesticides, volatile organic compounds
SM 4500-HB	**pH**
200.8	**Selenium**, **selenium (dissolved)**, antimony, barium, beryllium, **boron**, cadmium, chromium, **copper, copper (dissolved), lead, lead (dissolved)**, arsenic, manganese, nickel, silver, thallium, **zinc, zinc (dissolved)**
SM 5540C, 425.1	Surfactants
SM 2540C	**TDS**
Thermal Analysis	**Temperature**
SM 5310C, 415.3	Total Organic Carbon (TOC)
Calculation	**Total Organic Nitrogen (TON)**
SM 4500NorgC	**Total Kjeldahl Nitrogen (TKN)**
SM 4500PE	**Total phosphorous-P, orthophosphate-P**
SM 2540D	**TSS**
SM 2130B	**Turbidity**

Note: Bold text indicates a constituent that is also part of the “short list” of wet weather constituents.

7.1.3 Wet Weather Monitoring Results

During the 2023-2024 MS4 permit year, one significant storm event occurred, leading to one sample collection from the sampling locations. The samples were collected with automated samplers and composite samples were prepared for laboratory analysis.

The laboratory analyzed the “long list” of constituents for the storm event of the MS4 permit year, as shown in Table 7-2. Wet weather sampling reports for the significant storm events and historic wet weather sampling data are included in Appendix A.

Table 7-2: Wet Weather Sampling Events for the Current MS4 Permit Year (2023-2024)

Sampling Location	“Long List” Constituents Analyzed
The Club at Sunrise	09/01/2023
Rainbow Gardens	09/01/2023

Table 7-3 and Table 7-4 present wet weather monitoring data collected in the 2023-2024 MS4 permit year for both The Club at Sunrise and Rainbow Gardens sampling locations, respectively. Table 7-5 and Table 7-6 further identify the detections of organic compounds for the current MS4 permit year and the prior three MS4 permit years for The Club at Sunrise and Rainbow Gardens, in stormwater samples. Data was consistent with the previously collected wet weather characterization data.

Table 7-3: The Club at Sunrise Wet Weather Monitoring Constituent Data for the Current MS4 Permit Year (2023-2024)

Parameter	Units	01-September-2023	Median 2023-2024 [a]	Historical Median 1997-2024	Historical Range 1997-2024		
NPDES Constituents [b]							
Oil and Grease - Gravimetric	mg/L	10.0	10.0	< 5	< 2.4	-	1,180
Total Dissolved Solids (TDS)	mg/L	93.3	93.3	531	93	-	2,500
Total Suspended Solids (TSS)	mg/L	867	867	860	18	-	8,350
Total Phosphorus-P	mg/L	2.04	2.04	1.07	0.17	-	3.9
Orthophosphate-P	mg/L	1.54	1.54	0.18	< 0.01	-	1.54
Nitrite, Nitrogen by IC	mg/L	< 0.1 ND	< 0.1 ND	< 0.10	< 0.089	-	6.5
Nitrate-N by IC	mg/L	1.05	1.05	1.30	< 0.1	-	165
Total Kjeldahl Nitrogen (TKN)	mg/L	3.66	3.66	4.50	< 0.2	-	28.0
Copper, Total, ICAP	mg/L	0.043	0.043	0.043	0.005	-	0.69
Lead, Total, ICAP	mg/L	0.028	0.028	0.023	< 0.0005	-	0.18
Zinc, Total, ICAP	mg/L	0.29	0.29	0.20	0.01	-	4.6
Copper, ICAP, Dissolved	mg/L	0.003	0.003	0.008	< 0.002	-	0.11
Lead, ICAP, Dissolved	mg/L	< 0.001 ND	< 0.001 ND	< 0.0005	< 0.0005	-	< 0.1
Zinc, ICAP, Dissolved	mg/L	< 0.01 ND	< 0.01 ND	< 0.024	< 0.001	-	0.4
Boron, Total, ICAP	mg/L	0.10	0.10	0.21	< 0.02	-	0.84
Turbidity	NTU	731	731	443	28	-	5,200
Temperature	Thermal Analysis	27.3	27.3	22.3	12.0	-	27.3
Fecal Coliform Bacteria	MPN/100mL	> 241,960	> 241,960	58,850	130	-	160,000,000
Fecal Streptococci	MPN/100mL	23,820	23,820	23,820	< 1	-	3,300,000
E. Coli	MPN/100mL	32,600	32,600	102,300	32,600	-	172,000
Semivolatile Organic Compounds (SVOCs) [c]	No. of Detects	0	0	2	0	-	7
Volatile Organic Compounds (VOCs) [c]	No. of Detects	1	1	2	0	-	14
Pesticides [c]	No. of Detects	0	0	0	0	-	5
Herbicides [c]	No. of Detects	0	0	1	0	-	4
Expansion Constituents							
Alkalinity as $CaCO_3$	mg/L	228	228	102	51	-	960
Aluminum, Total, ICAP	mg/L	14.1	14.1	5.09	0.0113	-	56
Antimony, Total, ICAP	mg/L	0.0036	0.0036	0.0039	< 0.001	-	0.1
Arsenic, Total, ICAP	mg/L	0.0081	0.0081	0.0078	0.0014	-	0.046
Barium, Total, ICAP	mg/L	0.265	0.265	0.215	0.058	-	1.8
Beryllium, Total, ICAP	mg/L	< 0.001 ND	< 0.001 ND	< 0.001	< 0.001	-	< 0.01
Bicarbonate Alkalinity as HCO_3^-	mg/L	228	228	124	51	-	960
BOD	mg/L	< 20 ND	< 20 ND	32.3	< 2	-	263
Bromide	mg/L	< 0.05 ND	< 0.05 ND	0.05	< 0.005	-	0.53
Carbonate, Calculated	mg/L	< 5.00 ND	< 5.00 ND	< 2.00	< 0.028	-	< 10.0
Cadmium, Total, ICAP	µg/L	< 1.0 ND	< 1.0 ND	< 1.0	< 0.5	-	6.9
Chloride	mg/L	9.5	9.5	34.8	5.86	-	266
Chromium, Total, ICAP	mg/L	0.0242	0.0242	0.0145	< 0.0001	-	15.0
COD	mg/L	251	251	178	< 38.6	-	990
Fluoride	mg/L	< 0.1 ND	< 0.1 ND	0.315	0.076	-	1.08
Hardness as $CaCO_3$	mg/L	715	715	715	101	-	5,600
Hydroxide as OH^-, Calc	mg/L	< 5.00 ND	< 5.00 ND	< 2.00	0.001	-	13.0
Iron, Total, ICAP	mg/L	12.3	12.3	8.55	0.018	-	100
Magnesium, Total, ICAP	mg/L	45.7	45.7	46	6.2	-	490
Manganese, Total, ICAP	mg/L	0.31	0.31	0.25	0.03	-	2.4
Mercury	mg/L	< 0.00032 ND	< 0.00032 ND	< 0.0002	< 0.00016	-	0.00506
Nickel, Total, ICAP	mg/L	0.0176	0.0176	0.0192	0.0038	-	0.14
pH, Lab	Standard Units	8.18	8.18	7.58	5.92	-	8.57
Selenium, Total	mg/L	0.0011	0.0011	< 0.005	< 0.001	-	< 0.05
Selenium, Dissolved	mg/L	< 0.001 ND	< 0.001 ND	< 0.001	0.0005	-	< 0.0025
Silver, Total, ICAP	mg/L	< 0.001 ND	< 0.001 ND	< 0.0005	< 0.0005	-	< 0.005
Sodium, Total, ICAP	mg/L	9.7	9.7	36.1	6.5	-	1,020
Sulfate	mg/L	41.9	41.9	165	19	-	1,300
Surfactants	mg/L	0.31	0.31	0.34	< 0.05	-	2.18
Thallium Total, ICAP	mg/L	< 0.001 ND	< 0.001 ND	< 0.001	< 0.001	-	< 0.01
Total Organic Carbon	mg/L	19.0	19.0	41	6.42	-	131

Notes:
NA = Not Available / Not Analyzed
ND = Non-detect / Not detected above laboratory method reporting limit
[a] Not a true median as there is only one sample, sample value is listed
[b] NPDES Constituents = Constituents originally analyzed under the Las Vegas Valley MS4 Wet Weather Sampling Program (Starting in 1991)
[c] Refer to Table 7-8 for The Club at Sunrise Wet Weather Monitoring Detected Organics Data for the Current MS4 Permit Year (2023-2024) and Prior Three Permit Years

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Table 7-4: Rainbow Gardens Wet Weather Monitoring Constituent Data for the Current MS4 Permit Year (2023-2024)

Parameter	Units	01-September-2023	Median 2023-2024 [a]	Historical Median 1997-2024	Historical Range 1997-2024		
NPDES Constituents [b]							
Oil and Grease-Gravimetric	mg/L	7.6	7.6	< 5.0	1.4	-	10
Total Dissolved Solids (TDS)	mg/L	335	335	1,123	270	-	2,560
Total Suspended Solids (TSS)	mg/L	680	680	420	< 5	-	12,000
Total Phosphorus-P	mg/L	1.56	1.56	0.58	0.074	-	4.3
Orthophosphate-P	mg/L	1.23	1.23	0.13	< 0.01	-	3.0
Nitrite, Nitrogen by IC	mg/L	0.24	0.24	< 0.10	< 0.001	-	1.9
Nitrate-N by IC	mg/L	2.89	2.89	7.39	< 0.1	-	45
Total Kjeldahl Nitrogen (TKN)	mg/L	3.66	3.66	2.00	< 0.2	-	24.5
Copper, Total, ICAP	mg/L	0.027	0.027	0.0260	0.0013	-	0.218
Lead, Total, ICAP	mg/L	0.0163	0.0163	0.0081	< 0.0005	-	0.151
Zinc, Total, ICAP	mg/L	0.17	0.17	0.08	0.029	-	0.62
Copper, ICAP, Dissolved	mg/L	0.0046	0.0046	0.010	< 0.001	-	0.0329
Lead, ICAP, Dissolved	mg/L	< 0.001 ND	< 0.001 ND	< 0.0005	< 0.0005	-	0.109
Zinc, ICAP, Dissolved	mg/L	0.0283	0.0283	0.0239	< 0.005	-	0.109
Boron, Total, ICAP	mg/L	0.21	0.21	0.41	0.05	-	0.75
Turbidity	NTU	581	581	200	3	-	3,700
Temperature	Thermal Analysis	27.1	27.1	26.2	25.3		27.1
Fecal Coliform Bacteria	MPN/100mL	198,630	198,630	81,640	23	-	5,000,000
Fecal Streptococci	MPN/100mL	13,330	13,330	12,390	< 1	-	500,000
E. Coli	MPN/100mL	130,000	130,000	770,000	130,000	-	1,410,000
Semivolatile Organic Compounds (SVOCs) [c]	No. of Detects	0	0	1	0	-	5
Volatile Organic Compounds (VOCs) [c]	No. of Detects	1	1	4	0	-	12
Pesticides [c]	No. of Detects	0	0	0	0	-	3
Herbicides [c]	No. of Detects	0	0	0	0	-	4
Expansion Constituents							
Alkalinity as $CaCO_3$	mg/L	256	256	120	65	-	420
Aluminum, Total, ICAP	mg/L	9.86	9.86	3.50	0.0096	-	69
Antimony, Total, ICAP	mg/L	0.003	0.003	< 0.002	< 0.001	-	0.02
Arsenic, Total, ICAP	mg/L	0.009	0.009	0.011	0.0048	-	0.099
Barium, Total, ICAP	mg/L	0.187	0.187	0.169	0.044	-	1.6
Beryllium, Total, ICAP	mg/L	< 0.001 ND	< 0.001 ND	< 0.001	< 0.0002	-	< 0.005
Bicarbonate Alkalinity as HCO_3^-	mg/L	256	256	140	79	-	420
BOD	mg/L	< 20 ND	< 20 ND	13.0	< 2	-	79.5
Bromide	mg/L	0.05	0.05	0.130	< 0.001	-	4.07
Carbonate, Calculated	mg/L	< 5.00 ND	< 5.00 ND	< 2.0	0.27	-	< 10
Cadmium, Total, ICAP	µg/L	< 1.0 ND	< 1.0 ND	< 1.0	< 0.1	-	610
Chloride	mg/L	55.7	55.7	186	56	-	369
Chromium, Total, ICAP	mg/L	0.0161	0.0161	0.0085	0.001	-	2.5
COD	mg/L	174	174	76	19.3	-	909
Fluoride	mg/L	0.44	0.44	0.55	< 0.1	-	1.0
Hardness as $CaCO_3$	mg/L	570	570	663	323	-	3,000
Hydroxide as OH^-, Calc	mg/L	< 5.00 ND	< 5.00 ND	< 2.00	0.005	-	< 5.0
Iron, Total, ICAP	mg/L	8.67	8.67	4.15	0.09	-	71
Magnesium, Total, ICAP	mg/L	38.4	38.4	63	29	-	200
Manganese, Total, ICAP	mg/L	0.29	0.29	0.32	0.012	-	3.6
Mercury	mg/L	< 0.00032 ND	< 0.00032 ND	< 0.0002	< 0.0001	-	0.0019
Nickel, Total, ICAP	mg/L	0.0128	0.0128	0.0129	0.0014	-	0.14
pH, Lab	Standard Units	8.03	8.03	7.57	6.9	-	8.48
Selenium, Total	mg/L	0.0019	0.0019	< 0.005	< 0.001	-	< 0.15
Selenium, Dissolved	mg/L	0.0016	0.0016	0.0019	0.0016		0.0027
Silver, Total, ICAP	mg/L	< 0.001 ND	< 0.001 ND	< 0.0005	< 0.0005	-	1.0
Sodium, Total, ICAP	mg/L	53.3	53.3	142	53.3	-	303
Sulfate	mg/L	156	156	419	156	-	1,100
Surfactants	mg/L	0.28	0.28	0.12	< 0.035	-	0.88
Thallium Total, ICAP	mg/L	< 0.0012 ND	< 0.0012 ND	< 0.001	< 0.001	-	< 0.005
Total Organic Carbon	mg/L	15.7	15.7	14.7	5.6	-	82.7

Notes:
NA = Not Available / Not Analyzed
ND = Non-detect / Not detected above laboratory method reporting limit
[a] Not a true median as there is only one sample, sample value is listed
[b] NPDES Constituents = Constituents originally analyzed under the Las Vegas Valley MS4 Wet Weather Sampling Program (Starting in 1991)
[c] Refer to Table 7-9 for Rainbow Gardens Wet Weather Monitoring Detected Organics Data for the Current MS4 Permit Year (2023-2024) and Prior Three Permit Years

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Table 7-5: The Club at Sunrise Wet Weather Monitoring Detected Organics Data for the Current MS4 Permit Year (2023-2024) and the Prior Three MS4 Permit Years

Parameter		Detections 2023-2024	Detections 2022-2023	Detections 2021-2022	Detections 2020-2021 [a]	Historical Range of Detections 1997-2024
Herbicide Detections	2,4-D		X	X		0 - 4
	Bentazon					
	Benzoic Acid					
	Dalapon					
	Dicamba			X		
	Picloram					
	Total No. of Detects:	0	1	2	-	
Pesticide Detections	Aldicarb Sulfone					0 - 5
	Alpha-BHC					
	Beta-BHC					
	Carbaryl					
	Total No. of Detects:	0	0	0	-	
SVOC Detections	4-Nitrophenol					0 - 7
	4-Methylphenol					
	Benzyl Alcohol		X	X		
	Bis(2-ethylhexyl)adipate					
	Bis(2-ethylhexyl)phthalate					
	Diethylphthalate		X			
	Dimethylphthalate					
	Di-n-Butylphthalate					
	Di-n-Octylphthalate					
	Phenol		X	X		
	Total No. of Detects:	0	3	2	-	
VOC Detections	2-Butanone					0 - 14
	Acetone	X	X	X		
	Acrylonitrile					
	Benzene					
	Bromodichloromethane					
	Chloroform					
	Chloromethane					
	Dibromomethane					
	Methyl ethyl ketone (MEK)		X	X		
	Tetrachloroethene					
	Toluene					
	Total No. of Detects:	1	2	2	-	

Notes:
Cells marked with an "X" indicate that the constituent was detected in the sample
[a] During the 2020-2021 MS4 permit year no significant storm events occurred that generated sufficient runoff for sampling

Table 7-6: Rainbow Gardens Wet Weather Monitoring Detected Organics Data for the Current MS4 Permit Year (2023-2024) and the Prior Three MS4 Permit Years

Parameter		Detections 2023-2024	Detections 2022-2023	Detections 2021-2022	Detections 2020-2021 [a]	Historical Range of Detections 2003-2024
Herbicide Detections	2,4-D		X			0 - 4
	Bentazon					
	Benzoic Acid					
	Dalapon					
	Picloram					
	Total No. of Detects:	0	1	0	-	
Pesticide Detections	Aldicarb Sulfone					0 - 3
	Alpha-BHC					
	Beta- BHC					
	Carbaryl					
	Carbofuran					
	Total No. of Detects:	0	0	0	-	
SVOC Detections	4-Nitrophenol					0 - 5
	4-Methylphenol					
	Benzyl alcohol		X	X		
	Di(2-ethylhexyl)phthalate					
	Di-n-Butylphthalate					
	Di-n-Octylphthalate					
	Diethylphthalate					
	Phenol		X			
	Total No. of Detects:	0	2	1	-	
VOC Detections	2-Butanone					0 - 12
	Acetone	X	X			
	Acrylonitrile					
	Benzene					
	Bromodichloromethane					
	Caprolactam			X		
	Chloroform		X			
	Chloromethane					
	Dibromomethane					
	Methyl ethyl ketone (MEK)		X			
	Naphthalene					
	Tetrachloroethene					
	Toluene					
	Total No. of Detects:	1	3	1	-	

Notes:

Cells marked with an "X" indicate that the constituent was detected in the sample

[a] During the 2020-2021 MS4 permit year no significant storm events occurred that generated sufficient runoff for sampling

7.1.4 2024-2025 Stormwater Monitoring Plan

Section B.6.1.1 specifies that "the Permittees shall submit a revised stormwater monitoring plan to the Division for review for this permit within eighteen (18) months of the issuance of this permit." The due date is August 5th, 2025. In the meantime, the previous monitoring plan will continue to be implemented.

The evaluation of characterization data (Section 15) included in this Annual Report showed some outlying data points in correlation of turbidity and TSS. To do more evaluation of the correlation between turbidity and TSS, additional turbidity and TSS samples will be collected. These samples will be analyzed by another laboratory certified by the State of Nevada for both constituents in upcoming sampling events. In-situ turbidity samples will be analyzed to align with sampling duration, which is approximately every 3 minutes during a sampling event for the Club at Sunrise and 5 mins at Rainbow Gardens.

Section 8

Public Outreach and Education Program

8 Public Outreach and Education Program

Section B.5.4 of the 2024-2029 NPDES MS4 Permit for the Las Vegas Valley includes requirements for a Public Outreach and Education Program. The permit requires that the SWMP describe: 1) the public outreach and education program intended to reduce the discharge of pollutants to the maximum extent practicable; 2) the different types of educational materials to be distributed; 3) the specific educational and public activities undertaken; and 4) how the Permittees inform developers, contractors, architects, engineers, local officials, etc. about water quality issues associated with urban runoff, NPDES requirements, and the availability of educational / training workshops pertaining to urban runoff.

The overall objectives of the Public Outreach and Education Program are to:

- Inform the general public in the Las Vegas Valley about important water quality issues related to stormwater runoff in the Las Vegas Valley.
- Influence behavior of the general public to reduce activities that have a negative impact on stormwater runoff quality and increase activities that have a positive impact on stormwater runoff quality in the Las Vegas Valley.

8.1 Overview of Best Management Practices

Table 5-1 in Section 5.0 (Stormwater Management Approach) of this Annual Report identifies the BMPs employed by the Las Vegas Valley in the 2023-2024 MS4 permit year, to meet permit requirements. Specifically, the Public Outreach and Education Program employed the following Source Control (SC) BMPs, discussed in the following subsections:

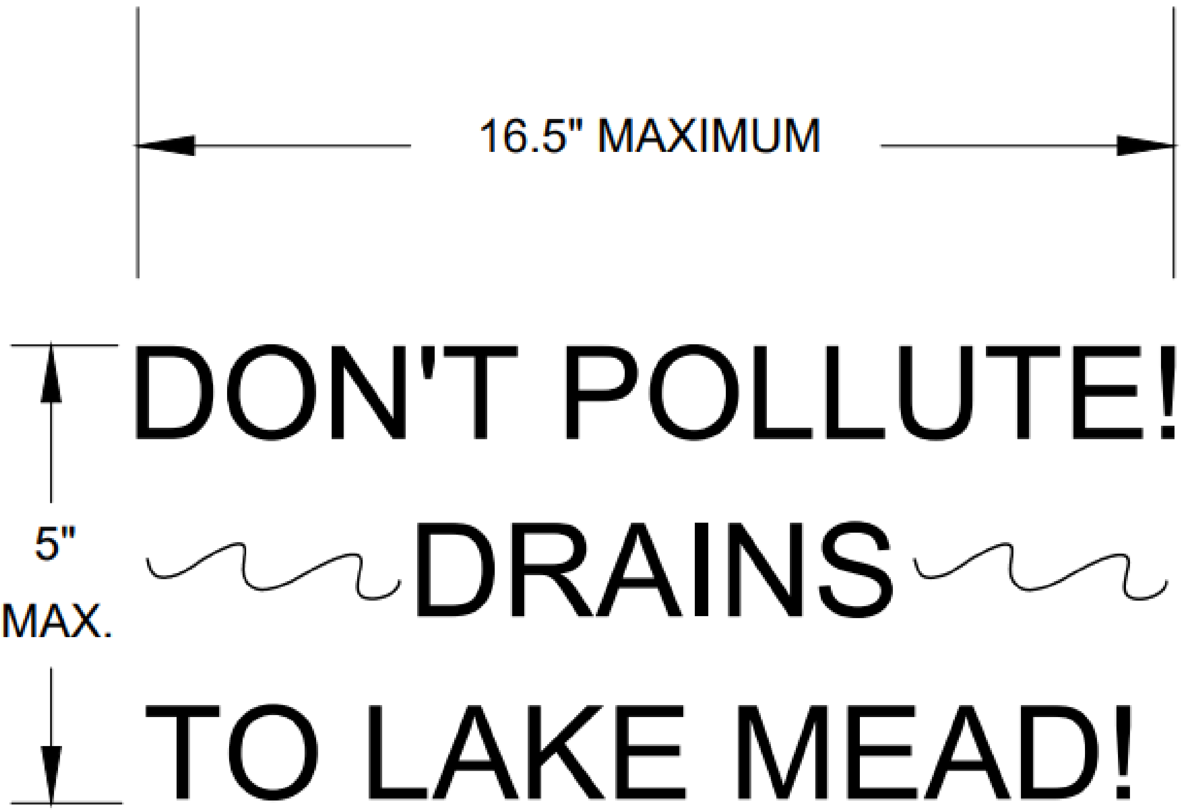
- SC-11 Storm Drain Marking Program
- SC-17 Pet Waste Management
- SC-30 LVV Stormwater Quality Website
- SC-31 Public Outreach Events
- SC-32 Elementary School Presentations
- SC-33 Public Service Announcements / Flood Channel
- SC-34 Brochures and Printed Material

8.2 Description of Individual Best Management Practices

8.2.1 Storm Drain Marking Program (SC-11)

The storm drain marking program consisted of imprinting the curb at storm drain inlets in new developments and areas of significant redevelopment. Figure 8-1 shows the Regional Transportation Commission of Southern Nevada (RTC) standard drawing No. 421 “Storm Water Quality Management Stamp and Sign Detail”. The stamps were required for new drain inlets installed in the public right-of-way and were intended to educate the public on the connection between the storm drain system and their drinking water source (Lake Mead), as well as to discourage illegal dumping.

Figure 8-1: Regional Transportation Commission of Southern Nevada (RTC) Standard Drawing No. 421 "Stormwater Quality Management Stamp and Sign Detail"



During the permit year there were no new or revised standards for storm drain marking. In 2023-2024, stamps were installed at 100% of new developments in the Las Vegas Valley, per the RTC standards. The Permittees continued to educate their inspectors and contractors of this requirement, per the RTC standard and per the SWMP. Inspectors verified that this requirement was met for all new development. During the permit year, City of Henderson installed 636 plaques on curbs that predated Standard Drawing No. 421.

8.2.2 Pet Waste Management (SC-17)

Pet waste management was largely addressed through public outreach events and activities targeted to pet owners. Pet owners were encouraged to clean up waste left by their pets in yards, parks, and open spaces. The Permittees provided educational materials at public outreach events, which are discussed in more detail in a later subsection. Public service campaigns regarding pet waste management are provided at the www.LVstormwater.com website.

In addition to providing educational materials, the Permittees also purchased pet waste disposal bags and dispensers and provided them at parks and open spaces. These measures can substantially reduce the potential for stormwater to pick up pathogens from pet waste in public and private areas. Table 8-1 provides a summary of pet waste disposal bags purchased during the current permit year and prior three permit years.

Table 8-1: Pet Waste Disposal Bags Purchased by Permittees during the Current Permit Year (2023-2024) and the Prior Three Permit Years

Municipal Permittee	2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	1,500,000	1,500,000	1,500,000	1,824,000
City of Las Vegas	1,760,000	1,320,000	1,600,000	1,620,000
City of North Las Vegas	120,000	120,000	100,000	480,000
Clark County	1,200,000	960,000	2,462,000	2,760,000
SWMP Target	Direct Public Outreach and Education to Pet Owners			

8.2.3 Las Vegas Valley (LVV) Stormwater Quality Website (SC-30)

The Stormwater Quality Management Committee (SQMC) continued to host the LVV stormwater quality website, www.LVstormwater.com, on behalf of the Permittees. The website provides information about the storm drain system, Las Vegas Valley monitoring programs, the NPDES MS4 Permit Program, federal and state regulations, and more. Several guidance documents are available for the construction industry, homeowners, businesses, and other industry to educate the public and special interest groups about reducing pollutants and improving the quality of stormwater runoff. The LVstormwater.com website was reviewed more than twice in the permit year, as shown in Table 8-2: (1) review of brochures, and (2) full review of accuracy and completeness.

In addition to the SQMC LVV stormwater quality website, the municipal Permittees continued to maintain stormwater information on their respective websites. During the permit year, the Permittees reviewed their respective websites and updated them as needed. The Permittee websites may include stormwater outreach materials, regulations, links for reporting illicit discharges or spills, and links to additional resources, including www.LVstormwater.com.

Table 8-2: Stormwater Quality Website Reviews during the Current Permit Year

Date Reviewed	Item(s) Reviewed
August 2023 – March 2024	Brochures
November 2023 March 2024	Overall accuracy and completeness
SWMP Target	Review lvstormwater.com website every six months

8.2.4 Public Outreach Events (SC-31)

During the permit year, the Permittees attended environmental fairs and community events to distribute educational materials on stormwater quality and respond to public questions or concerns. Table 8-3 provides an overview of the number of public outreach events that occurred during the current permit year and the prior three permit years.

Table 8-3: Number of Public Outreach and Education Events Attended by the Permittees for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Municipal Permittee	2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	10	6	3	1
City of Las Vegas	5	8	6	2
City of North Las Vegas	0	0	0	0
Clark County	0 [b]	0 [b]	0 [b]	0 [b]
Clark County Regional Flood Control District	50	30	61	0
TOTAL Number of Events Attended [a]	68	47	80	7
SWMP Target	Attend three total public outreach events annually			

Note:
[a] Total does not always equal the sum of individual Permittee attendance, as some events were attended by multiple Permittees
[b] See Section 8.2.5.1. Clark County Public Outreach is Grand Funded, so it is not counted towards MS4 Permit Compliance

Some examples of the public outreach and education events attended by Permittees during the current permit year included:

- City of Henderson Employee Stormwater Awareness
- City of Las Vegas Code Enforcement Professional Development Training
- City of Las Vegas Small Business & Food Truck Safety Expo
- City of Las Vegas YDSI Professional Development Training
- Clark County Employee Presentations for New Employees
- Clark County Wellness & Health Fair
- Discovery Children's Museum Flood Awareness Day/Stormwater
- Discovery Day Wetlands Park
- Fire Station 83, 85, 87, 91, 97 and 98 Open Houses
- National Night Out
- Nevada Contractors Construction Career Day
- Nevada State Science Teacher Conference
- Paws in the Park event, Desert Breeze Park
- Supplier Opportunity Fair

8.2.5 Elementary School Presentations (SC-32)

In an effort to introduce the importance of stormwater quality management at an early age, the CCRFCD also provided presentations to elementary school students on important stormwater concepts. The presentations were provided during normal school sessions and day camps for students. The presentations focused on stormwater quality and flood safety concerns. Table 8-4 provides a summary of the elementary school presentation effort during the current permit year and the prior three permit years.

Table 8-4: Summary of Elementary School Presentations for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Number of Contacts	2023-2024	2022-2023	2021-2022	2020-2021
Students	3,280	1,963	630	405
Elementary Schools	38	14	1	13
SWMP Target	Conduct five elementary school presentations annually			

8.2.5.1 FY2024 Clark County Water Quality Grant Funded Public Outreach

MS4 Permit requirements for public outreach and education are fulfilled by the CCRFCD. Grant funded public outreach and education provided by Clark County Water Quality are above and beyond that which is necessary to comply with the MS4 Permit. Items of note included:

- Clark County's educational stormwater website (StormwaterVegas.com) is accessible to the general public to provide insight into the program.
- Water Quality participated in the Earth Day event at the Springs Preserve, the BioBlast at the Clark County Wetlands Park, and the Las Vegas Science and Technology Festival.
- Water Quality organized the second annual Stormwater Pollution Awareness Month. The event was hosted in collaboration with nine project partners, including the Clark County (CC) Water Reclamation District (WRD), CC Wetlands Park, CC Department of Aviation, CCRFCD, Las Vegas Wash Coordination Committee (LVWCC), Southern Nevada Water Authority, City of Henderson, and the City of Las Vegas. The environmental outreach month included proclamations by the Clark County Commissioners and the CCRFCD and outreach including billboards and weekly social media posts.
- Water Quality participated in a Career Day event at Vassiliadis Elementary School.

8.2.6 Public Service Announcements / Flood Channel (SC-33)

In the Las Vegas Valley, there were additional methods utilized to provide stormwater-related information to the general public, particularly the use of public service announcements (PSAs) and segments presented on the CCRFCD-sponsored Flood Channel. The Permittees produced several PSAs that were broadcast during the current permit year and produced new Flood Channel segments. Topics included: proper disposal of pet waste and household chemicals, the importance of commercial car washes, and avoiding or reporting clogged storm drains. Details regarding the dissemination of PSAs is provided in Table 8-5.

Table 8-5: Summary of Public Service Announcements for the Current Permit Year (2023-2024)

Public Service Announcement Type	Distribution Source	Duration
Half-hour Flood Channel Segments and paid radio spots	Local cable Channels 2 and 4 plus Anthem HOA TV - The Flood Channel. Local Channels 3, 5, 8, 13, and Telemundo-- Stormwater Quality	January-June 2024 Airs six to seven times a week. Airs approximately 28 times a month.
Social Media PSAs	Facebook, Instagram, TikTok, and X (formerly Twitter)	Continuously
Be Lake Friendly PSA	North Las Vegas City Hall Lobby	Continuously on community information video loop
SWMP Target	Produce or update one PSA every 2 years	
	Broadcast one PSA annually, for at least a two month duration	

8.2.7 Brochures and Printed Material (SC-34)

The Permittees have a variety of brochures and printed material available to educate the public, many of which are created by the SQMC. Currently brochures are available for construction site BMPs, information for residents, guidelines for businesses and homeowners, construction site supervision, industrial stormwater permits, industrial and commercial BMPs, and stormwater pollution prevention information for businesses and homeowners.

Clark County has also created over 30 different stormwater pollution prevention flyers and brochures, developed in both English and Spanish through Non-Point Source (NPS) grants. These include commercial/industrial, construction, and resident's flyers. Most of the brochures and flyers are available on their website (https://www.clarkcountynv.gov/government/departments/water_quality/index.php).

CCRFCD created and distributed Drainger Danger Activity books and Dog Poop flyers. City of Las Vegas has a water quality educational kiosk structure installed at the Harris-Marion Park facility, next to the Las Vegas Wash. City of North Las Vegas created and distributed a flash flood & flood safety information.

During the permit year, COH had 10 stormwater brochures that inspectors or enforcement staff distributed as applicable during the permit year. In addition, stormwater 101 posters were put up at libraries, and pickup dog waste coloring sheets and general stormwater brochures were provided at public outreach events. Public outreach events may include one of three Putt Putt greens to educate the public on stormwater pollutants (Putt Putt Themes: car wash, household pollutants and pet waste). In October 2023, COH proclaimed it was stormwater pollution awareness month. Internally COH sent out information on stormwater pollution awareness month via the City's newsletter "Spotlight", in the City Manager's video, and highlighted on it on CityNet, COH's internal website.

Throughout the permit year, the Permittees routinely distributed information on stormwater quality and how it can be influenced by common behaviors, including the importance of proper pet waste disposal. In addition, the Permittees distributed materials in-person at environmental, community events, during construction inspections, industrial inspection and when responding to customer complaints. Table 8-6 identifies the materials printed by the municipal Permittees to supplement CCRFCD materials for the permit year.

Table 8-6: Educational Brochures Printed for the Current Permit Year (2023-2024)

Permittee	Number of Educational Brochures Printed
City of Henderson	1,670
City of Las Vegas	600
City of North Las Vegas	50
Clark County	0 [a]
SWMP Target	Produce printed material annually, as needed

Note:
[a] Previously created materials were distributed, and electronic versions are available on Clark County's website

Section 9

Source Control and MS4 Maintenance Program

9 Source Control and MS4 Maintenance Program

Section B.5.5 of the 2024-2029 NPDES MS4 Permit for the Las Vegas Valley includes requirements for a Source Control and MS4 Maintenance Program to reduce pollutants in stormwater runoff from commercial and residential areas. The permit requires that the SWMP describe: 1) the maintenance activities and schedule to reduce pollutant discharges from the MS4; 2) the practices for operating and maintaining public roadways and procedures for reducing the impact on receiving waters; 3) the evaluation, monitoring, and reduction in pollution runoff from municipal facilities; and 4) the evaluation and reduction in pollution from the MS4 associated with the application of pesticides, herbicides, and fertilizer. The focus of the Source Control portion of the program is pollution minimization, while the focus of the MS4 maintenance portion of the program is removing sediment and other pollutants from public streets and drainage systems.

9.1 Overview of Best Management Practices

Table 5-1 in Section 5 (Stormwater Management Approach) of this Annual Report identifies the BMPs employed by the Permittees and other stakeholders in the 2023-2024 MS4 permit year, to meet permit requirements. Specifically, the Source Control and MS4 Maintenance Program employed the following Maintenance Measure (MM) and Source Control (SC) BMPs, discussed in the following subsections:

- MM-1 Street Sweeping
- MM-2 Local Storm Drain Maintenance
- MM-3 Regional Detention Basin Maintenance
- MM-4 Maintenance of Public Facilities
- SC-1 Water Conservation Ordinances
- SC-2 Turf Conversion Program
- SC-3 Public Employee Supervisor Fertilizer / Pesticide Training
- SC-4 Use of Alternate Products and Application Procedures
- SC-5 Household Hazardous Waste Collection
- SC-7 Ordinances Prohibiting Non-Stormwater Discharges and Littering
- SC-8 Desert Dumping Controls
- SC-10 Dust Control Measures
- SC-14 Trash Receptacle Enclosures

9.2 Description of Individual Best Management Practices

9.2.1 Street Sweeping (MM-1)

The Las Vegas Valley street sweeping program applies to public streets under the jurisdiction of the municipal Permittees and is expanded as new areas are developed. In contrast, state highway and freeway maintenance are the responsibility of the Nevada Department of Transportation (NDOT), while maintenance of private streets and parking lots is the responsibility of the private owner. Public street maintenance includes street sweeping of paved streets with curb and gutter. Curbed-and-paved public streets are swept on a regular basis to remove accumulated sediment, debris, trash, hydrocarbons, and other chemicals.

The number of miles of public streets maintained by each Permittee include:

- City of Henderson 959 centerline miles
- City of Las Vegas 2,683 curb miles
- City of North Las Vegas 692 centerline miles
- Clark County 4,780 centerline miles

Table 9-1 provides a summary of the miles of street swept and the amount of material removed for each Permittee during the current permit year and the prior three permit years.

Table 9-1: Summary of Street Sweeping Activity for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Municipal Permittee		2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	Street Swept [miles]	71,310 [a]	74,692 [a]	64,507 [a]	66,936 [a]
	Material Removed [cubic yards]	4,907 [b]	4,882 [b]	3,928 [b]	4,145 [b]
City of Las Vegas	Street Swept [curbed miles]	182,773	116,156	174,246	168,156
	Material Removed [cubic yards]	18,062	9,810	14,740	15,718
City of North Las Vegas	Street Swept [miles]	15,561	14,138	20,152	20,547
	Material Removed [cubic yards]	3,982	3,634	5,974	6,230
Clark County	Street Swept [miles]	69,750	73,400	67,650	64,800
	Material Removed [cubic yards]	5,364	6,927	25,500	27,588
SWMP Target	Sweep curbed-and-paved public city streets once every 30 days				

Notes:
[a] Odometer miles
[b] Material removed is a total of street sweeping and drain inlet material removed

9.2.2 Local Storm Drain System Maintenance (MM-2)

The Permittees inspect and, as needed, clean (i.e., remove sediment, debris, and trash) storm drain inlets and catch basins in the Las Vegas Valley MS4 system. Routine maintenance is performed to assure proper hydraulic performance, prevent clogging, and to remove potential sources of pollution. After large storms, additional inspections of facilities that historically have problems with debris accumulation and clogging are performed and the facilities are cleaned, if necessary, in preparation for the next storm event.

The number of storm drain drop inlets in the public right-of-way maintained by each Permittee include:

- City of Henderson 5,307 storm drain inlets
- City of Las Vegas 9,067 storm drain inlets
- City of North Las Vegas 3,450 storm drain inlets
- Clark County 13,829 storm drain inlets

Table 9-2 provides a summary of the number of storm drain inlets cleaned / maintained and the amount of material removed for each Permittee during the current permit year and the prior three permit years.

Table 9-2: Summary of Storm Drain Maintenance Activity for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Metric		2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	Number of Inlets Inspected/Cleaned	1,126	996	1,049	1,910
	Percentage of Total Drop Inlets Inspected	21%	20%	21%	39%
	Material Removed [cubic yards]	4,907 [a]	4,882 [a]	3,928 [a]	4,145 [a]
City of Las Vegas	Number of Inlets Inspected/Cleaned	21,654	16,125	15,192	13,860
	Percentage of Total Drop Inlets Inspected	239% [b]	188% [b]	192% [b]	175% [b]
	Material Removed [cubic yards]	797	568	460	446
City of North Las Vegas	Number of Inlets Inspected/Cleaned	675	607	759	569
	Percentage of Total Drop Inlets Inspected	20%	20%	25%	20%
	Material Removed [cubic yards]	4,622	3,183	2,351	66
Clark County	Number of Inlets Inspected/Cleaned	6,767	5,629	14,198	16,059
	Percentage of Total Drop Inlets Inspected	49%	41%	103% [b]	116% [b]
	Material Removed [cubic yards]	1,009	1,517	2,882	476
SWMP Target	Inspect 20% of drop inlets a minimum of once per year; clean as appropriate				

Notes:
[a] Material removed is a total of street sweeping and drain inlet material removed
[b] Percentage exceeds 100%, as the same drain inlet may be inspected several times during the permit year

9.2.3 Regional Detention Basin Maintenance (MM-3)

Based on criteria developed by the CCRFCD and adopted by all Permittees, regional detention basins are designed to control the 100-year flood to discharges that can be safely conveyed in downstream facilities. The purpose of the detention basin maintenance program is to remove sediment, debris, and other pollutants from detention basins, so they are not transported downstream through the MS4. The Permittees inspect and, as needed, clean (i.e., remove sediment, debris, and trash) detention basins within their jurisdiction. Maintenance activities, including rehabilitation, are also performed to preserve flood storage capacity, assure proper hydraulic performance, and remove potential sources of pollution.

The number of detention basins within the permit area include:

- City of Henderson 14 detention basins
- City of Las Vegas 22 detention basins
- City of North Las Vegas 10 detention basins

- Clark County 33 detention basins

Table 9-3 provides a summary of the number of detention basin inlets cleaned / maintained, and the amount of material removed for each Permittee during the current permit year and the prior three permit years.

Table 9-3: Summary of Detention Basin Maintenance Activity for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Municipal Permittee		2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	Number of Detention Basins Inspected/Cleaned	33 [a]	33 [a]	39 [a]	26 [a]
	Material Removed [cubic yards]	17,325 [b]	12,106 [b]	2,739	4,366
City of Las Vegas	Number of Detention Basins Inspected/Cleaned	70 [a]	105 [a]	69 [a]	40 [a]
	Material Removed [cubic yards]	82,867	9,691	11,470	21,253
City of North Las Vegas	Number of Detention Basins Inspected/Cleaned	19 [a]	23 [a]	41 [a]	53 [a]
	Material Removed [cubic yards]	3,920	530	2,566	5,254
Clark County	Number of Detention Basins Inspected/Cleaned	132 [a]	128 [a]	120 [a]	116 [a]
	Material Removed [cubic yards]	2,135	1,660	4,324	2,085
SWMP Target	Inspect twice annually and after major storms; clean as appropriate				

Notes:

[a] Number is total number of detention basins inspected/cleaned during the permit year (may include multiple cleans/ inspections at individual detention basins).

[b] Number includes material removed from storm channel maintenance.

9.2.4 Maintenance of Public Facilities (MM-4)

This measure is aimed at Permittee-owned sites with urban land uses such as parks, golf courses, parking lots, garages, vehicle wash areas, as well as vehicle storage and maintenance areas. This measure is similar to MM-1 and MM-2 and involves street sweeping, drain inlet cleaning, and vehicle maintenance on publicly owned parcels.

BMP MM-4's target goal is that public facility maintenance plans should be reviewed every other year, during odd permit years. The Permittees reviewed and modified public facility maintenance plans during the 2023-2024 MS4 permit year as follows:

- City of Henderson – Reviewed and updated the contact information for Van Wagenen, Vactor Dump, Fleet Maintenance, and Park plans.
- City of Las Vegas – Reviewed and updated their contact information and staffing on the Fleet Facilities and Parks Maintenance.
- Clark County – Reviewed and updated contact information and maps for the Public Facility Maintenance Plan.

- City of North Las Vegas - Reviewed and updated contact information for the Public Facility Plan.

9.2.5 Water Conservation (Drought) Ordinances (SC-1)

Each Permittee has a water conservation ordinance designed to reduce use of water outdoors. The water conservation ordinances adopted by the Permittees include restrictions on new turf areas, particularly in front yards, and requires the use of xeriscaping in new development. The local water conservation ordinances are the City of Henderson Municipal Code, Chapter 14.14, Conservation; the City of Las Vegas Municipal Code, Chapter 14.11, Drought Plan; the City of North Las Vegas, Chapter 13.08, Water Conservation; and the Clark County Code, Chapter 24.34, Water Use Restrictions. Minimizing outdoor water use reduces water waste and limits the amount of pollutants transported to the MS4 via overwatering.

In addition, the SNWA (2024 Water Resource Plan) has a regional water use goal of 86 total system gallons per capita per day (GPCD) by 2035. This goal addresses changing conditions and identifies that additional progress is needed to maximize available supplies. The total system GPCD is calculated by dividing all SNWA water sources diverted (excluding off-stream storage) less corresponding Colorado River return-flow credits by total SNWA resident population served per day.

The 2024 Water Resource Plan states that warmer and drier conditions will possibly increase local water demands. System age and climate change could increase this demand by 10 GPCD or more by 2035. Improving the efficiency of turf irrigation and cooling uses are some actions that can help to keep local supply in balance.

SNWA GPCD recognizes that not all water delivered by SNWA is consumed, as SNWA recycles nearly all indoor water use, either through return-flow credits or direct reuse, and also allows reporting to reflect actual weather conditions. Table 9-4 shows Consumptive Use GPCD over the past several years.

Table 9-4: SNWA Reported Per Capita Water Use Rate (GPCD) for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Metric	2023	2022	2021	2020
Gallons per Capita per Day (GPCD)	89	104	110	112
SWMP Target	100% compliance with drought ordinances			
	No increase in per capita water use rates			

9.2.6 Turf Conversion Program (SC-2)

One goal of the Source Control and MS4 Maintenance Program is to reduce runoff from irrigated urban areas. In combination with drought ordinances, turf removal can assist with this effort. The SNWA has a Water Smart Landscapes program (https://www.snwa.com/rebates/wsl/index.html) that offers a rebate to consumers for removal of existing turf. This program helps Southern Nevada conserve water and eliminates the need to apply fertilizers and herbicides to the converted areas. The SNWA currently offers a Water Smart Landscapes rebate to customers (business, homeowners associations, and multifamily properties) of $3.00 per square foot of grass that is removed and replaced with desert landscaping up to the first 10,000 square feet converted per property, per fiscal year. Beyond the first 10,000 square feet, SNWA will provide a rebate of $1.50 per square foot of turf conversion. The program has assisted the community upgrade more than 223 million square feet of lawn to water-efficient landscaping, saving more than 176 billion of gallons of water since the program began in 1999.

For residential properties (homeowners only), SNWA offers $5.00 per square foot of grass that is removed and replaced with desert landscaping up to the first 10,000 square feet converted per property, per fiscal year. Beyond the first 10,000 square feet, SNWA will provide a rebate of $3.50 per square foot of turf conversion. The project must be completed in 2024 for this limited time offer.

Additionally, as part of the Water Smart Landscape rebate program, the Tree Enhancement Program pays new applicants a bonus of $100 for every new tree installed. The list of qualifying trees is based on a combination of factors related to climate resiliency, water efficiency, pathogen resistance, drought tolerance, maintenance, diversity, and invasiveness (https://www.snwa.com/assets/pdf/wsl-tree-rebate-qualifying.pdf).

In June 2021, the Nevada Legislature passed Assembly Bill (AB) 356, which directed the SNWA Board of Directors to develop a plan for the removal of nonfunctional turf in the Las Vegas Valley. The legislation prohibits Southern Nevada's water supply from watering existing unused grass on properties that are not zoned exclusively for single-family residences after January 1, 2027. According to SNWA, removing this nonfunctional turf can save about 9.5 billion gallons of water per year.

The City of Henderson is partnering with SNWA on the Water Smart Landscapes Rebate. COH is supplementing the SNWA Water Smart Landscapes program with an additional rebate of $575 for Single-Family Residential homes. For the 2023-2024 permit year the City of Henderson rebate funding available was $500,000, the rebate actual expenditure was $953,784.00 for 1,079,637 sq ft of turf converted for an estimated water saving of 60,243,774 gallons annually.

Table 9-5 provides a summary of the Water Smart Landscapes Program during the current permit year and the prior three permit years.

Table 9-5: SNWA Water Smart Landscapes Program Data for the Current Permit Year (2023-2024) and the Prior Three Permit Years

SNWA Water Smart Landscapes Program Elements	2023	2022	2021	2020
Rebate Funding Available	$37,408,611	$25,250,000	$25,048,889	$17,200,000
Turf Converted (sq. ft.)	12,591,938	12,643,927	5,999,043	4,524,720
Estimated Water Savings (gallons)	702,630,140	705,531,127	334,746,599	252,479,376
Actual Funding Expenditure	$37,533,745	$31,420,105	$16,331,092	$12,023,946

9.2.7 Public Employee Supervisor Fertilizer / Pesticide Training (SC-3)

Permittees require supervisors responsible for personnel who commonly use fertilizers, pesticides, and herbicides to be trained. This primarily includes Public Works employees and Permittees' Parks and Recreation Department personnel responsible for landscaping maintenance. For the permit year, 100% of the supervisors or specialists responsible for herbicide and pesticide application for COH, CLV, CNLV, and CC were properly trained.

9.2.8 Use of Alternate Products and Application Procedures (SC-4)

Permittees may experiment with or transition to use of "green" products to replace traditional fertilizers, pesticides, and herbicides. Permittees try alternative products and application procedures on an intermittent basis, when promising products or methods become available. As such, there may be no experimental applications to be reported in some years. Products and application procedures were reviewed during the permit year; there are no revisions to the lists of products or application procedures for any of the Permittees for the current permit year.

9.2.9 Household Hazardous Waste Collection (SC-5)

Many common household chemicals can cause significant water quality degradation when disposed of improperly and allowed to access the MS4. These household chemicals are considered hazardous waste and may include: paint thinners, solvents, paint removers, gasoline, diesel fuel, lighter fluid, waste oil, batteries, garden chemicals, pool chemicals, cleaning fluids, and aerosol cans. Republic Services (the Las Vegas Valley's recycling and waste disposal company) continues to provide household hazardous waste collection and recycled oil services for all residents in the Las Vegas Valley. Household hazardous waste is limited to 40 pounds dry or 15 gallons liquid per customer (gasoline restricted to 5 gallons). Republic Services provides two drop-off locations (South Valley: 560 Cape Horn Drive, Henderson and North Valley: 333 W. Gowan Road, North Las Vegas) that are open on rotating weeks, Wednesday through Saturday from 9 am to 1 pm. Table 9-6 provides a summary of the quantities of household hazardous waste received by Republic Services, and presumably spared from storm drains, for the current permit year.

Table 9-6: Republic Services Household Hazardous Waste Collection for the Current Permit Year (2023-2024)

Hazardous Waste Type	Pounds Collected
Aerosols	13,086
Alkaline Batteries (Dry)	589
NiCd Batteries (Dry)	275
Oil based paint Liquid and Sludge	9,871
RCRA Exempt Pesticide Liquids in Consumer Packaging	10,510
Total	**34,331**

9.2.10 Ordinances Prohibiting Non-Stormwater Discharges and Littering (SC-7)

All municipal Permittees have ordinances prohibiting discharges of non-stormwater (except as expressly permitted) to the MS4. Local ordinances give the entities the authority to take enforcement action against illegal and illicit discharges, illegal dumping, littering, and other practices that may adversely affect the quality of water in the MS4, including those actions that have the "potential to pollute". Violations may be reported by code enforcement officers, public agency staff, or by general citizens through hotlines and Permittee websites.

Section 4.0 of this Annual Report identifies the relevant stormwater ordinance(s) for each municipal Permittee and discusses the review and revision actions taken by Permittees for the permit year. Under those ordinances, the Permittees are granted enforcement authority. Table 9-7 summarizes the non-stormwater discharge enforcement activity undertaken by each Permittee for the current permit year and the prior three permit years.

Table 9-7: Enforcement of Non-Stormwater Discharges and Litter Complaints / Responses for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Municipal Permittee	2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	81 enforcement actions [a] (from 109 complaints)	43 enforcement actions [a] (from 77 complaints)	39 enforcement actions [a] (from 69 complaints)	38 enforcement actions [a] (from 259 complaints)
City of Las Vegas	50 enforcement actions [b] and 115 Biohazard ROW Cleanup Responses	83 enforcement actions [b] and 93 Biohazard ROW Cleanup Responses	40 enforcement actions [b] and 124 Biohazard ROW Cleanup Responses	60 enforcement actions and 83 biohazard cleanup responses
City of North Las Vegas	5,400 enforcement actions [b]	2,377 enforcement actions [b]	2,142 enforcement actions [b]	1,348 enforcement actions [b]
Clark County	3,272 solid waste cases, 130 biohazard, 44 sewage, 10 chemical/fuel, 377 illegal dumping complaints, and 181 enforcement actions [b]	3,162 solid waste cases, 99 biohazard, 53 sewage, 7 chemical/fuel, 323 illegal dumping complaints, and 48 enforcement actions [b]	2,247 solid waste cases, 436 illegal dumping complaints, and 342 enforcement actions [b]	1,994 solid waste cases, 263 illegal dumping complaints, and 133 enforcement actions [b]
SWMP Target	Maintain and enforce stormwater ordinances			

Notes:

[a] City of Henderson enforcement actions do not include: verbal warnings; for Desert Dumping and Illicit Discharge complaints, they do include notice of violations, certified letters to abate, misdemeanor citations, and fines

[b] Enforcement actions include: verbal warning, corrective notice, Notice of Violation, Notice to Abate, Cease and Desist Orders, and judicial actions

9.2.11 Desert Dumping Controls (SC-8)

The Permittees have ordinances prohibiting dumping of materials in the desert surrounding the developed areas of the Las Vegas Valley. In addition to being unsightly and posing threats to the local ecology and human health, illegally dumped materials could be sources of water pollution if they come in to contact with stormwater (e.g., old vehicles, household waste, commercial and industrial waste, construction waste, landscaping refuse). Depending on the type and location of the observation, reports of illegal dumping may be referred to the BLM (data not reported in this Annual Report), the Southern Nevada Health District (SNHD), or the Clark County Public Response Office (CCPRO) for investigation and enforcement. Table 9-8 summarizes the desert dumping enforcement activity undertaken by each Permittee or relevant agency for the current permit year and the prior three permit years.

Table 9-8: Enforcement of Desert Dumping Complaints / Responses for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Municipal Permittee	2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	5 enforcement actions [a] from 12 complaints	7 enforcement actions [a] from 64 complaints	2 enforcement actions [a] from 57 complaints	0 enforcement actions [a] from 9 complaints
City of Las Vegas	0 enforcement actions [b]	0 enforcement actions [b]	0 enforcement actions [b]	0 enforcement actions [b]
City of North Las Vegas	373 enforcement actions	258 enforcement actions	335 enforcement actions	164 enforcement actions
Clark County Public Response Office	3,272 solid waste cases and 377 illegal dumping complaints	3,162 solid waste cases and 323 illegal dumping complaints	2,247 solid waste cases and 436 illegal dumping complaints	1,994 solid waste cases and 263 illegal dumping complaints
Southern Nevada Health District	956 complaints; 58 NOVs; 60 cases adjudicated; $120,500 in penalties	907 complaints; 60 NOVs; 44 cases adjudicated; $82,000 in penalties	1,085 complaints; 91 NOVs; 72 cases adjudicated; $119,200 in penalties	1,244 complaints; 61 NOVs; 89 cases adjudicated; $74,350 in penalties
SWMP Target	Maintain and enforce stormwater ordinances			

Notes:

[a] City of Henderson enforcement actions do not include: verbal warnings; for Desert Dumping and Illicit Discharge complaints, they do include notice of violations, certified letters to abate, misdemeanor citations, and fines

[b] CLV is called by SNHD to clean up desert dumping on CLV public property; CLV defers to SNHD for enforcement actions on private properties

9.2.12 Dust Control Measures (SC-10)

To meet regulations associated with the Clean Air Act, agencies within the Las Vegas Valley enforce dust control measures at construction sites and stationary industrial sites that may generate significant dust (e.g., cement plants, rock crushing facilities). In the Las Vegas Valley, the Clark County Department of Environment and Sustainability (DES) has primary responsibility for assuring that air quality regulations are met. During the permit year the DES performed 7,224 dust inspections. Inspections resulted in 75 enforcement actions, with a total of $250,500 in fines assessed.

9.2.13 Trash Receptacle Enclosures (SC-14)

Municipal codes for each of the Permittees require that trash receptacles for commercial sites, industrial sites, and multi-family developments be enclosed, however they do not need to be covered. These code requirements reduce the potential for stormwater to contact pollutants such as organics and bacteria, and minimize the potential for litter to be blown from the trash receptacle into the MS4. Code requirements apply to all new development. During the permit year, plan reviews included reviews of trash enclosures for compliance with design standards.

Section 10

Post-Construction Program for New Development and Significant Redevelopment

10 Post-Construction Program for New Development and Significant Redevelopment

Section B.5.6 of the 2024-2029 NPDES MS4 Permit for the Las Vegas Valley includes requirements for a Post-Construction Program for New Development and Significant Redevelopment (NDSR). The purpose of the Post-Construction Program for NDSR is to utilize BMPs to address impacts to urban runoff water quality after construction activities have ceased.

There are no specific NPDES MS4 Permit requirements for a Watershed Program. However, the SWMP includes a description of the Las Vegas Valley Watershed Program, in response to the unique factors affecting the Las Vegas Valley and stakeholder interest in the development of such a program. As such, the Permittees report on their progress towards watershed-based BMPs in this section of the Annual Report.

10.1 Overview of Best Management Practices

Table 5-1 in Section 5 (Stormwater Management Approach) of this Annual Report identifies the BMPs employed by the Las Vegas Valley in the 2023-2024 MS4 permit year to meet permit requirements. Specifically, the Post-Construction Program for NDSR employed the following Source Control (SC), Site Design (SD), and Treatment Control (TC) BMPs, discussed in the following subsections:

- SC-18 Stormwater Outfall Map (discussed in Section 6.0 of this Annual Report)
- SC-35 Stormwater Outfall Map with Areas of NDSR
- SD-1 Open Space and Landscaping Objectives
- SD-2 Rural Land Overlay
- SD-3 Hillside Development Ordinances
- SD-4 Sustainability and Green Building Initiatives
- SD-5 Covered Fuel Areas
- SD-6 Raised Fuel Areas
- SD-7 Emergency Shut-off Switch and Shear Valve
- SD-8 Standard Drainage Design Criteria
- SD-9 Parking Lot Low Impact Development (LID) Measures
- SD-10 LID Measures
- TC-4 Sand / Oil Separator
- TC-5 Sand Filter

The following Watershed Program Treatment Control (TC) BMPs are also discussed:

- TC-1 Regional Detention Basins
- TC-2 Regional Channel Lining

- TC-3 Las Vegas Wash Stabilization Structures
- TC-6 Regional Detention Basin Retrofit

10.2 Description of Best Management Practices

Table 10-1 provides a summary of the Permittees' activities for the current permit year that satisfy the Site Design and Treatment Control BMPs identified in the SWMP for the Post-Construction Program for NDSR.

Table 10-1: Post-Construction Program for New Development and Significant Redevelopment BMP Activity for the Current Permit Year (2023-2024)

BMP	Purpose of the BMP	Permittee Activities
SD-1 Open Space and Landscaping Objectives	▪ Reduce runoff and resulting pollutant load ▪ Natural wash areas may provide natural runoff treatment ▪ Minimize impact of development immediately adjacent to active stream courses	Development plans were reviewed for compliance and developer agreements used to define standards for master planned communities, when applicable.
SD-2 Rural Land Overlay	▪ Reduce runoff and resulting pollutant load	Development plans were reviewed for compliance.
SD-3 Hillside Development Ordinances	▪ Limit development or set strict criteria ▪ Reduce high flow rates from erosion susceptible areas	Development plans were reviewed for compliance.
SD-4 Sustainability and Green Building Initiatives	▪ Reduce runoff and resulting pollutant load ▪ Provide onsite treatment for new developments	Green Building Initiatives promoted, when applicable.
SD-5 Covered Fuel Areas	▪ Cover fueling areas with roofs or awnings	Standard practice. All new fueling areas were constructed with covered roofs or awnings.
SD-6 Raised Fuel Areas	▪ Raise fueling areas above the surrounding pavement	Standard practice. All new fueling areas were constructed on a small concrete platform.
SD-7 Emergency Shut-Off Switch and Shear Valve	▪ Isolate fueling areas after spills by installing emergency shut-off switches `and valves at new gas stations	Standard practice. All new gas stations were constructed with emergency shut-off switches or valves.
SD-8 Standard Drainage Design Criteria	▪ Provide drainage design criteria requiring stabilization of drainage ways to prevent erosion ▪ Implement Low Impact Development (LID) designs, when applicable	Development plans were reviewed for compliance.
SD-9 Parking Lot LID Measures	▪ Reduce parking lot runoff and resulting pollutant load ▪ Implement LID requirements for medium and large parking lots	Development plans were reviewed for compliance.
SD-10 LID Measures	▪ Minimize the impact of individual urban developments on stormwater runoff quantity and quality	LID measures promoted, when applicable. Ordinances did not require an update.
TC-4 Sand / Oil Separator	▪ Remove solids and floatables, including hydrocarbons from stormwater or wastewater	▪ CC installed 6 sand / oil separators ▪ CNLV installed 1 sand / oil separator ▪ CLV installed 7 sand / oil separators
TC-5 Sand Filter	▪ Remove small particulates and some dissolved pollutants from stormwater	No sand filters were installed during the permit year
SWMP Target	100% compliance with design criteria, standards, and policies	

10.2.1 Stormwater Outfall Map with Areas of NDSR

The Las Vegas Valley NPDES MS4 Permit requires the Permittees to prepare an annual map of NDSR within the permit area. Figure 10-1 presents a Valley-wide GIS map depicting areas, or approximate areas, of NDSR in the Las Vegas Valley for the permit year. Figure 10-2 through Figure 10-5 provide a more detailed view of four Las Vegas Valley regions (northwest, northeast, southwest, and southeast, respectively). These maps were prepared based on stormwater infrastructure data provided from the Permittees and parcel level data from Clark County. Data were compiled only for development projects that were completed (e.g., have received Certificates of Occupancy, Certificates of Completion) during the permit year.

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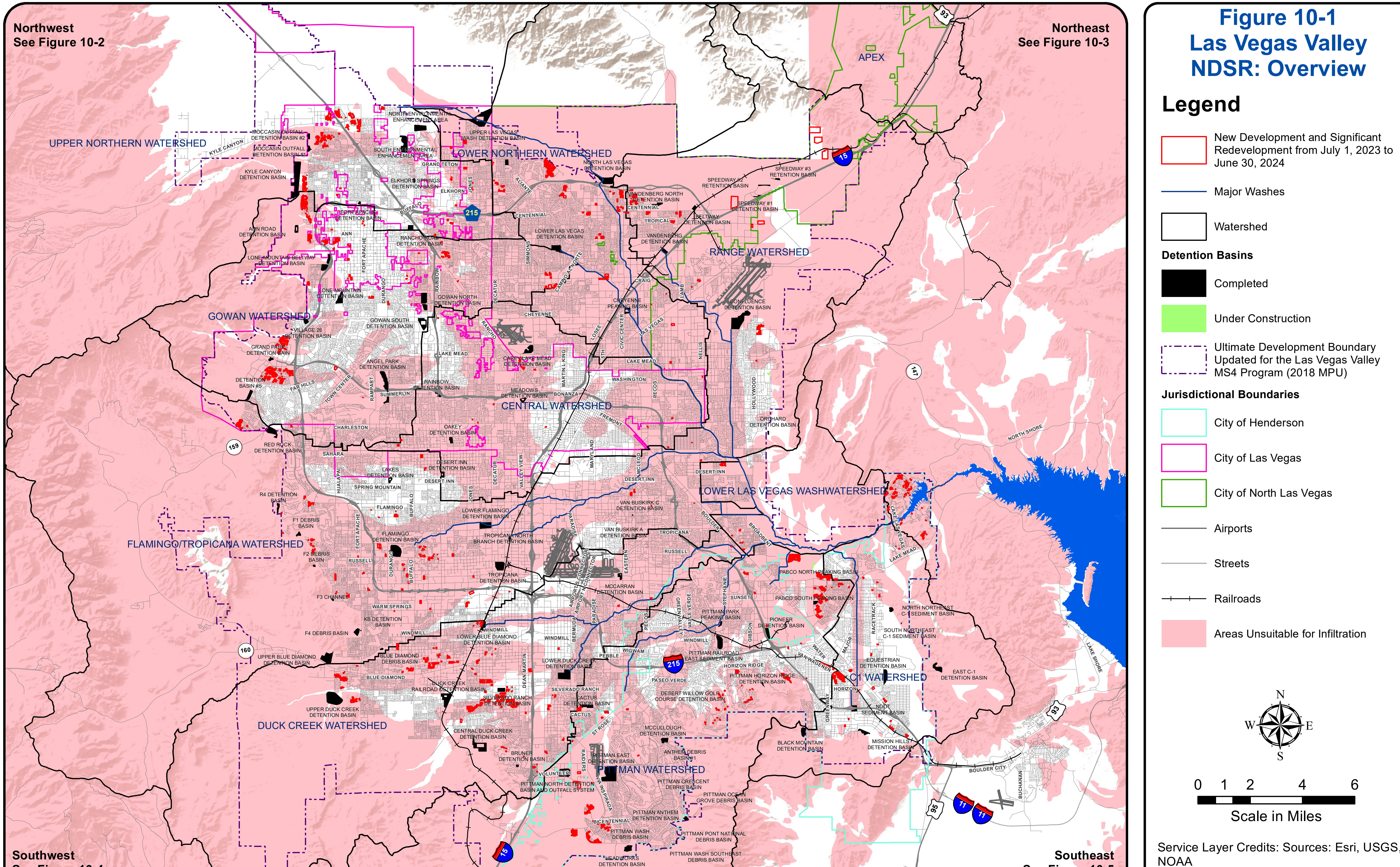

Figure 10-1
Las Vegas Valley NDSR: Overview

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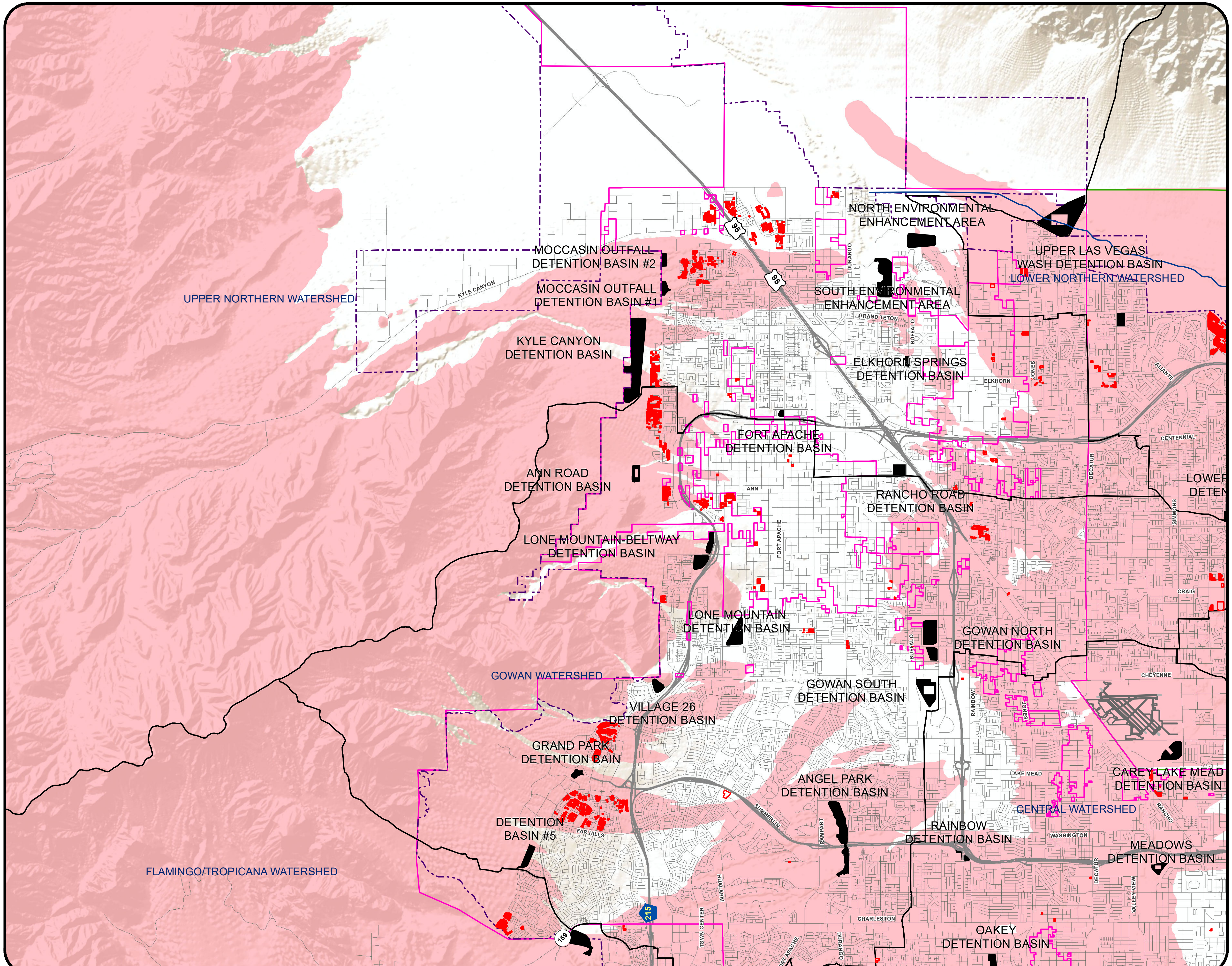

Figure 10-2
Las Vegas Valley NDSR: Northwest

Legend

- New Development and Significant Redevelopment from July 1, 2023 to June 30, 2024
- Major Washes
- Watershed

Detention Basins

- Completed
- Under Construction
- Ultimate Development Boundary Updated for the Las Vegas Valley MS4 Program (2018 MPU)
- Areas Unsuitable for Infiltration

Jurisdictional Boundaries

- City of Henderson
- City of Las Vegas
- City of North Las Vegas
- Airports
- Streets
- Railroads

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Scale in Miles

Service Layer Credits: Sources: Esri, USGS, NOAA

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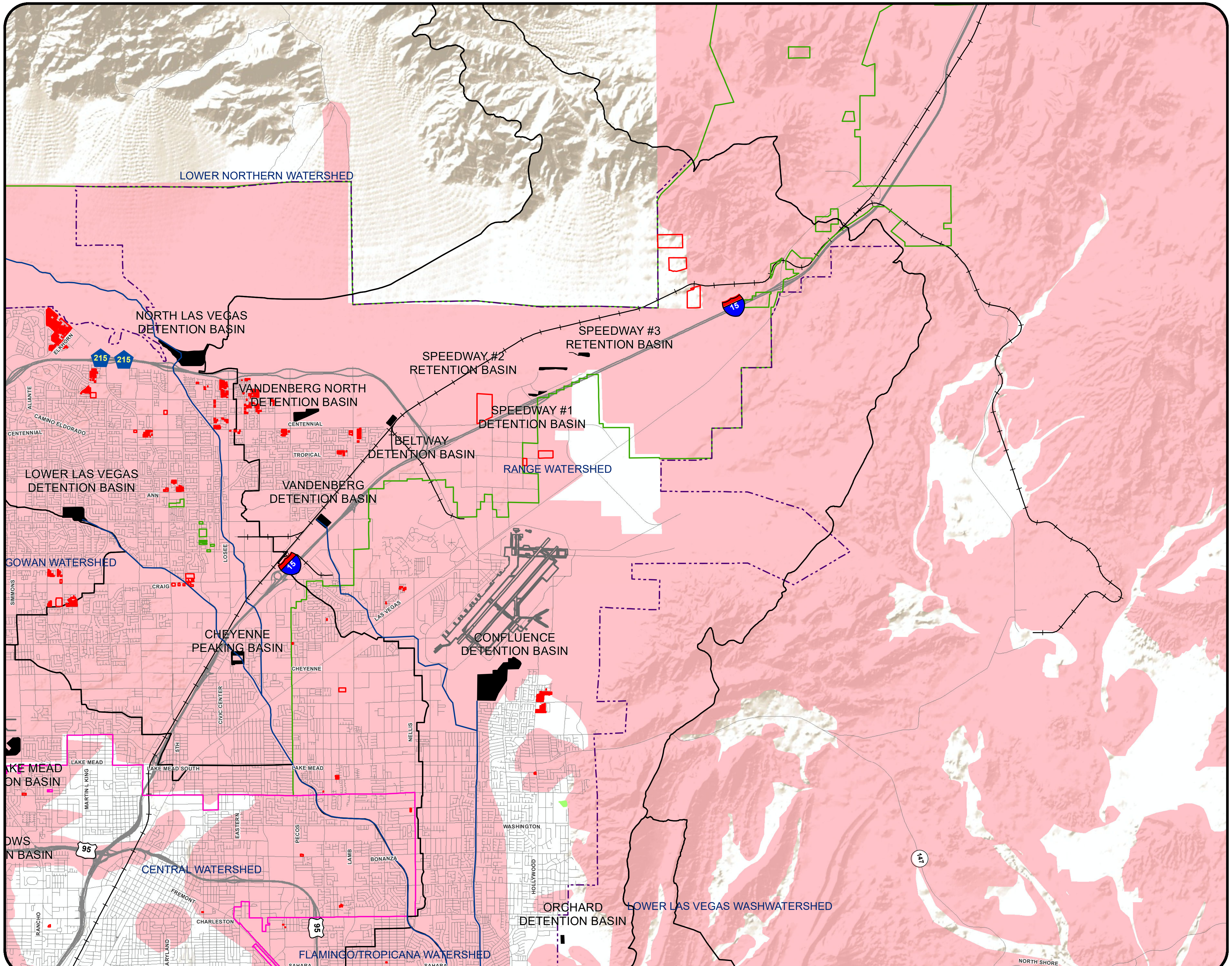

Figure 10-3
Las Vegas Valley NDSR: Northeast

Legend

- New Development and Significant Redevelopment from July 1, 2023 to June 30, 2024
- Major Washes
- Watershed

Detention Basins

- Completed
- Under Construction
- Ultimate Development Boundary Updated for the Las Vegas Valley MS4 Program (2018 MPU)
- Areas Unsutiable for Infiltration

Jurisdictional Boundaries

- City of Henderson
- City of Las Vegas
- City of North Las Vegas
- Airports
- Streets
- Railroads

0 0.5 1 2 3

Scale in Miles

Service Layer Credits: Sources: Esri, USGS, NOAA

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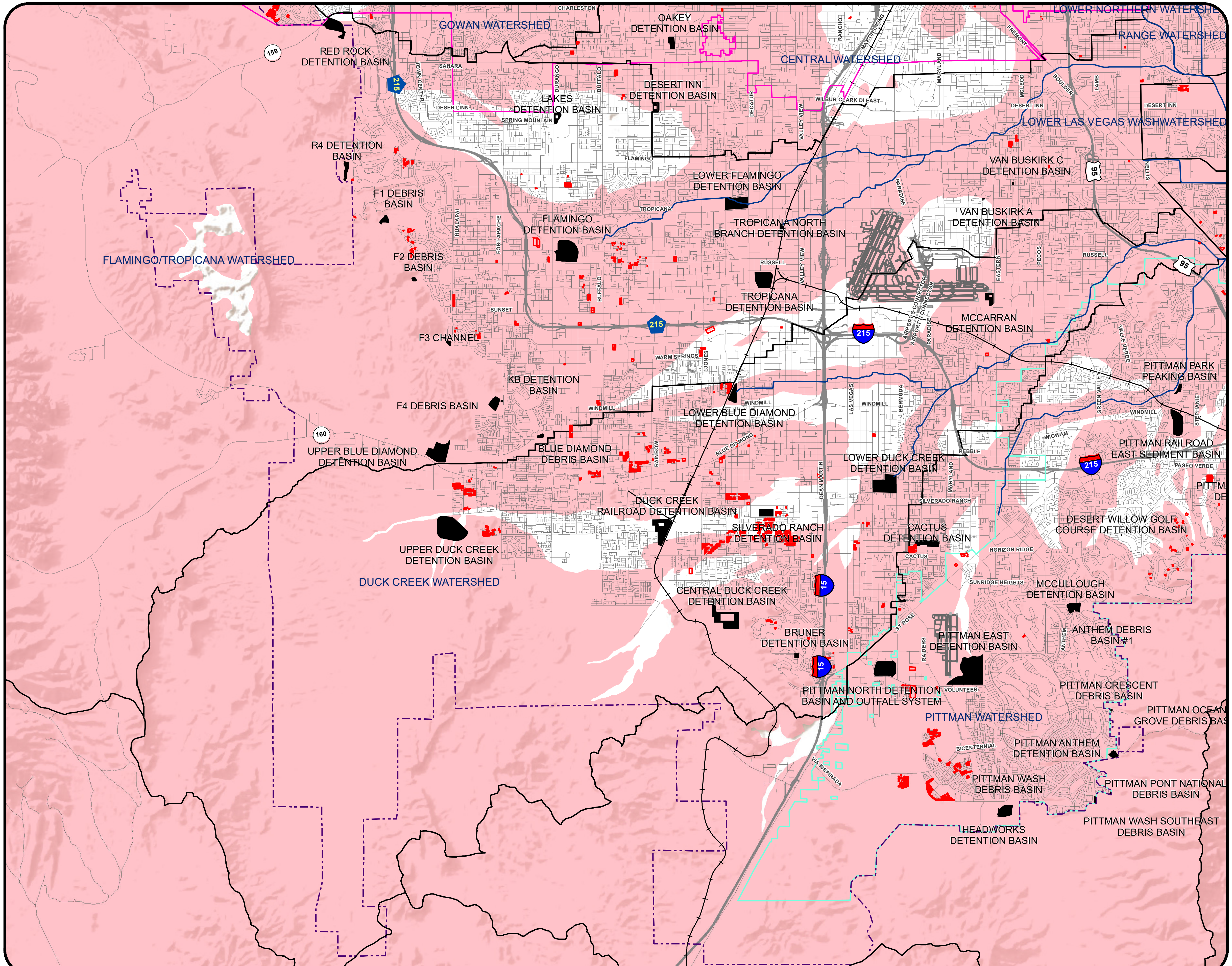

Figure 10-4
Las Vegas Valley NDSR: Southwest

Legend

- New Development and Significant Redevelopment from July 1, 2023 to June 30, 2024
- Major Washes
- Watershed

Detention Basins

- Completed
- Under Construction
- Ultimate Development Boundary Updated for the Las Vegas Valley MS4 Program (2018 MPU)
- Areas Unsuitable for Infiltration

Jurisdictional Boundaries

- City of Henderson
- City of Las Vegas
- City of North Las Vegas
- Airports
- Streets
- Railroads

N W E S

0 0.5 1 2 3

Scale in Miles

Service Layer Credits: Sources: Esri, USGS, NOAA

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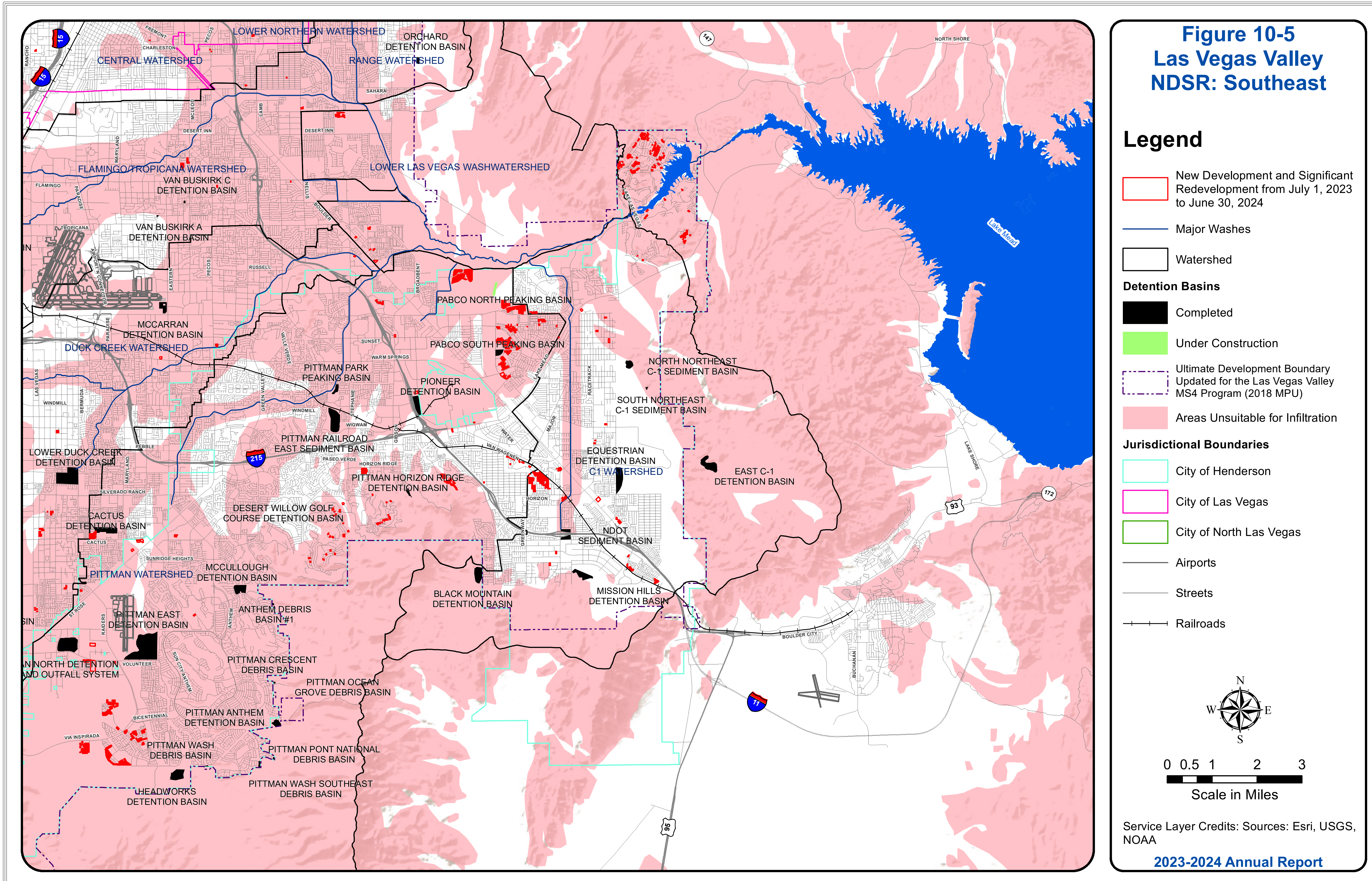

Figure 10-5
Las Vegas Valley
NDSR: Southeast
Legend
New Development and Significant Redevelopment from July 1, 2023 to June 30, 2024
Major Washes
Watershed
Detention Basins
Completed
Under Construction
Ultimate Development Boundary Updated for the Las Vegas Valley MS4 Program (2018 MPU)
Areas Unsuitable for Infiltration
Jurisdictional Boundaries
City of Henderson
City of Las Vegas
City of North Las Vegas
Airports
Streets
Railroads
N
S
E
W
0 0.5 1 2 3
Scale in Miles
Service Layer Credits: Sources: Esri, USGS, NOAA
2023-2024 Annual Report
LOWER NORTHERN WATERSHED
ORCHARD DETENTION BASIN
CENTRAL WATERSHED
RANGE WATERSHED
LOWER LAS VEGAS WASHWATERSHED
FLAMINGO/TROPICANA WATERSHED
VAN BUSKIRK C DETENTION BASIN
VAN BUSKIRK A DETENTION BASIN
MCCARRAN DETENTION BASIN
DUCK CREEK WATERSHED
PABCO NORTH PEAKING BASIN
PABCO SOUTH PEAKING BASIN
PITTMAN PARK PEAKING BASIN
PIONEER DETENTION BASIN
NORTH NORTHEAST C-1 SEDIMENT BASIN
SOUTH NORTHEAST C-1 SEDIMENT BASIN
PITTMAN RAILROAD EAST SEDIMENT BASIN
LOWER DUCK CREEK DETENTION BASIN
EQUESTRIAN DETENTION BASIN
C1 WATERSHED
EAST C-1 DETENTION BASIN
PITTMAN HORIZON RIDGE DETENTION BASIN
DESERT WILLOW GOLF COURSE DETENTION BASIN
CACTUS DETENTION BASIN
NDOT SEDIMENT BASIN
PITTMAN WATERSHED
MCCULLOUGH DETENTION BASIN
BLACK MOUNTAIN DETENTION BASIN
MISSION HILLS DETENTION BASIN
ANTHEM DEBRIS BASIN #1
PITTMAN EAST DETENTION BASIN
PITTMAN CRESCENT DEBRIS BASIN
PITTMAN OCEAN GROVE DEBRIS BASIN
PITTMAN ANTHEM DETENTION BASIN
PITTMAN WASH DEBRIS BASIN
PITTMAN PONT NATIONAL DEBRIS BASIN
PITTMAN WASH SOUTHEAST DEBRIS BASIN
HEADWORKS DETENTION BASIN
Lake Mead

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10.2.2 Areas of NDSR in Watersheds with Impaired Waterbodies

As shown in Figure 10-1 through Figure 10-5, during the permit year, NDSR occurred in watersheds that convey water to tributaries listed as impaired waterbodies on the 303(d) list. Construction of new development was not likely to impact the segments listed for boron or fluoride. Table 10-2 shows the acreage of NDSR in the watersheds that drain to tributaries that are listed for TDS, TSS, temperature, iron, *E. Coli* and/or selenium.

Table 10-2: NDSR Acreage in Watersheds with Impaired Waterbodies for the Current Permit Year (2023-2024)

Watershed	Impaired Waterbody	Impairment Parameter	NDSR (Acres)
Central	Las Vegas Creek - From its origin to the Las Vegas Wash	Selenium	14.8
Duck Creek	Duck Creek - From its origin to the Las Vegas Wash	Selenium, Temperature, and TDS	225.7
Flamingo / Tropicana	Flamingo Wash - From its origin to the Las Vegas Wash	Selenium, iron, and TSS	126.5
Range	Sloan Channel - From North Las Vegas Blvd. to the Las Vegas Wash	Selenium	282.7
Upper and Lower Northern	Las Vegas Wash - Above wastewater treatment plants	*E. Coli*, Iron, Selenium, TDS, and TSS	294.8

In addition to depicting areas of NDSR, Figure 10-1 through Figure 10-5 show the portions of the Las Vegas Valley watershed previously identified to be unsuitable for infiltration. In these areas, NDSR may induce infiltration to shallow alluvial groundwater along stream courses, which could affect TDS and selenium loads in listed waterbodies. As such, BMP practices adopted for NDSR by the Permittees are designed to minimize the impacts of these pollutants by preventing or discouraging infiltration measures.

10.2.3 Water Quality Capture Volume

The Permittees utilize a regional approach to manage water quality. One of the regional strategies includes the effective use of detention basins as BMPs. The status of design and construction projects for new or retrofitted regional detention basins is discussed in more detail later in this section.

New or modified regional detention basins incorporate extended detention basins (EDBs) or other low flow features to improve water quality. The low flow features and the associated proposed construction schedules are discussed in detail in the SWMP Technical Memorandum (TM) IV.16 Strategic Plan for Use of Regional Detention Basins for Water Quality Management. The volume of water captured and treated by these features is referred to as the water quality capture volume (WQCV) in the regional detention basins.

Increasing development within the Las Vegas Valley watersheds increases the demand on regional detention basins. The required capture volume (RCV), which represents the stormwater quality requirement created by additional acres of NDSR, is compared to the WQCV provided by regional detention basins.

During the permit year, two detention basins were upgraded to include low flow features, Gowan North (53.6 AF) and Oakey (12.5 AF). This increased the total WQCV of the Las Vegas Valley by 66.1 AF.

Table 10-3 provides a summary of estimated NDSR acreage, the RCV, and the WQCV for the current permit year and the prior three permit years, as well as cumulative totals summed from the beginning of the Post-Construction Program for NDSR in 2013.

Figure 10-6 depicts the progress of the WQCV implementation schedule. For planning purposes, as the RCV reaches 85% of the cumulative WQCV, design of the next new detention basin or retrofit is initiated, if not already in progress. During the 2023-2024 permit year, four detention basins were under design (Airport Peaking basin, North Las Vegas, Van Buskirk-Paradise, and Meadows) and three under construction (Pabco North Peaking Basin, Jim McGaughey, and Pittman East).

Table 10-3: RCV vs WQCV for NDSR for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Metric	2023-2024		2022-2023		2021-2022		2020-2021	
	Annual	Cumulative [a]	Annual	Cumulative [a]	Annual	Cumulative [a]	Annual	Cumulative [a]
NDSR [b] [acres]	1,549	20,672	1,575	19,123	1,878	17,548	1,749	15,670
WQCV in Regional DBs [acre-feet]	66.1	309.5	25.8	243.4	4.5	217.6	45	213.1
RCV [acre-feet]	20.66	247.47	21.01	226.81	25.05	205.8	23.33	180.75
Net WQCV (WQCV - RCV) [acre-feet]	45.44	62.03	4.79	16.59	-20.55	11.8	21.67	32.35

Notes:

[a] Cumulative values presented begin from NDSR program implementation in the 2013-2014 permit year

[b] Includes parcels with areas less than 1 acre that fall outside of the scope of the NDSR Program

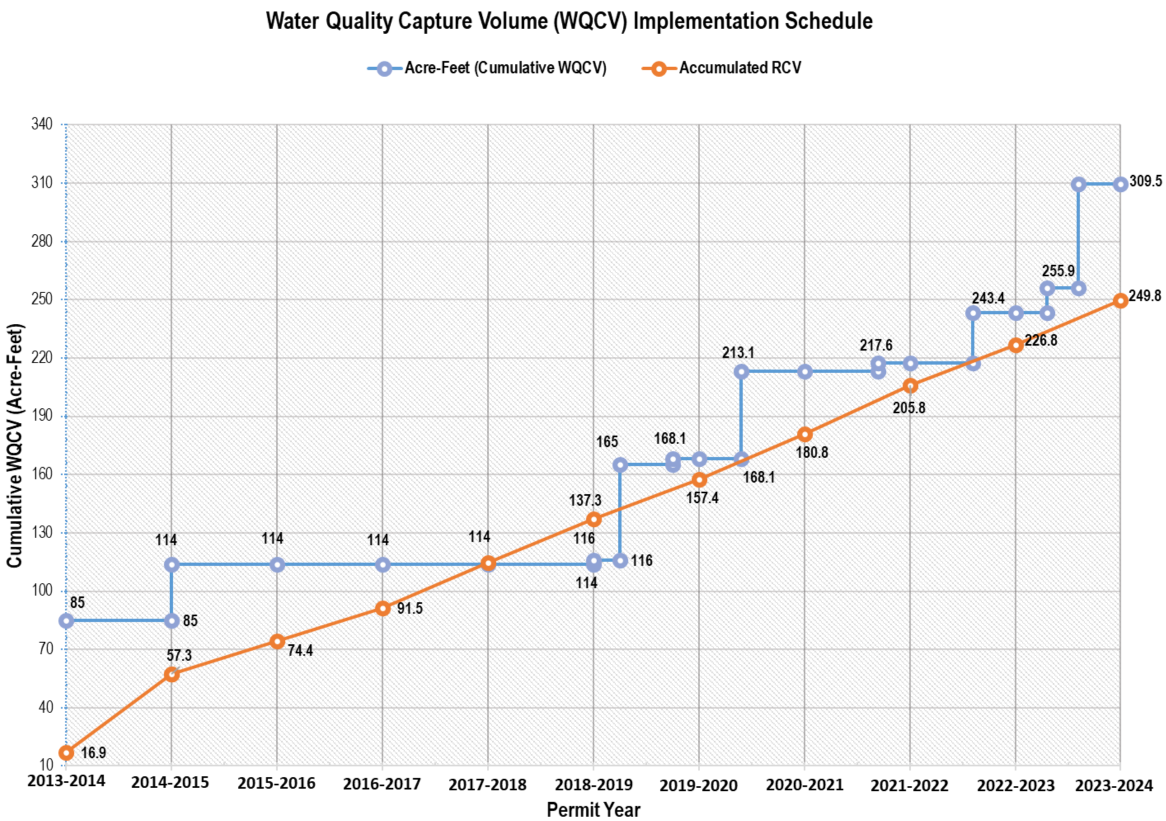


Figure 10-6: Las Vegas Valley Regional WQCV Implementation Schedule

10.2.4 Regional Detention Basins (TC-1)

Regional flood control detention basins are a key component of the MS4 Watershed Program. Due to the infrequency, localization, and variable magnitude of storm events in the Las Vegas Valley, the use of regional detention basins to capture and regulate runoff and associated pollutants is more efficient than the use of smaller scale facilities. Table 10-4 summarizes the status of regional detention basins designed and constructed during the current permit year and the prior three permit years.

Table 10-4: Status of Regional Detention Basins for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Metric	2023-2024		2022-2023		2021-2022		2020-2021	
	Number	Details	Number	Details	Number	Details	Number	Details
Detention Basins in Design	4	Van Buskirk-Paradise, Airport Peaking Basin, Meadows [a], North Las Vegas [a]	3	Meadows [a], Airport Peaking Basin, North Las Vegas [a]	4	Airport Peaking Basin, Jim McGaughey, Paradise, Meadows [a]	3	Airport Peaking Basin, Jim McGaughey, Paradise
Detention Basins Completed Design	0	NA	2	Paradise, Jim McGaughey	2	Silverado Ranch, Pittman East [a]	2	Speedway 2 [a], Silverado Ranch
Detention Basins Under Construction	3	Jim McGaughey, Pittman East [a], Pabco North Peaking Basin	2	Pabco North Peaking Basin, Pabco South Peaking Basin	1	Grand Park	2	Grand Park, Beltway
Detention Basins Completed Construction	3	Gowan North [a], Oakey [a], Pabco South Peaking Basin	2	Grand Park, Silverado Ranch	2	Beltway, Speedway 2 [a]	1	Vandenberg North

Notes:
NA = Not Applicable
[a] Addition of low flow features

10.2.5 Regional Channel Lining

The Hydrologic Criteria and Drainage Design Manual requires all regional flood control channels to be stabilized in some manner. In addition to improving hydraulic performance, channel lining eliminates channel erosion that would contribute to downstream sediment load, TSS, and turbidity. Slopes in the Las Vegas Valley are generally moderate-to-steep, flow velocities are high, and soils are erodible; therefore, most channels are stabilized using concrete lining. The CCRFCD prefers providing concrete lining for regional flood control channels to minimize capital costs, right-of-way requirements, and maintenance costs. As a result of the CCRFCD policy, very few channels within the existing developed area are unlined. However, occasionally unlined channels are replaced. Table 10-5 provides a summary of regional channel lining projects completed during the current permit year and the prior three permit years.

Table 10-5: Miles of Regional Channel Stabilization for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Metric	2023-2024	2022-2023	2021-2022	2020-2021
Miles of Regional Channel Stabilized (e.g., replacing an unlined channel with an armored channel or reinforced concrete box)	0.037	0.25	2.4	2.2

10.2.6 Las Vegas Wash Stabilization Structures (TC-3)

Over the past 40 years, erosion in the Las Vegas Wash due to treated wastewater discharges from WWTP's and urban stormwater runoff has resulted in dramatic channel down cutting and reduction in wetland areas from approximately 2,000 acres to 200 acres. This in turn contributed to downstream water quality degradation in the Las Vegas Wash and Las Vegas Bay. SNWA, through the Las Vegas Wash Coordination Committee (LVWCC), was delegated responsibility for constructing grade control structures in sections where the Las Vegas Wash is eroding. SNWA erosion control structures (i.e.,weirs) and projects have been completed.

10.2.7 Regional Detention Basin Retrofit (TC-6)

Regional detention basins are designed to reduce peaks from large flood events. In most cases, small runoff events pass through the regional detention basins with relatively little attenuation and little removal of constituents. The SWMP TM IV.16 was prepared to identify existing detention basins that could benefit from low flow feature retrofits and to plan low flow features in the construction of new detention basins, which would result in enough total WQCV to address the runoff from NDSR. Low flow features are tracked as part of TC-1, Regional Detention Basins.

Section 11

Illicit Discharge Detection and Elimination Program

11 Illicit Discharge Detection and Elimination Program

Section B.5.7 of the 2024-2029 NPDES MS4 Permit for the Las Vegas Valley includes requirements for an Illicit Discharge Detection and Elimination Program. The Illicit Discharge Detection and Elimination (IDDE) Program consists of four components: field screening, field inspections, public reporting opportunities, and a spill response strategy. The components are designed to detect and eliminate illicit discharges and improper disposal into the MS4.

Essentially all aspects of the MS4 management program are directed toward reducing or eliminating illicit and illegal discharges to the MS4 in some way. Accordingly, all BMPs in the Las Vegas Valley MS4 program are connected directly or indirectly to IDDE. This section of the Annual Report focuses on BMPs that specifically target illicit discharges that are not discussed in other sections of the report.

11.1 Overview of Best Management Practices

Table 5-1 in Section 5 (Stormwater Management Approach) of this Annual Report identifies the BMPs employed by the Las Vegas Valley in the 2023–2024 MS4 permit year, to meet permit requirements. Specifically, the Illicit Discharge Detection and Elimination Program employed the following Source Control (SC) BMPs, discussed in the following subsections:

- SC-12 Spill Control Prevention Plan
- SC-16 Regional Water Quality Planning
- SC-19 Sanitary Sewer Line Inspection and Replacement Program
- SC-26 Storm Channel Inspections
- SC-29 Stormwater-Related Complaint Response

11.2 Description of Individual Best Management Practices

11.2.1 Spill Control Prevention Plan (SC-12)

Spill Control Prevention Plans are plans to prevent and contain spills of hazardous materials that would impact downstream water quality. The Permittees currently have spill prevention and response regulation programs in place through their fire departments and contracts with special emergency response contractors. These regulations and programs are authorized in response to other State requirements but provide benefits to the MS4 program.

11.2.2 Regional Water Quality Planning (SC-16)

Regional water quality planning activities are performed by a variety of agencies and organizations including the SNWA, the Las Vegas Valley Watershed Advisory Committee (LVVWAC), the Las Vegas Wash Coordination Committee (LVWCC), and the Lake Mead Water Quality Forum (LMWQF). These regional coalitions allow for the coordination of activities designed to benefit stormwater quality throughout the Las Vegas Valley. The Permittees participate in these meetings.

During the permit year, the LMWQF did not hold any quarterly meetings. However, there were three meetings for the LVVWAC and two meetings for the LVWCC.

11.2.3 Sanitary Sewer Line Inspection and Replacement Program (SC-19)

This program is intended to prevent exfiltration from the sanitary sewer system to the MS4, by assuring the integrity of the sanitary sewer collection system. This program focuses on assessing both maintenance and structural deficiencies, as well as identifying areas of infiltration, which in some instances could lead to exfiltration. Table 11-1 provides a summary of sanitary sewer lines inspected and repaired for the current permit year and the prior three permit years.

Table 11-1: Summary of Sanitary Sewer Line Inspection and Replacement Activity for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Permittee	Metric	2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	Inspected [miles]	93 miles 10,087 manholes	75 miles 6,138 manholes	95 miles 6,124 manholes	96 miles 7,412 manholes
	Repaired [miles repaired or jetted]	479	243	246	240
City of Las Vegas	Inspected [miles]	159 miles 11 sewer laterals televised 88 manholes	148 miles 25 sewer laterals televised 47 manholes	31 sewer laterals televised 28 manholes	147 miles 19 manholes
	Repaired [miles repaired or jetted]	445 miles 88 manholes	2.5 miles repaired 421.5 miles 47 manholes	574 miles 28 manholes	567
City of North Las Vegas	Inspected [miles]	155 miles [a] 880 manholes	107 miles [a] 854 manholes	100 miles [a] 812 manholes	51 miles [a] 891 manholes
	Repaired [miles repaired or jetted]	0	0	83 LF	1.82
Clark County	Inspected [miles]	98 miles 24,534 manholes	111	124 miles 352 manholes	123 miles 179 manholes
	Repaired [miles repaired or jetted]	475 miles, 51 manholes	722 miles, 64 manholes	754 Miles jetted and 89 repairs, 64 manholes	764 Miles jetted and 69 repairs, 64 manholes
SWMP Target	Minimize sanitary sewer overflows				

Note:
N/A: Not Available / Not Analyzed
[a] This number includes miles inspected and/or jetted

11.2.4 Storm Channel Inspections (SC-26)

Semi-annual inspections of open storm channels and detention basins include, but are not limited to, inspecting for evidence of illicit discharges and illegal dumping. MS4 facilities were inspected by the Permittees in Fall 2023 and Spring 2024. Inspections included visually inspecting exposed storm channels and detention basins, to look for evidence of non-stormwater discharges. Emphasis was placed on those areas that had a reasonable potential for containing illicit discharges, exfiltration from the sanitary sewer system, or other sources of non-stormwater. Heavy sediment loads that may be associated with construction site runoff were also inspected.

In general, dry weather flows in Las Vegas Valley MS4 channels were minor. Erosion, gravel/silt, and debris were commonly observed along the channels and within detention basins. Vegetation, trash, debris, and graffiti were commonly found in channels inspected by City of North Las Vegas, City of Henderson, and City of Las Vegas. Clark County commonly observed vegetation, gravel/silt, and debris during the inspections.

11.2.5 Stormwater-Related Complaint Response (SC-29)

The Permittees provide several avenues by which the public can report potential illicit discharges to the MS4, including:

- Websites
  - The Permittees' collective SQMC website, www.LVstormwater.com, has a link for reporting illicit discharges. This link gives contact information for reporting illicit discharges and clogged storm drains.
  - Individual Permittee websites also include links for reporting illicit discharges or illegal dumping within their jurisdiction.
- Southern Nevada Health District (SNHD)
  - The SNHD has the authority to enforce ordinances prohibiting dumping of solid waste, semisolid waste, liquid waste, and sewage to the Las Vegas Valley MS4. The public can call SNHD and report problems directly or can submit a complaint form for reporting evidence of illegal dumping via their website: www.southernnevadahealthdistrict.org/solid-waste/illegal-dumping.php
- Clark County Public Response Office
  - The CCPRO receives public complaints related to illegal dumping and other ordinance violations and is empowered to respond and address these problems via their website: http://www.clarkcountynv.gov/administrative-services/pro/Pages/default.aspx
- Direct Contact with Permittees
  - Each of the Permittees receives direct reports from citizens reporting dumping, illegal discharges of non-stormwater to the drainage system, maintenance problems, and other activities that may affect water quality. The CLV, CNLV, and COH follow up on these complaints within their jurisdiction; Clark County follows up on complaints in unincorporated Clark County. The CCRFCD also routinely receives reports through its citizen contact system, often in response to its PSAs. Complaints are directed to the appropriate jurisdiction for resolution.

Table 11-2 provides a summary of the number of reported stormwater-related complaints for the current permit year and the prior three permit years.

Table 11-2: Stormwater-Related Complaints Received for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Permittee	2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	208	177	197	50
City of Las Vegas	50	83	61	60
City of North Las Vegas	18	19	18	20
Clark County	683	596	535	496
SWMP Target	Respond to 100% of stormwater-related complaints.			

Section 12

Industrial Facility Monitoring and Control Program

12 Industrial Facility Monitoring and Control Program

Section B.5.8 of the 2024-2029 NPDES MS4 Permit for the Las Vegas Valley includes requirements for an Industrial Facility Monitoring and Control Program. Activities conducted under the Las Vegas Valley Industrial Facility Monitoring and Control Program consisted of identifying industrial facilities that could be potential pollutant sources, conducting inspections of industrial facilities, and conducting an ongoing training program for local industrial facility inspectors. This program is intended to complement the separate industrial facility permitting program conducted by NDEP.

12.1 Overview of Best Management Practices

Table 5-1 in Section 5 (Stormwater Management Approach) of this Annual Report identifies the BMPs employed by the Las Vegas Valley in the 2023-2024 MS4 permit year to meet permit requirements. Specifically, the Industrial Facility Monitoring and Control Program employed the following Source Control (SC) BMPs, discussed in the following subsections:

- SC-6 Commercial / Industrial Housekeeping Practices
- SC-9 Grease Interceptor Program
- SC-13 Industrial Pretreatment Program
- SC-15 Southern Nevada Health District Inspections
- SC-23 Industrial Facility Stormwater Inspections
- SC-24 Industrial Facility Stormwater Inventory
- SC-25 Industrial Facility Stormwater Inspection Checklist
- SC-28 Industrial Facility Inspector Training Workshops

12.2 Description of Individual Best Management Practices

12.2.1 Commercial / Industrial Housekeeping Practices (SC-6)

Commercial and industrial facility operators are encouraged to apply good housekeeping practices in exterior areas, such that stormwater runoff would not contact pollutant sources and contribute a substantial load of pollutants to the MS4. In addition, municipal codes for each of the municipal Permittees require that all activities and operations at industrial facilities and commercial facilities where hazardous materials and chemicals are used, be conducted in, and contained by enclosed structures. Permittees promote good commercial / industrial facility maintenance by providing facility owners with information regarding good housekeeping practices during inspections and through the www.LVstormwater.com website.

12.2.2 Grease Interceptor Program (SC-9)

Municipal Permittees have existing ordinances requiring proper removal and disposal of grease from grease interceptors in restaurants and industrial facilities. Clogged grease interceptors could allow wastewater to be directed to the MS4. Public wastewater treatment service providers inspect over 2,000 restaurants and industrial facilities each year. BMPs are enforced consistently among each of the Permittees in the Las Vegas Valley. Table 12-1 provides a summary of the number of inspections the Permittees completed during the current permit year and the prior three permit years.

Table 12-1: Number of Grease Interceptor Inspections Performed for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Permittee	2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	177	110	106	105
City of Las Vegas	847	919	863	1,171
City of North Las Vegas	369	599	904	269
Clark County	5,211	4,004	6,221	8,531
SWMP Target	Minimize sanitary sewer overflows			

12.2.3 Industrial Pretreatment Program (SC-13)

Permittees have industrial pretreatment programs associated with their wastewater systems. All new qualifying industrial facilities must comply with the industrial pretreatment program and are subject to periodic pretreatment inspections. Activities associated with this BMP are reported separately under individual NPDES discharge permits.

12.2.4 Southern Nevada Health District Inspections (SC-15)

The Southern Nevada Health District (SNHD) performs inspections of commercial and industrial facilities that are conditionally exempt small quantity generators of hazardous waste (CESQG). These are smaller facilities that do not fall under the State's hazardous materials regulations. In addition, the SNHD Solid Waste and Compliance Division inspect several underground storage tanks (UST) and permitted disposal facilities (PDF). SNHD sets the policies and procedures to comply with the BMP. Table 12-2 provides a summary of the number of inspections the SNHD completed during the current permit year and the prior three permit years.

Table 12-2: Summary of Southern Nevada Health District Industrial Facility Inspections for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Inspection Type	2023-2024	2022-2023	2021-2022	2020-2021
Permitted Disposal Facilities	233	235	238	225
Underground Storage Tank	659	877	734	1,185
Waste Management Audit	3,155	3,086	3,424	3,459

12.2.5 Industrial Facility Stormwater Inspections (SC-23)

The Permittees are required to conduct inspections of industrial facilities that are included on their industrial facility inventories (discussed in the next subsection). Annual inspections are required for industrial facilities that belong to one of four categories: 1) Industrial facilities subject to Section 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986; 2) Municipal landfills: 3) Hazardous waste, treatment, disposal, and recovery facilities; and 4) Other industrial facilities determined by the Permittees to be contributing a substantial pollutant load to the MS4. The Permittees did not identify any Category 4 industrial facilities during the permit year.

Industrial facilities were inspected for compliance with stormwater BMPs, however they are also regularly inspected as a requirement of other regulatory programs (e.g., pretreatment inspections). As such, in Table 12-3, the Permittees report the total number of industrial facility inspections performed based on permit requirements, as well as the number of follow-up actions taken during the current permit year and the prior three permit years.

Table 12-3: Summary of Industrial Facility Stormwater Inspections and Follow-Up Actions for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Permittee	Metric	2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	Number of Inspections	114	142	146	109
	Number of Follow-Up Actions	2	12	13	9
City of Las Vegas	Number of Inspections	189	207	301	264
	Number of Follow-Up Actions	3	8	7	16
City of North Las Vegas	Number of Inspections	369	221	231	194
	Number of Follow-Up Actions	10	10	12	7
Clark County	Number of Inspections	211	331	510	510
	Number of Follow-Up Actions	313 [a]	463 [a]	544 [a]	544 [a]
SWMP Target	Conduct annual inspections of industrial facilities identified as belonging to Category 1, 2, or 3				

Notes:
Number of inspections includes the total number of industrial site inspections based on permit requirements
[a] Follow-up actions include follow-up inspections, correction orders, violation notices, enforcement meetings, and penalties.

12.2.6 Industrial Facility Stormwater Inventory (SC-24)

The Permittees are required to provide an inventory of industrial facilities within their jurisdiction to the NDEP; the inventory is updated annually. The four categories of industrial facilities that require annual inspections, according to the permit, are discussed in more detail in the following subsections.

12.2.6.1 SARA Title III Section 313

SARA Title III Section 313 requires certain classes of industrial facilities to submit reports to the EPA, based on their potential for toxic chemical releases. The EPA regulates and maintains a list of these industrial facilities, as well as other facilities that release certain amounts of regulated chemicals into the environment. The EPA's website (https://www.epa.gov/enviro/tri-search) was used to identify all Toxics Release Inventory (TRI) facilities in the Las Vegas Valley. However, some inaccuracies in the EPA GIS data may be present. Section 313 facilities within the Las Vegas Valley that require an industrial inspection are included in the Permittees' inventories and are also identified in Table 12-4.

Table 12-4: Industrial Facilities in the Las Vegas Valley Subject to SARA Title III Section 313, According to EPA TRI Search for the Current Permit Year (2023-2024)

Industrial Facility Name	Address	Inspected Annually By
Accurate Metal Solutions, Las Vegas, LLC [a]	3261 Builders Ave., Las Vegas, NV 89101	NA [d]
Aggregate Industries SWR Gown Asphalt	413 E Gowan Rd., North Las Vegas, NV 89030	City of North Las Vegas
Amazon.com Services LLC (LSA Development)	5801 Nicco Way, Las Vegas, NV 89115 [e]	City of North Las Vegas
Anderson Dairy	801 Searles Ave., Las Vegas, NV 89101	City of Las Vegas
Calportland Company Gary Plant	6501 W Richmar Ave., Las Vegas, NV 89139	Clark County
Calportland Company Gowan Plant	143 W Gowan Rd., North Las Vegas, NV 89032	City of North Las Vegas
Calportland Company Henderson Plant (Silver State Materials)	450 Eastgate Rd., Henderson, NV 89014	City of Henderson
Calportland Company Range Ready Mix Plant	5910 Range Rd., North Las Vegas, NV 89115	City of North Las Vegas
Calportland Company Sloan Plant	5300 Sloan Rd., Sloan, NV 89124	Clark County
Capital Cabinet Corp [b]	3645 Losee Rd., North Las Vegas, NV 89030	NA [d]
Casino Ready Mix [b]	5355 N Beesley Dr., Las Vegas, NV 89115	NA [d]
Cemex - Block Plant	5030 N Lamb Blvd., Las Vegas, NV 89115 [e]	City of North Las Vegas
Cemex – Sloan Plant	14998 S Las Vegas Blvd., Las Vegas, NV 89124	Clark County
Cemex Anthem Plant #1856 [b]	2403 Democracy Way, Henderson, NV 89044	NA [d]
Cemex Blue Diamond Plant 1855 [b]	9325 S Jones Blvd., Las Vegas, NV 89119	NA [d]
Cemex Gowan Plant #1860	29 W Gowan., North Las Vegas, NV 89030	City of North Las Vegas
Cemex Kyle Canyon Plant #1866	10025 Moccasin Rd., Las Vegas, NV 89143	City of Las Vegas
Cemex MGM City Center [b]	3790 S Las Vegas Blvd., Las Vegas, NV 89109	NA [d]
Cemex North Las Vegas Plant #1853 – Losee Plant	4001 N Losee Rd., North Las Vegas, NV 89030	City of North Las Vegas
Cemex Turnberry Plant #1859 [b]	2777 Paradise Rd., Las Vegas, NV 89109	NA [d]
Certain Teed Gypsum - Las Vegas Finishing Plant	3838 Civic Center Dr., North Las Vegas, NV 89030	City of North Las Vegas
Certain Teed Gypsum - Las Vegas Plant	13500 Blue Diamond Rd Las Vegas, NV 89161	Clark County
CMC Economy Steel and CMC Rebar Las Vegas	4485 E Colton Ave., Las Vegas, NV 89115	Clark County
Custom Building Products	3115 E. Lone Mountain Rd., Suite 1000, North Las Vegas, NV 89081	City of North Las Vegas
Ergon Asphalt & Emulsions Inc. - Las Vegas	3901 W Ponderosa Way, Las Vegas, NV 89118	Clark County
Ergon Asphalt & Emulsions Inc. - Las Vegas	6400 W Richmar Ave., Las Vegas, NV 89139	Clark County
Farm Fresh Foods	3840 Civic Center Dr., North Las Vegas, NV 89030	City of North Las Vegas
Firestone Building Products	4272 Corporate Center Dr., North Las Vegas, NV 89030	City of North Las Vegas
Grand Products Nevada Inc. (CES) [b]	751 Pilot Rd. Suite A, Las Vegas, NV 891119	Clark County
HD Supply Construction Supply LTD (Harris Real Estate Nevada LLC)	2437 1/2 Losee Rd., North Las Vegas, NV 89030	City of North Las Vegas

Notes:
[a] This business is not operational / does not have a business license in CLV
[b] Facility not operational or no longer exists
[c] Stormwater inspections not required, due to facility process change
[d] NA = Not Applicable; no inspection necessary
[e] The address and jurisdiction have been verified to be accurate
[f] Current address: 4800 E El Campo Grande Ave., North Las Vegas, NV 89115

Table 12-4: Industrial Facilities in the Las Vegas Valley Subject to SARA Title III Section 313, According to EPA TRI Search for the Current Permit Year (2023-2024)

Industrial Facility Name	Address	Inspected Annually By
IGT [b]	6355 S Buffalo Dr., Las Vegas, NV 89113	Clark County [d]
Jensen Precast	3853 Losee Rd., North Las Vegas, NV 89030	City of North Las Vegas
Jensen Precast	3840 N Bruce St., North Las Vegas, NV 89030	City of North Las Vegas
Jensen Precast [b]	2750 Marion Dr., Las Vegas, NV 89115	NA [d]
Kalco Lighting LLC	6355 S Windy St. Suite 3, Las Vegas, NV 89119	Clark County
Ken's Foods Inc. Las Vegas	8925 Ken's Ct., Las Vegas, NV 89139	Clark County
Las Vegas Cultured Marble Inc. [b]	6875 Speedway Blvd. Building U-102, Las Vegas, NV 89115	NA [d]
Las Vegas Paving Corp	10846 W. Lone Mountain Rd., Las Vegas, NV 89129	City of Las Vegas
Las Vegas Paving Corp [b]	6600 Speedway Blvd., Las Vegas, NV 89115	City of North Las Vegas
Las Vegas Paving Corp	3300 N 5th St., North Las Vegas, NV 89030	City of North Las Vegas
Las Vegas Paving Corp	3400 N 5th St., North Las Vegas, NV 89030	City of North Las Vegas
Las Vegas Paving Corp	521 Cape Horn Dr., Henderson, NV 89011	City of Henderson
Las Vegas Paving Corp	9325 S Jones Blvd., Las Vegas, NV 89139	Clark County
Las Vegas Paving Corp [b]	0.75 Miles W of I-15 & 15 SW of US 95, Las Vegas, NV 89115	NA [d]
Las Vegas Paving Corp [b]	1.5 Miles N of Hollywood & Las Vegas Blvd., Las Vegas, NV 89115	NA [d]
Lighthouse VIP Products [b]	4601 E Cheyenne Ave., Las Vegas, NV 89115	NA [d]
Mars Chocolate NA	1 Sunset Way, Henderson, NV 89014	City of Henderson
May Manufacturing LLC (dba Artesian Spas)	4720 N Lamb Blvd., Las Vegas NV 89115	Clark County
MCC-Uniflex LLC [b]	1151 Grier Dr., Las Vegas, NV 89119	NA [d]
Meadow Gold Dairies	6350 E Centennial Pkwy., North Las Vegas, NV 89115	City of North Las Vegas
Nevada Ready Mix Arville	4301 W Hacienda Ave., Las Vegas, NV 89109	Clark County
Nevada Ready Mix [b]	2200 Bowes St., Henderson, NV 89044	NA [d]
Nevada Ready Mix Bonanza	601 W Bonanza Rd., Las Vegas, NV 89106	City of Las Vegas
Nevada Ready Mix Echelon [b]	2920 S Industrial Rd., Las Vegas, NV 89109	NA [d]
Nevada Ready Mix Le Reve [b]	Sands & S Las Vegas Blvd., Las Vegas, NV 89109	NA [d]
Nevada Ready Mix Lone Mountain	10811 W Washburn Ave., Las Vegas, NV 89129	Clark County
Nevada Ready Mix Plant 9 [b]	8755 W Sunset Rd., Las Vegas, NV 89123	NA [d]
Nitrex Inc.	201 E Mayflower Ave., North Las Vegas, NV 89030	City of North Las Vegas
Nucor Insulated Panel Group	4700 Engineers Way Suite 103, North Las Vegas, NV 89081	City of North Las Vegas
Ocean Spray Cranberries Inc. [c]	1301 American Pacific Dr., Henderson, NV 89014	NA [d]
Pacific Engineering & Production Co. of Nevada [b]	8291 Gibson Rd., Henderson, NV 89015	NA [d]
Pavestone – Las Vegas NV Plant	4720 Alto Ave. Las Vegas, NV 89115	Clark County
Pioneer Americas LLC D/B/A Olin Chlor Alkali Products	350 S Fourth St., Henderson, NV 89015	Clark County
PLI (CPI Card Group)	1220 Trade Drive, North Las Vegas, NV 89030	City of North Las Vegas
Poly-West [b]	251 Conestoga Way, Henderson, NV 89002	NA [d]
Pro Petroleum LLC.	4985 N Sloan Ln., Las Vegas, NV 89115	Clark County

Notes:
[a] This business is not operational / does not have a business license in CLV
[b] Facility not operational or no longer exists
[c] Stormwater inspections not required, due to facility process change
[d] NA = Not Applicable; no inspection necessary
[e] The address and jurisdiction have been verified to be accurate
[f] Current address: 4800 E El Campo Grande Ave., North Las Vegas, NV 89115

Table 12-4: Industrial Facilities in the Las Vegas Valley Subject to SARA Title III Section 313, According to EPA TRI Search for the Current Permit Year (2023-2024)

Industrial Facility Name	Address	Inspected Annually By
Pro Terminal Operators LLC	4800 E El Campo Grande Ave., Las Vegas, NV 89115 [f]	City of North Las Vegas
Quikrete	112 W Brooks Ave North Las Vegas, NV 89030	City of North Las Vegas
Rebel Oil Co Inc.	5054 N Sloan Ln., Las Vegas, NV 89115	Clark County
Reladyne (New West Holdings LLC)	2420 Losee Rd., North Las Vegas, NV 89030	City of North Las Vegas
Rinker Las Vegas Pipe	2100 Burns Rd. Henderson, NV 89011	City of Henderson
Rinker Materials Blue Diamond [b]	9275 S Jones Blvd., Las Vegas, NV 89139	NA [d]
Rinker Materials Buffalo Main 1850 [b]	4511 S Buffalo Dr., Las Vegas, NV 89147	NA [d]
Rinker Materials Henderson 1854 [b]	750 Capehorn Dr., Henderson, NV 89015	NA [d]
Safety-Kleen Systems North Las Vegas (LVN)	4582 Donovan Way, North Las Vegas, NV 89081	City of North Las Vegas
Saguaro Power Company	435 S Fourth St., Henderson, NV 89015	Clark County
Service Rock Products (Robertson's Ready Mix)	8350 4th St Henderson, NV, 89015	Clark County
Service Rock Products Inc. Las Vegas [b]	800 Feet S of Intersection of Cactus Rd. & Polluck Dr., Las Vegas, NV 89102	NA [d]
Service Rock Products (Robertson's Ready Mix)	10811 W Washburn, Las Vegas, NV 89149	Clark County
Service Rock Products Inc - Sloan (Robertson's Ready Mix)	14575 Arville St., Las Vegas, NV 89124	Clark County
Service Rock Products Inc – Beesley (Robertson's Ready Mix)	5255 Beesley Dr., Las Vegas, NV 89115	Clark County
Sierra North Batch Plant	4150 Smiley Rd., North Las Vegas, NV 89081	City of North Las Vegas
Sierra West Batch Plant	10021 Moccasin Rd., Las Vegas, NV 89143	City of Las Vegas
Southern Nevada Paving Summerlin Asphalt Plant [b]	Summerlin Pkwy. & I-215, Las Vegas, NV 89145	NA [d]
Sparkletts Drinking Water Corp	4225 W Desert Inn Rd., Las Vegas, NV 89102	Clark County
Sparkletts Water System Aqua Vend [b]	3140 Polaris Ave. #10, Las Vegas, NV 89102	NA [d]
Spartan of Nevada, Inc. [b]	2441 W Desert Inn Rd., Las Vegas, NV 89109	NA [d]
Thatcher Co of Nevada	90 Business Center St., Henderson, NV 89014	City of Henderson
Thermo Fluids Inc. Antifreeze Services	4000 Arcata Way, North Las Vegas, NV 89030	City of North Las Vegas
Thomas Petroleum - Las Vegas Bonanza [b]	715 W Bonanza Rd., Las Vegas NV 89106	NA [d]
Thomas Petroleum LLC Sloan [b]	4825 N Sloan Ln., Las Vegas NV 89115	Clark County
Titanium Metals Corp	181 N Water St., Henderson, NV 89015	Clark County
Transportation Systems Services Operations Inc.	5406 E El Campo Grande Ave., North Las Vegas, NV 89115	City of North Las Vegas
Tronox LLC (EMD Acquisitions LLC)	560 W Lake Mead Pkwy., Henderson NV, 89015	Clark County
Wells Enterprises Inc.	1001 Olsen St., Henderson, NV 89015	City of Henderson
Universal Urethane Inc.	4201 E Lone Mountain Rd., North Las Vegas, NV 89081	City of North Las Vegas
Washington Group International [b]	4610 N Grand Canyon Dr., Las Vegas, NV 89129	NA [d]
West District Oil #75 LAS	4581 Eaker St., North Las Vegas, NV 89081	City of North Las Vegas

Notes:
[a] This business is not operational / does not have a business license in CLV
[b] Facility not operational or no longer exists
[c] Stormwater inspections not required, due to facility process change
[d] NA = Not Applicable; no inspection necessary
[e] The address and jurisdiction have been verified to be accurate
[f] Current address: 4800 E El Campo Grande Ave., North Las Vegas, NV 89115

Table 12-4: Industrial Facilities in the Las Vegas Valley Subject to SARA Title III Section 313, According to EPA TRI Search for the Current Permit Year (2023-2024)

Industrial Facility Name	Address	Inspected Annually By
Westlake Royal Roofing (formerly Boral Roofing, LLC)	430 Eastgate Rd., Henderson, NV 89011	City of Henderson
Young Electric Sign Co.	5119 S Cameron St., Las Vegas, NV 89118	Clark County
SWMP Target	Provide an annual update to the inventory of industrial facilities to be inspected	

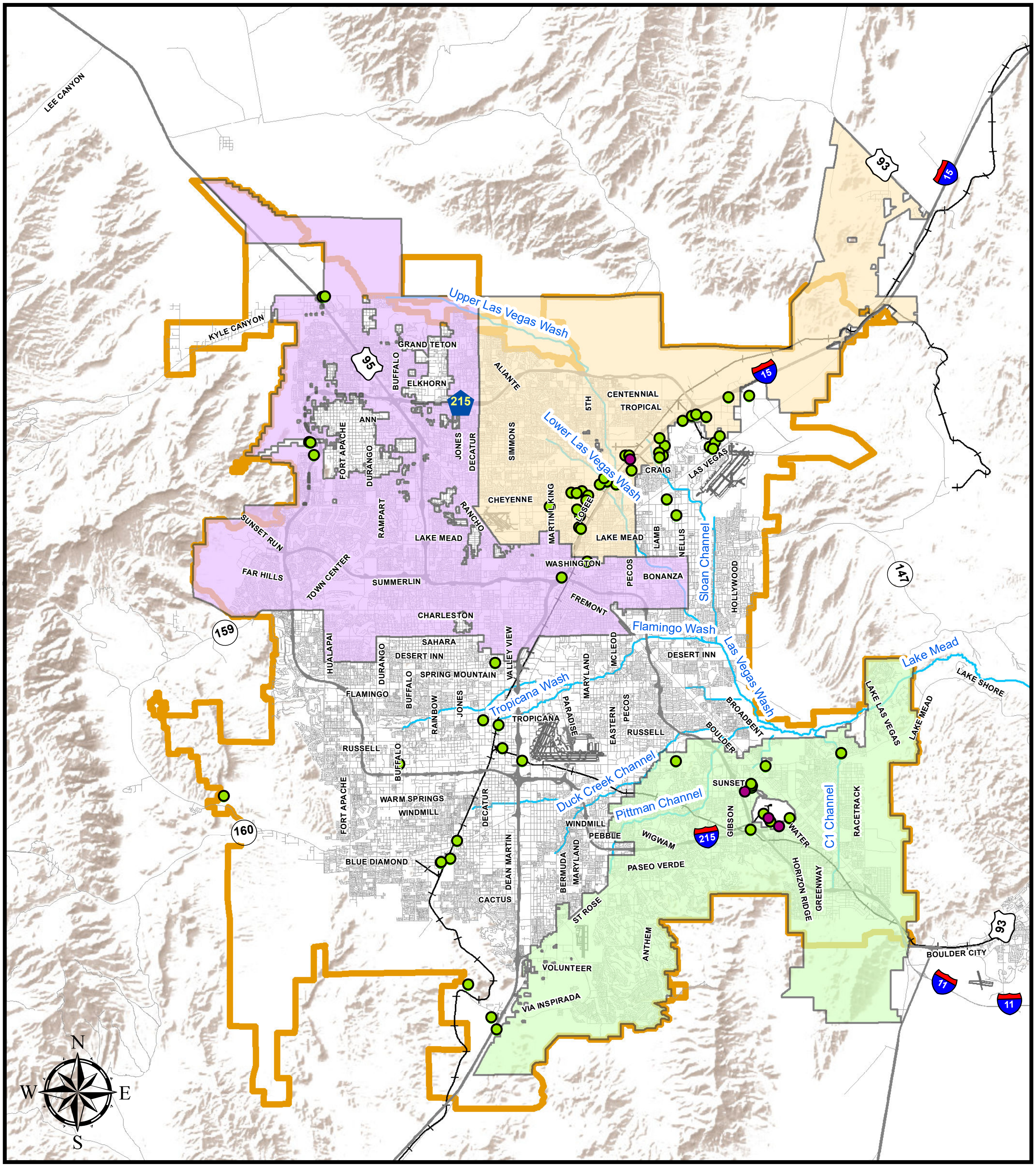
Notes:
[a] This business is not operational / does not have a business license in CLV
[b] Facility not operational or no longer exists
[c] Stormwater inspections not required, due to facility process change
[d] NA = Not Applicable; no inspection necessary
[e] The address and jurisdiction have been verified to be accurate
[f] Current address: 4800 E El Campo Grande Ave., North Las Vegas, NV 89115

The following facility was added to the industrial facilities per the SIC codes:

- Pavestone – Las Vegas NV Plant

12.2.7 Industrial Facility Stormwater Inspection Boundary

The boundary for the Industrial Facility Inspections for the 2023-2024 Annual Report is based on the 2018 Ultimate Development Boundary (UDB) Updated for the Las Vegas Valley MS4 Program. While no changes to the boundary are currently anticipated, the program will be modified, if necessary, in response to any updates to the UDB.



Legend

- Ultimate Development Boundary Updated for the Las Vegas Valley MS4 Program (2018 MPU)
- Hazardous Waste Treatment Disposal and Recovery Facilities
- Industrial Facility Subject to Section 313
- Airports
- Streets
- Railroads

Jurisdictional Boundaries

- City of Henderson
- City of Las Vegas
- City of North Las Vegas
- Clark County

0 1.5 3 6 9

Scale in Miles

Service Layer Credits: Sources: Esri, USGS, NOAA

Figure 12-1
Industrial Facility Locations
2023-2024 Annual Report

12.2.8 Municipal Landfills

The Apex Regional Landfill is currently the only active local landfill in the Las Vegas area, however it is located outside of the Las Vegas Wash watershed. As there are no active municipal landfills in the Las Vegas Wash drainage area, the Permittees did not identify any municipal landfills for inclusion on their industrial facility inspection inventories.

12.2.9 Hazardous Waste Treatment, Disposal, and Recovery Facilities

The EPA keeps a list of hazardous waste treatment, disposal, and recovery facilities that are subject to the control of hazardous waste under the Resource Conservation and Recovery Act (RCRA). The EPA RCRA Info website (https://enviro.epa.gov/facts/rcrainfo/search.html) was searched to find hazardous waste treatment, disposal, and recovery facilities within the Las Vegas Valley. The facilities subject to RCRA within the Las Vegas Valley that require an industrial inspection are included in the Permittees' inventories and are also identified in Table 12-5.

Table 12-5: Hazardous Waste Treatment, Disposal, and Recovery Facilities in the Las Vegas Valley, According to EPA RCRA Info for the Current Permit Year (2023-2024)

Industrial Facility Name	Address	Inspected Annually By
Basic Remediation Company (BRC)	875 W Warm Springs Rd., Henderson, NV 89011	Clark County
Safety Kleen Systems, Inc	4582 Donovan Way, North Las Vegas, NV 89081	City of North Las Vegas
Pioneer Americas LLC D/B/A Olin Chlor Alkali Products	350 S Fourth St., Henderson, NV 89015	Clark County
Tronox LLC (EMD Acquisitions LLC)	560 W Lake Mead Pkwy., Henderson, NV 89105	Clark County
SWMP Target	Provide an annual update to the inventory of industrial facilities to be inspected	

12.2.10 Other Facilities that Contribute a Substantial Pollutant Load to the MS4

The Permittees have not identified any other facilities contributing a substantial pollutant load to the MS4. However, many industrial facilities, in addition to those listed in Table 12-5, are being inspected each year in the Las Vegas Valley by the Permittees, and under other programs.

12.2.11 Industrial Facility Inventory

Table 12-6 lists the inventory of facilities and the frequency of inspection that will be inspected during the 2024-2025 MS4 permit year. This list is reviewed every year and submitted to NDEP as part of the Annual Report.

Table 12-6: Inventory of Facilities and Inspection Frequency for 2024-2025 Permit Year

Type of Industrial Facility	Facility Name	SIC Code(s)	NAICS Code(s)	Address	Jurisdiction	Minimum Inspection Frequency
Section 313 of SARA	Calportland Company Gary Plant	3273	327320	6501 W Richmar Ave., Las Vegas, NV 89139	Clark County	Once Annually
	Calportland Company Sloan Plant	3273	327320	5300 Sloan Rd., Las Vegas, NV 89054		
	Cemex Sloan Plant	3273	327320	14998 S Las Vegas Blvd., Las Vegas, NV 89124		
	Certain Teed Gypsum - Las Vegas Plant	NA	212399	13500 Blue Diamond Rd Las Vegas, NV 89161		
	CMC Economy Steel and CMC Rebar Las Vegas	3441	332312	4485 E Colton Ave., Las Vegas, NV 89115		
	Creative Electronics and Software, Inc.	3672	334412	751 E Pilot Rd, Las Vegas, NV 89119		
	Ergon Asphalt & Emulsions Inc. - Las Vegas	2951	324121	3901 W Ponderosa Way, Las Vegas, NV 89118		
	Ergon Asphalt & Emulsions Inc. - Las Vegas	2951	324121	6400 W Richmar Ave., Las Vegas, NV 89139		
	IGT	3999	339999	6355 S Buffalo Dr., Las Vegas, NV 89113		
	Kalco Lighting LLC	3999	335122	6355 S Windy St. Suite 3, Las Vegas, NV 89119		
	Ken's Foods Inc. Las Vegas	2099	311941	8925 Ken's Ct., Las Vegas, NV 89139		
	Las Vegas Paving Corp	1081	324121	9325 S Jones Blvd., Las Vegas, NV 89139		
	May Manufacturing LLC (dba Artesian Spas)	3088	326191	4720 N Lamb Blvd., Las Vegas NV 89115		
	Nevada Ready Mix Arville	3273	327320	4301 W Hacienda Ave., Las Vegas, NV 89109		
	Nevada Ready Mix Lone Mountain	3273	327320	10811 W Washburn Ave., Las Vegas, NV 89129		
	Pavestone – Las Vegas NV Plant	3273	327331	4720 Alto Ave. Las Vegas, NV 89115		
	Pro Petroleum Inc.	5171	424710	4985 N Sloan Ln., Las Vegas, NV 89115		
	Rebel Oil Co Inc.	5171	424710	5054 N Sloan Ln., Las Vegas, NV 89115		
	Saguaro Power Company	4939	221112	435 Fourth St., Henderson, NV 89015		
	Service Rock Products (Robertson's Ready Mix)	3273	327320	8350 4th St Henderson, NV, 89015		
	Service Rock Products (Robertson's Ready Mix)	3273	327320	10815 W Washburn Rd., Las Vegas, NV 89149		

Table 12-6: Inventory of Facilities and Inspection Frequency for 2024-2025 Permit Year

Type of Industrial Facility	Facility Name	SIC Code(s)	NAICS Code(s)	Address	Jurisdiction	Minimum Inspection Frequency
Section 313 of SARA	Service Rock Products Inc – Sloan (Robertson's Ready Mix)	3273	327320	14575 Arville St., Las Vegas, NV 89124	Clark County	Once Annually
	Service Rock Products Inc – Beesley (Robertson's Ready Mix)	3273	327320	5255 Beesley Dr., Las Vegas, NV 89115		
	Sparkletts Drinking Water Corp	5149	312112	4225 W Desert Inn Rd., Las Vegas, NV 89102		
	Thomas Petroleum LLC Sloan	5171	424710	5000 N Sloan Ln., Las Vegas NV 89115		
	Titanium Metals Corp	3339	331419	181 N Water St., Henderson, NV 89015		
	Young Electric Sign Co.	3993	811121	5119 S Cameron St., Las Vegas, NV 89118		
Section 313 of SARA	Anderson Dairy	2023, 2024, 2026	311511, 311514, 311520	801 Searles Ave., Las Vegas, NV 89101	City of Las Vegas	Once Annually
	Apex Materials LLC	1442	212321	10551 Skye Village Rd., Las Vegas, NV 89136		
	Arteaga Concrete Inc.	3273	327320	2550 Highland Dr., Las Vegas, NV 89109		
	Capriati Construction Corp.	1429	212319	10051 Moccasin Rd., Las Vegas, NV 89143		
	Cemex Kyle Canyon Plant #1866	3273	327320	10025 Moccasin Rd., Las Vegas, NV 89143		
	Las Vegas Paving Corp.	3273	324121	10846 W. Lone Mountain Rd., Las Vegas, NV 89129		
	Mel Clark Inc. Lone Mountain Pit	1429	212319	10550 W Lone Mtn Rd., Las Vegas, NV 89129		
	Nevada Ready Mix Bonanza	3273	327320	601 W Bonanza Rd., Las Vegas, NV 89106		
	Sierra West Batch Plant	3273	327320	10021 Moccasin Rd., Las Vegas, NV 89143		
	Wells Cargo Inc. Lone Mountain Pit	1429	212319	10191 Park Run Dr., Las Vegas, NV 89145		
Section 313 of SARA	Aggregate Industries SWR Gown Asphalt	2951	23411, 23571, 324121	413 E Gowan Rd., North Las Vegas, NV 89030	City of North Las Vegas	Once Annually
	Amazon.com Services LLC (LSA Development)	5961	454110	5801 Nicco Way., Las Vegas, NV 89115		
	American Eagle	NA	NA	120 W Delhi Ave., North Las Vegas, NV 89030		

Table 12-6: Inventory of Facilities and Inspection Frequency for 2024-2025 Permit Year

Type of Industrial Facility	Facility Name	SIC Code(s)	NAICS Code(s)	Address	Jurisdiction	Minimum Inspection Frequency
Section 313 of SARA	Calportland Company Gowan Plant	NA	327320	143 W Gowan Rd., North Las Vegas, NV 89032	City of North Las Vegas	Once Annually
	Calportland Company Range Ready Mix Plant	NA	327320	5910 Range Rd., North Las Vegas, NV 89115		
	Cemex - Block Plant	3251, 3273	327320, 327331	5030 N Lamb Blvd., Las Vegas, NV 89115		
	Cemex Gowan Plant #1860	3273	327320	29 W Gowan., North Las Vegas, NV 89030		
	Cemex North Las Vegas Plant #1853 - Losee Plant	3273	327320	4001 N Losee Rd., North Las Vegas, NV 89030		
	Certain Teed Gypsum - Las Vegas Finishing Plant	3275	327420	3838 Civic Center Dr., North Las Vegas, NV 89030		
	Core & Main	NA	NA	2829 Losee Rd., North Las Vegas, NV 89030		
	Custom Building Products	3272	327999, 327390	3115 E. Lone Mountain Rd. Suite 1000, North Las Vegas, NV 89081		
	Farm Fresh Foods	5147	311991	3840 Civic Center Dr., North Las Vegas, NV 89030		
	Firestone Building Products	3081	326113	4272 Corporate Center Dr., North Las Vegas, NV 89030		
	Jensen Precast	3272	327390, 327331	3853 Losee Rd., North Las Vegas, NV 89030		
	Jensen Precast	3272	327390, 327331	3840 N Bruce St., North Las Vegas, NV 89030		
	HD Supply Construction Supply LTD (Harris Real Estate Nevada LLC)	1791	2381201	2437 1/2 Losee Rd., North Las Vegas, NV 89030		
	Las Vegas Paving Corp	2951	324121	6600 Speedway Blvd., Las Vegas, NV 89115		
	Las Vegas Paving Corp	NA	324121	3400 N 5th St., North Las Vegas, NV 89030		
	Meadow Gold Dairies	2026	311511, 311514, 424430	6350 E Centennial Pkwy., North Las Vegas, NV 89115		
	Nitrex Inc.	3398	332811	201 E Mayflower Ave., North Las Vegas, NV 89030		
	Nucor Insulated Panel Group	3448	332311	4700 Engineers Way Suite 103, North Las Vegas, NV 89081		

Table 12-6: Inventory of Facilities and Inspection Frequency for 2024-2025 Permit Year

Type of Industrial Facility	Facility Name	SIC Code(s)	NAICS Code(s)	Address	Jurisdiction	Minimum Inspection Frequency
Section 313 of SARA	PLI (CPI Card Group)	NA	326199, 323111,	1220 Trade Drive, North Las Vegas, NV 89030	City of North Las Vegas	Once Annually
	Pro Terminal Operators LLC	5171	424710	4800 E El Campo Grande Ave., North Las Vegas, NV 89115		
	Quikrete	3273	327320	112 W Brooks Ave North Las Vegas, NV 89030		
	Reladyne (New West Holdings LLC)	5171	424710	2420 Losee Rd., North Las Vegas, NV 89030		
	Sierra North Batch Plant	NA	327320	4150 Smiley Rd., North Las Vegas, NV 89081		
	Thermo Fluids Inc. Antifreeze Services	2899, 5093	325998, 423930	4000 Arcata Way, North Las Vegas, NV 89030		
	Transportation Systems Services Operations Inc.	3743	336510, 33651	5406 E El Campo Grande Ave., North Las Vegas, NV 89115		
	Universal Urethane Inc.	3069, 3086, 3714	326150, 32615	4201 E Lone Mountain Rd., North Las Vegas, NV 89081		
	West District Oil #75 LAS	NA	424710	4581 Eaker St., North Las Vegas, NV 89081		
Section 313 of SARA	Calportland Company Henderson Plant (Silver State Materials)	3273	327320	450 Eastgate Rd., Henderson, NV 89014	City of Henderson	Once Annually
	Las Vegas Paving Corp	2951	324121	521 Cape Horn Dr., Henderson, NV 89011		
	Mars Chocolate NA	2066	311352, 445292	1 Sunset Way, Henderson, NV 89014		
	Rinker Las Vegas Pipe	3273	327320	1899 Burns Rd. Henderson, NV 89011		
	Thatcher Co of Nevada	0111, 9999	3251, 32512, 325180, 325188	90 Business Center St., Henderson, NV 89014		
	Wells Enterprises	2024	311520	1001 Olsen St., Henderson, NV 89015		
	Westlake Royal Roofing (formerly Boral Roofing, LLC)	3251	327390	430 Eastgate Rd., Henderson, NV 89011		
Hazardous Waste Treatment, Disposal, and Recovery	Tronox LLC (EMD Acquisitions LLC)	2819, 1799	32518, 325180, 325188	560 W Lake Mead Pkwy., Henderson NV, 89015	Clark County	Once Annually
	Basic Remediation Company (BRC)	2819	325188	875 W Warm Springs Rd., Henderson, NV 89011		
	Pioneer Americas LLC D/B/A Olin Chlor Alkali Products	2812	325181, 325188, 32532, 32512	350 S Fourth St., Henderson, NV 89015		

Table 12-6: Inventory of Facilities and Inspection Frequency for 2024-2025 Permit Year

Type of Industrial Facility	Facility Name	SIC Code(s)	NAICS Code(s)	Address	Jurisdiction	Minimum Inspection Frequency
Hazardous Waste Treatment, Disposal, and Recovery	Safety-Kleen Systems Inc.	7389, 4953	325998, 484220, 484230, 562112, 532490	4582 Donovan Way, North Las Vegas, NV 89031	City of North Las Vegas	Once Annually
Landfills	None in the Las Vegas Valley					
Other Facilities Contributing a Substantial Pollutant Load	None in the Las Vegas Valley					

The following facility was added to the industrial facilities inventory per the SIC codes and the inspections will initiate in the 2024-2025 permit year:

- Pavestone – Las Vegas NV Plant

12.2.12 Industrial Facility Stormwater Inspection Checklist (SC-25)

The Permittees have a standard checklist that is used by inspectors to conduct industrial facility inspections. The Industrial Facility Stormwater Inspection Checklist was approved by NDEP in 2016. Each Permittee modified the standard checklist slightly to meet its needs. However, the general information collected during inspections by each Permittee was similar, according to permit requirements.

12.2.13 Industrial Facility Inspector Training Workshops (SC-28)

The Permittees train new inspectors and refresh the training of existing inspectors utilizing a presentation that includes a description of the Las Vegas Valley NPDES MS4 Permit and the Las Vegas Valley SWMP, a description of the local ordinances, and the Industrial Facility Monitoring and Control Program. The industrial facility inspector training was accepted by NDEP in 2015. Table 12-7 provides a summary of the number of industrial facility inspectors for each Permittee during the current permit year and the prior three permit years.

Table 12-7: Number of Industrial Facility Inspectors for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Inspection Type	2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	9 [a]	5	4 [d]	9
City of Las Vegas	5	4	4	2
City of North Las Vegas	3	3	3	3
Clark County	13 [b]	1 [c]	8 [c]	15 [c]

Note:
[a] Inspectors also have inspections duties beyond stormwater
[b] 2 full time inspectors and 11 part-time inspectors
[c] Also employ 16 part-time stormwater inspectors
[d] 11 Inspectors; however, only 5 generally conduct the stormwater industrial inspections

Industrial facility inspector training workshops are performed on an as-needed basis by each of the Permittees. If changes to the program and associated procedures have not occurred and no new inspectors have been on boarded, then a formal workshop may not be conducted. However, the Permittees provide internal stormwater training to multiple staff departments, which may include industrial facility inspectors as well.

Section 13

Construction Site Program

13 Construction Site Program

Section B.5.9 of the 2024-2029 NPDES MS4 Permit for the Las Vegas Valley includes requirements for a Construction Site Program to reduce pollutants in stormwater runoff from construction sites to the MS4. In addition, Section B.5.10 includes requirements for inspection of construction sites to verify compliance with local ordinances and permits, as well as requirements to identify the implementation and enforcement actions necessary to assure compliance.

13.1 Overview of Best Management Practices

Table 5-1 in Section 5 (Stormwater Management Approach) of this Annual Report identifies the BMPs employed by the Las Vegas Valley in the 2023-2024 MS4 permit year to meet permit requirements. Specifically, the Construction Site Program employed the following Source Control (SC) BMPs, discussed in the following subsections:

- SC-20 Construction Site BMP Guidance Manual
- SC-21 Construction Site Inspections
- SC-22 Construction Site Training Workshops

13.2 Description of Individual Best Management Practices

13.2.1 Construction Site BMP Manual (SC-20)

In 2009, the Permittees produced the Las Vegas Valley Construction Site Best Management Practices Guidance Manual that describes the construction site runoff management program and provides non-structural and structural BMP implementation guidance for contractors, engineers, and other construction professionals. The manual provides guidance on selecting and designing construction site BMPs that are suitable to the unique environment and conditions in the Las Vegas Valley. Table 11-3 of the SWMP provides a list of the various BMPs that are described in the Las Vegas Valley Construction Site BMP Guidance Manual. Both documents are available on the CCRFCD website and on the www.LVstormwater.com website. During the permit year the manual was reviewed. Revisions to the manual are expected after development of the updated SMWP.

The Las Vegas Valley MS4 Construction Site Program complements, but is independent of, the NDEP's State construction site permitting program. The Las Vegas Valley Construction Site BMP Guidance Manual includes information for developers, engineers, and operators about the requirements for complying with both the local and State construction site stormwater programs; procedures for State compliance are also summarized in Table 13-1.

Table 13-1: Summary of Procedures for Notifying Developers, Engineers, and Operators about NDEP Construction Site Program Requirements

Procedure	City of Henderson	City of Las Vegas	City of North Las Vegas	Clark County
Grading improvement plan submittals require the completed Las Vegas Valley Stormwater Quality Management Program Construction Permit Submittal Checklist, and a copy of the Notice of Intent (NOI) or a copy of the letter of authorization from NDEP	X	X	X	X
Standard comment on Grading Permit review letter notifying developer of need for NDEP construction permit	X	X	X	X
Standard general condition for construction plans or specifications on Public Works projects assigning the owner or contractor the responsibility for obtaining the NDEP construction permit	X	X	X	X
SWMP Target	Notify developers of the requirements to comply with all State and local construction site stormwater permitting programs			

Note: An "X" indicated that the Permittee utilizes this procedure

13.2.2 Construction Site Inspections (SC-21)

Supported by the Permittees' local ordinance language, construction sites in the Las Vegas Valley are inspected not only for active discharges to the MS4, but also for the potential to discharge (e.g., absence of or poorly installed and maintained BMPs), effective waste management onsite, and effective erosion and sediment control practices. Every effort is made to resolve minor infractions through close coordination between the inspector and the site operator. The goal of the construction site inspection program is education and compliance, rather than punishment. Inspectors have the authority to review the Stormwater Pollution Prevention Plans (SWPPP) required by NDEP's Stormwater General Permit if site conditions warrant. However, this is not a required aspect of every inspection.

The frequency of a site inspection is determined by the site's characteristics. All construction sites disturbing 100 acres or more, any site determined by the Permittees as "a significant threat to water quality," and all sites disturbing more than 1 acre that are tributary to an impaired waterbody (for sediment or turbidity), were inspected at least monthly.

During the permit year, the Permittees identified the following number of construction sites requiring inspections at least monthly:

- City of Henderson
  - 1 site disturbing >100 acres; 3 sites determined to be a "significant threat"; 0 sites disturbing more than 1 acre that are tributary to an impaired waterbody listed for sediment or turbidity
- City of Las Vegas
  - 2 sites disturbing >100 acres; 1 site determined to be a "significant threat"; 1 site disturbing more than 1 acre that are tributary to an impaired waterbody listed for sediment or turbidity

- City of North Las Vegas
    - 0 sites disturbing >100 acres; 0 sites determined to be a “significant threat”; 0 sites disturbing more than 1 acre that are tributary to an impaired waterbody listed for sediment or turbidity
- Clark County
    - 2 sites disturbing >100 acres; 38 sites determined to be a “significant threat”; 33 sites disturbing more than 1 acre that are tributary to an impaired waterbody listed for sediment or turbidity

Further, all construction sites greater than 1 acre that were not identified as a “significant threat to water quality” were inspected at least twice during ground disturbing activities.

The Permittees’ construction site inspections consist of the following activities:

- Assess compliance with Permittee stormwater ordinances
- Verify proper implementation and maintenance of BMPs
- Assess potential BMP effectiveness
- Conduct visual observations for non-stormwater discharges, potential illicit connections, and the potential to discharge pollutants to the MS4
- Provide education and outreach materials to site personnel on stormwater pollution prevention, the NPDES MS4 Permit, and NDEP construction permit processes, as needed
- Prepare a written or electronic inspection record

The Permittees used existing inspection staff or a third party contractor to perform construction site inspections. A standard Construction Site Inspection Checklist was approved by NDEP in 2016 and is in use by the Permittees. Each Permittee customized the standard checklist slightly to meet its needs. However, the general information collected during inspections by each Permittee remained similar, according to permit requirements. Table 13-2 summarizes the construction site inspection activities for the current permit year and the prior three permit years.

Table 13-2: Construction Site Inspection Activities for the Current Permit Year (2023-2024) and the Prior Three Permit Years

Permittee	Metric	2023-2024	2022-2023	2021-2022	2020-2021
City of Henderson	Number of Construction Site Inspections Conducted	1,514	1,535	1,498	1,628
	Number of Follow-Up Actions	241	242	230	269
City of Las Vegas	Number of Construction Site Inspections Conducted	1,395	1,392	1,233	738
	Number of Follow-Up Actions	103	189	285	246
City of North Las Vegas	Number of Construction Site Inspections Conducted	278	237	241	153
	Number of Follow-Up Actions	131	63	10	19
Clark County	Number of Construction Site Inspections Conducted	1,826	1,635	1,684	1,684
	Number of Follow-Up Actions	1,371	1,676 [a]	1,112 [a]	1,121 [a]
SWMP Targets	Inspect 100% of construction sites > 1 acre, per Permittee policies				
	Follow-Up on 100% of potential violations, per Permittee policies				

Notes:
[a] Includes follow-up inspections, correction orders, and violation notices

13.2.3 Construction Site Training Workshops (SC-22)

The Permittees provide regular training to their internal construction site inspectors and other staff on construction site-related sources of stormwater pollution, appropriate construction site BMPs, and the proper procedures for conducting construction site inspections. If changes to the program and associated procedures have not occurred and no new inspectors have been on boarded, then a formal workshop may not be conducted. However, the Permittees often provide internal stormwater training to multiple staff departments, which may include construction inspectors or construction inspectors may attend training conducted by other parties.

Collectively, as an SQMC-sponsored function, the Permittees host construction site training workshops that are open to Las Vegas area contractors, developers, and other interested stakeholders. These workshops included presentations from NDEP and NDOT on their specific stormwater-related construction site requirements.

During the permit year, the Permittees updated the Stormwater Training for Construction Contractors workshop. Four training sessions were held for the construction industry: two sessions on June 24, 2024 and two sessions on June 25, 2024. A summary of Permittee attendance at these, and other internal construction site training sessions is provided in Table 13-3.

Table 13-3: Summary of Construction Site Training Workshops for the Current Permit Year (2023-2024)

Permittee	Number of Trainings Conducted	Estimated Number of Attendees
City of Henderson	1	1
City of Las Vegas	2	16
City of North Las Vegas	0	0
Clark County	10	33
Permittee Training for Construction Contractors	4	128
SWMP Target	Conduct a minimum of one contractor training workshop annually	

Section 14

Staff and Resources

14 Staff and Resources

Section B.6.3.3.11 of the 2024-2029 NPDES MS4 Permit for the Las Vegas Valley requires Permittees to provide information on annual expenditures for the reporting period, broken down by the major programs indicated in the SWMP. The summary of current expenditures and the anticipated budget for the next permit year are included in Table 14-1 and Table 14-2, respectively.

Table 14-1: Annual Las Vegas Valley MS4 Program Expenditures for the Current Permit Year (2023-2024)

Permit Element	Clark County Regional Flood Control District	City of Henderson	City of Las Vegas	City of North Las Vegas	Clark County
Public Outreach and Education Program	$200,887	$21,409	$18,939	$15,000	N/A
Stormwater Monitoring Program	$152,194	N/A	N/A	N/A	N/A
Source Control and MS4 Maintenance Program [a]	$0	$4,194,860	$27,954,797	$2,210,000	$9,243,548
Post-Construction Program for NDSR	$10,000	$1,468,974	$907,956	$15,000	$1,301,492
Illicit Discharge Detection and Elimination Program	$5,000	$1,493,669	$88,563	$2,292,000	$34,834,796
Industrial Facility Monitoring and Control Program	$0	$77,881	$235,907	$77,500	$2,112,465
Construction Site Program	$10,000	$121,982	$147,188	$62,000	$298,069
Watershed Program	$122,666,696	$817,053	$453,129	Included in Source Control	$750,779
MS4 Program Management [b]	$471.420	$44,567	$177,347	$77,500	$185,468
TOTAL [c]	$123,045,248	$8,240,395	$29,983,826	$4,749,000	$48,726,617

Notes:

[a] Amount does not include funding from CCRFCD. Amount from CCRFCD MWP is included in source control expenditures

[b] This category includes staff and consulting costs, management, and administrative costs, reporting, tracking, Permittee coordination, and other related costs

[c] There may be expenditures made by the Permittees, SNWA, SNHD, and others that are not captured in this estimate

Table 14-2: Anticipated Las Vegas Valley MS4 Program Budget for the Next Permit Year (2024-2025)

Permit Element	Clark County Regional Flood Control District	City of Henderson	City of Las Vegas	City of North Las Vegas	Clark County
Public Outreach and Education Program	$202,207	$22,250	$24,635	$16,000	N/A
Stormwater Monitoring Program	$166,732	N/A	N/A	N/A	N/A
Source Control and MS4 Maintenance Program [a]	$0	$4,837,482	$28,087,460	$2,275,000	$13,814,776
Post-Construction Program for NDSR	$10,000	$1,520,738	$935,194	$16,000	$1,549,541
Illicit Discharge Detection and Elimination Program	$5,000	$530,988	$91,220	$2,360,000	$52,155,862
Industrial Facility Monitoring and Control Program	$0	$80,606	$242,984	$80,000	$2,086,645
Construction Site Program	$10,000	$126,251	$151,604	$64,000	$426,302
Watershed Program	$80,202,800	$11,000,000	$4,586,700	Included in Source Control	$5,010,955
MS4 Program Management [b]	$559,153	$46,127	$240,491	$80,000	$278,055
TOTAL [c]	$81,155,892	$18,164,442	$34,360,288	$4,891,000	$75,322,136

Notes:

[a] Amount does not include funding from CCRFCD. Amount from CCRFCD MWP is included in source control expenditures

[b] This category includes staff and consulting costs, management, and administrative costs, reporting, tracking, Permittee coordination, and other related costs

[c] There may be expenditures made by the Permittees, SNWA, SNHD, and others that are not captured in this estimate

14.1 Funding

The CCRFCD will continue to fund its MS4 program responsibilities from revenue collected from the ¼ cent sales tax that provides funding for all CCRFCD functions. The other Permittees (CC, CLV, CNLV, and COH) will continue to fund their projects primarily from their respective general tax revenues. A portion of the construction program measures (e.g., inspections, design reviews) may also be financed through development permit fees.

14.2 Staffing

Although Permittee personnel dedicated solely to the Las Vegas Valley MS4 Program are limited, staff from multiple departments are involved in program activities including: industrial site inspections, construction site inspections, development submittals, and storm drain system maintenance activities.

Overall permit program management activities have also been supported in part by outside consultants, Brown and Caldwell and HDR. Permittee personnel are further supplemented by staff of other agencies that are responsible for performing specific BMPs. For example, the SNWA is responsible for water conservation measures, while the SNHD is responsible for enforcement of illegal discharge ordinances. These relationships are expected to continue into the next permit year.

Section 15

Evaluation of Characterization Data

15 Evaluation of Characterization Data

This section evaluates wet weather characterization data previously submitted and collected. This section also evaluates whether existing data collection programs and BMPs should be modified.

15.1 Background

This section describes the regulatory requirements, stormwater management stakeholders, unique stormwater conditions, and wet weather monitoring program in the Las Vegas Valley.

15.1.1 MS4 Stormwater Permit

The Nevada Division of Environmental Protection (NDEP) has issued National Pollutant Discharge Elimination System (NPDES) Permit No. NV0021911 jointly to Clark County Regional Flood Control District (CCRFCD), the City of Las Vegas, the City of North Las Vegas, the City of Henderson, and Clark County (Permittees). This Permit, which was originally issued on December 13, 1990, authorized discharges from the Municipal Separate Storm Sewer System (MS4) in Las Vegas Valley. The Nevada Department of Transportation (NDOT) was included in the original permit and subsequently received its own MS4 Permit from NDEP in 2004.

The Permit has been renewed five times with the most current Permit being issued on February 5, 2024. The Permit requires the Permittees to develop and implement a Stormwater Management Plan (SWMP), which the Draft is being submitted. In addition to the structural best management practices (BMPs) discussed within this section, such as the regional detention basins, low-flow features, and channel lining, the Permittees have implemented a range of additional BMPs, including, but not limited to storm drain maintenance, construction site inspections, industrial site inspections, illicit discharge detection and elimination (IDDE), and public information and outreach.

The current Permit requires that the Permittees submit a Stormwater Monitoring Plan to NDEP by August 5, 2025. The Permittees submit wet weather monitoring data as part of their Annual Reports each year. This current evaluation extends the Permittees' reporting of wet weather monitoring data.

15.1.2 Clark County and Cities of Henderson, Las Vegas, and North Las Vegas

Las Vegas Valley consists of three incorporated cities and unincorporated Clark County. Each of these entities is responsible for stormwater management within their geographic boundaries, including the construction, operation, and maintenance of regional detention basins, conveyance facilities, and other MS4 facilities. Funding for some MS4 activities comes from the CCRFCD. Figure 15-1 shows a map of the political subdivisions of the Las Vegas Valley.

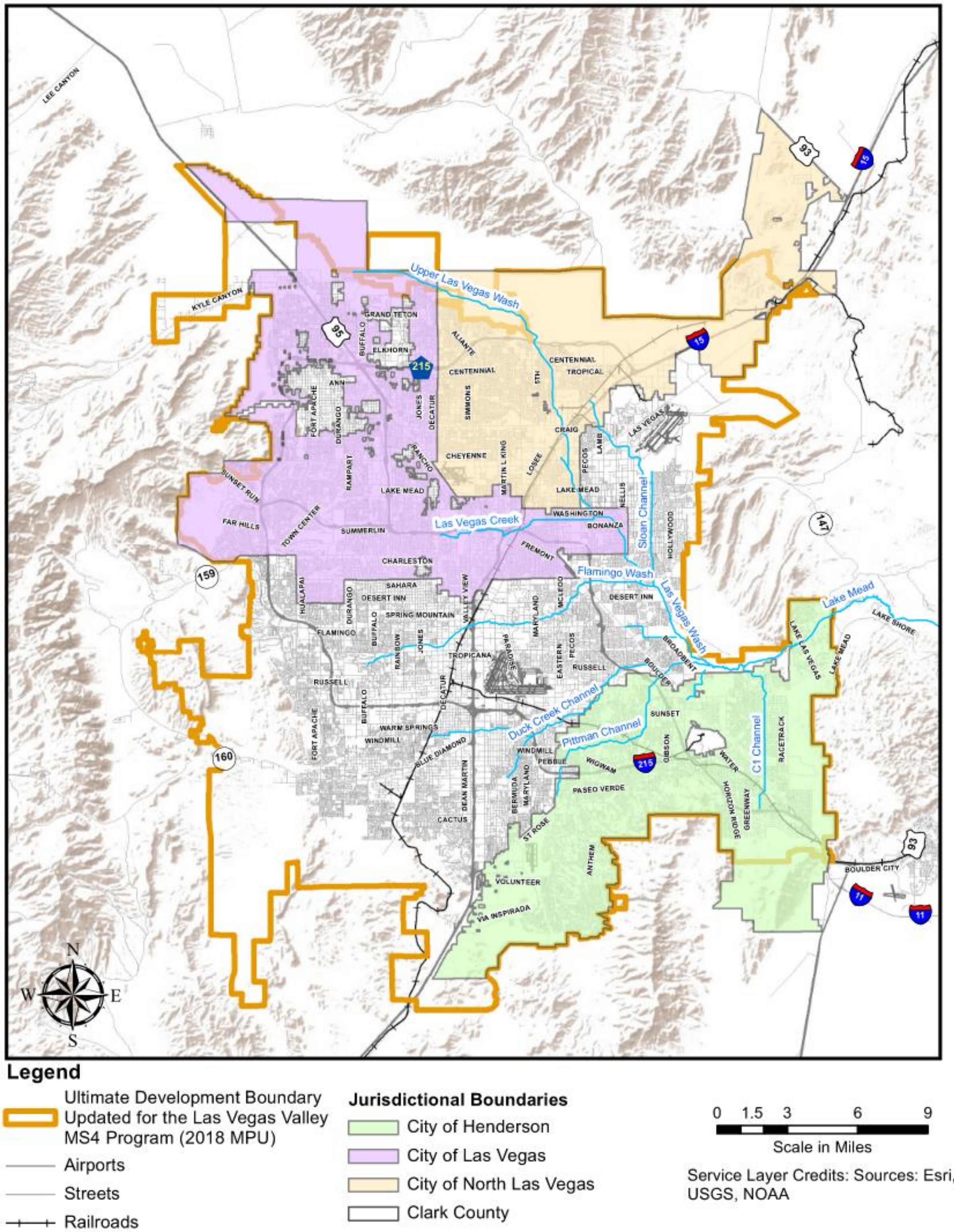


Figure 15-1. Las Vegas Valley Permittee jurisdictional boundaries

15.1.3 Clark County Regional Flood Control District

This section describes CCRFCD's background, agency organization, and infrastructure assets.

15.1.3.1 Origin and Process

The CCRFCD was established in 1986 following a series of flooding events in the Las Vegas Valley in the 1970s and early 1980s. Before the CCRFCD was established, virtually everywhere in the Las Vegas Valley was vulnerable to flood flows. Figure 15-2 shows flooding at Caesars Palace in 1975. The CCRFCD was authorized to develop and implement coordinated and comprehensive master plans to solve flooding problems throughout Clark County. Nearly all funding for designing, constructing, and maintaining flood control facilities comes from one-quarter of one percent sales tax in Clark County.

The CCRFCD is a distinct local government agency led by a general manager/chief engineer responsible for analyzing the extent of flood control problems and presenting solutions and recommendations to a Board of Directors. The CCRFCD Board of Directors includes two representatives from Clark County and the City of Las Vegas, and one from the cities of Henderson, North Las Vegas, Boulder City, and Mesquite.

Figure 15-2. 1975 flood on the Las Vegas Strip

15.1.3.2 Detention Basins, Low-Flow Facilities, and Channel Lining

As of June 2024, the Las Vegas Valley includes approximately 88 detention basins, 330 miles of regional underground storm drains, and 305 miles of surface channel, including 194 miles of concrete-lined, rip-rap, or otherwise protected against erosion. Figure 15-3 shows a map of stormwater infrastructure in Las Vegas Valley. All regional facilities are designed to manage runoff from the 100-year storm occurring under full build-out conditions in the watershed, with no assumption of onsite peak or volume reductions in new development. Runoff management is primarily accomplished using large regional detention basins that capture runoff from large watershed areas in the Las Vegas Valley. Some of these large regional detention basins have low-flow facilities that detain lower flows that would otherwise pass through. An example of these facilities is shown in Figures 15-4 and 15-5. These basins capture significant volumes of sediment and associated pollutants. The regional detention basins settle out sediment from larger storms, and the low-flow features settle out sediment from smaller storms. All detention basins are routinely inspected and sediment is removed as provided in CCRFCD's Operations and Maintenance Manual. For example, sediment may be removed from a detention basin when it accumulates a thickness of 1 to 2 feet. Some detention basins, such as those at the edge of development, fill up relatively quickly with dirt from the surrounding desert and are cleaned out frequently. Other detention basins need very little sediment removal. Figure 15-6 shows a pile of dirt in the process of being removed from Oakey Detention Basin. In addition to regional detention basins, the CCRFCD and its member agencies reduce bed and bank erosion in the Las Vegas Valley through extensive channel lining using concrete or other materials.

Figure 15-3. Map of stormwater infrastructure in the Las Vegas Valley

Figure 15-4. Oakey Detention Basin

Figure 15-5. Low-flow facility at Oakey Detention Basin

Figure 15-6. Sediment removal at Oakey Detention Basin

15.1.4 Erosion Control Structures

During the 1960s and 1970s, flows from the municipal wastewater treatment plants created wetlands in the lower Las Vegas Wash. During the 1970s and 1980s, however, erosion in the lower Las Vegas Wash reduced these wetlands and resulted in significant erosion into Lake Mead. In order to address this issue, the Las Vegas Wash Coordination Committee was formed in 1998 to prepare and implement a management strategy for the Las Vegas Wash (known as the Comprehensive Adaptive Management Plan or "CAMP"). A key element of the CAMP was to construct grade control structures in the eroding sections of the lower Las Vegas Wash to stabilize erosion and support new wetlands. Since 2000, the Southern Nevada Water Authority (SNWA) has constructed 21 erosion control structures or weirs and stabilized more than 13 miles of channel banks. Around the same time, Clark County created the Clark County Wetlands Park which consists of a large portion of the lower Las Vegas Wash. These efforts have significantly reduced erosion and sediment transport and restored and expanded the wetlands. Figure 15-7 shows the location of the weirs in the lower Las Vegas Wash.

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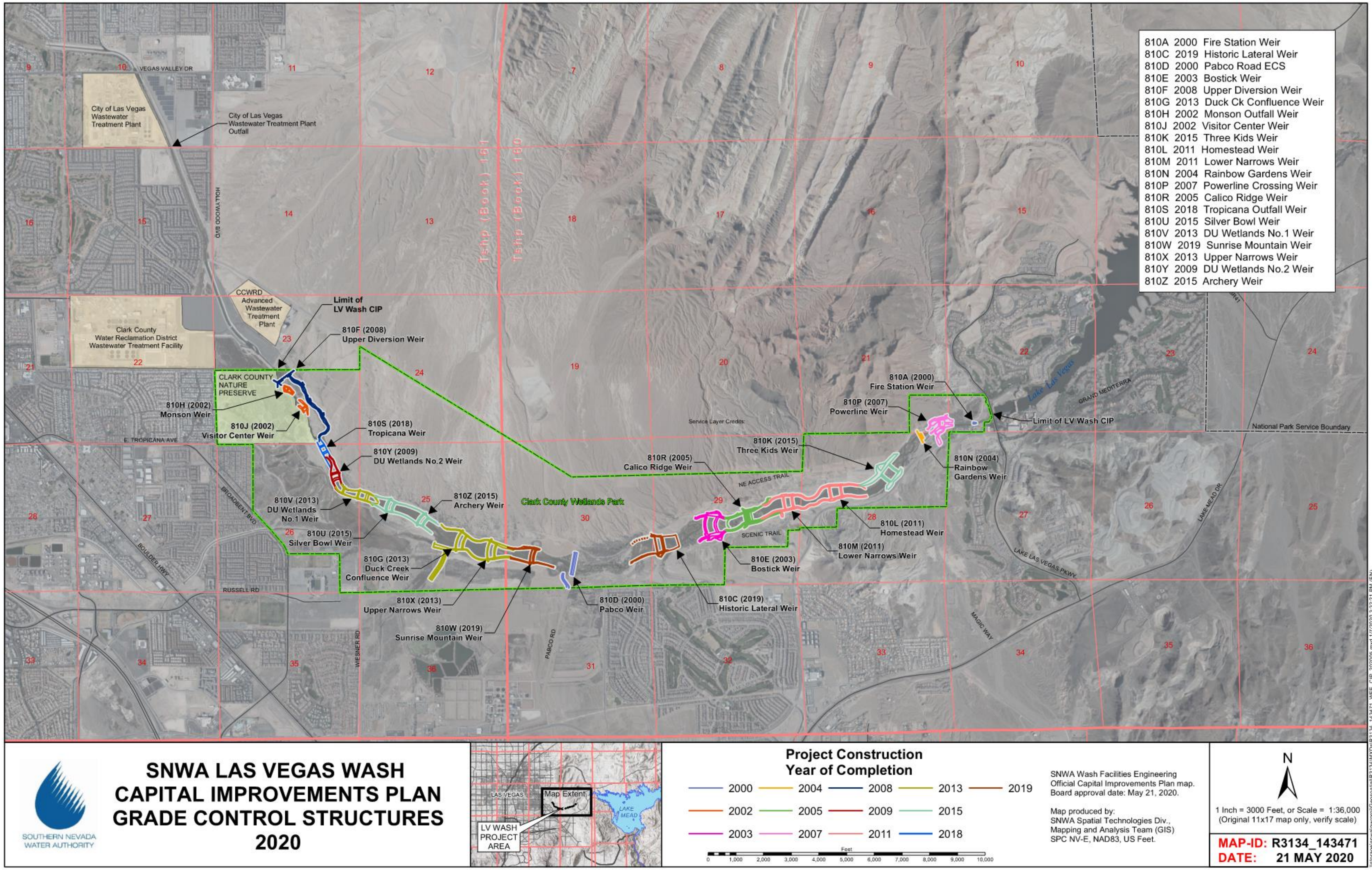

Figure 15-7. SNWA weir construction along Las Vegas Wash

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15.1.5 Unique Conditions in the Las Vegas Valley

Local conditions in the Las Vegas Valley are unique compared to other large metropolitan areas in the U.S. As a result, complying with MS4 Permit requirements may need a different approach from other regions of the United States. This section summarizes the factors that make the Las Vegas Valley unique and describes the implications of these unique factors in developing an appropriate MS4 program.

15.1.5.1 Climatic Factors

With a mean annual rainfall of 4.2 inches, the Las Vegas Valley is the driest large MS4 in the nation (see Table 15-1). Depending on soil and site conditions, developed areas and construction sites have the potential to produce measurable runoff on an average of only 6 to 11 days per year. Most runoff-producing events are short-duration (less than 3 hours) thunderstorms of limited areal extent, which may affect one part of the Valley but not other areas. The median number of dry days between rainfall events that produce runoff greater than 0.2 inches at the Harry Reid Airport gauge is 22 days, but dry periods can last for many months. This is representative of any given location in Las Vegas Valley.

Table 15-1: Mean Annual Rainfall in Western United States Cities

Community	Mean Annual Rainfall (inches)
Las Vegas, NV	4.2
Pheonix, AZ	7.2
Reno, NV	9.2
Riverside, CA	9.4
San Diego, CA	12
Tucson, AZ	12
Los Angeles, CA	12
Sacramento, CA	18
San Bernardino, CA	22
San Francisco, CA	23
Seattle, CA	37
Portland, OR	37

Source: NOAA U.S. Climate Normals, https://www.ncei.noaa.gov/access/us-climate-normals/

Most of the water used in the Las Vegas Valley comes from the Colorado River, which is heavily regulated. SNWA and the Permittees have been working for decades to reduce outdoor water use in Las Vegas Valley, for example by prohibiting turf (such as lawns that require regular watering) in new developments and paying property owners to replace turf with more appropriate desert landscaping.

Traditional BMPs that rely on vegetation for treatment are not recommended. In the Las Vegas Valley, using vegetation as a BMP would require extensive artificial irrigation if it were to be maintained as part of site landscaping. These BMPs would be inconsistent with the water conservation objectives of SNWA and the ordinances established by the Permittees.

15.1.5.2 Hydrologic Factors

The lower Las Vegas Wash is the receiving water for all storm runoff and other flows in the Las Vegas Valley. Annual flow in the lower Las Vegas Wash is comprised of about 90 percent wastewater effluent, 6 percent urban dry weather contributions, of which about half are from urban runoff and half from surfacing groundwater, and 4 percent storm runoff. The tributary channels to the lower Las Vegas Wash are not influenced by wastewater effluent. In these tributary channels, annual flow volumes comprise about 50 percent dry weather baseflows and 50 percent storm runoff. Most parts of the MS4 system in the Las Vegas Valley are dry for the entire year except in response to rainfall. When storm runoff does occur, it is typically of very short duration and extent (e.g., a few hours).

15.1.5.3 Geologic Factors

Caliche, expansive soils, and collapsible soils are widespread throughout the Las Vegas Valley, and compromise the effectiveness of standard infiltration BMPs. Caliche maps for the Las Vegas Valley are not available. As a result, the presence of any of these geologic conditions must be evaluated on a site-specific basis through geotechnical evaluations. This makes infiltration BMPs inappropriate for stormwater disposal in most areas of the Las Vegas Valley. In areas where infiltration is possible, it remains undesirable because infiltration can lead to other potential problems, including exacerbating the transport of naturally occurring selenium through the shallow aquifer into the lower Las Vegas Wash. Considering these factors, Figure 15-8 depicts the areas in which infiltration would be an unsuitable stormwater disposal method, principally because of geologic factors and high selenium shallow groundwater.

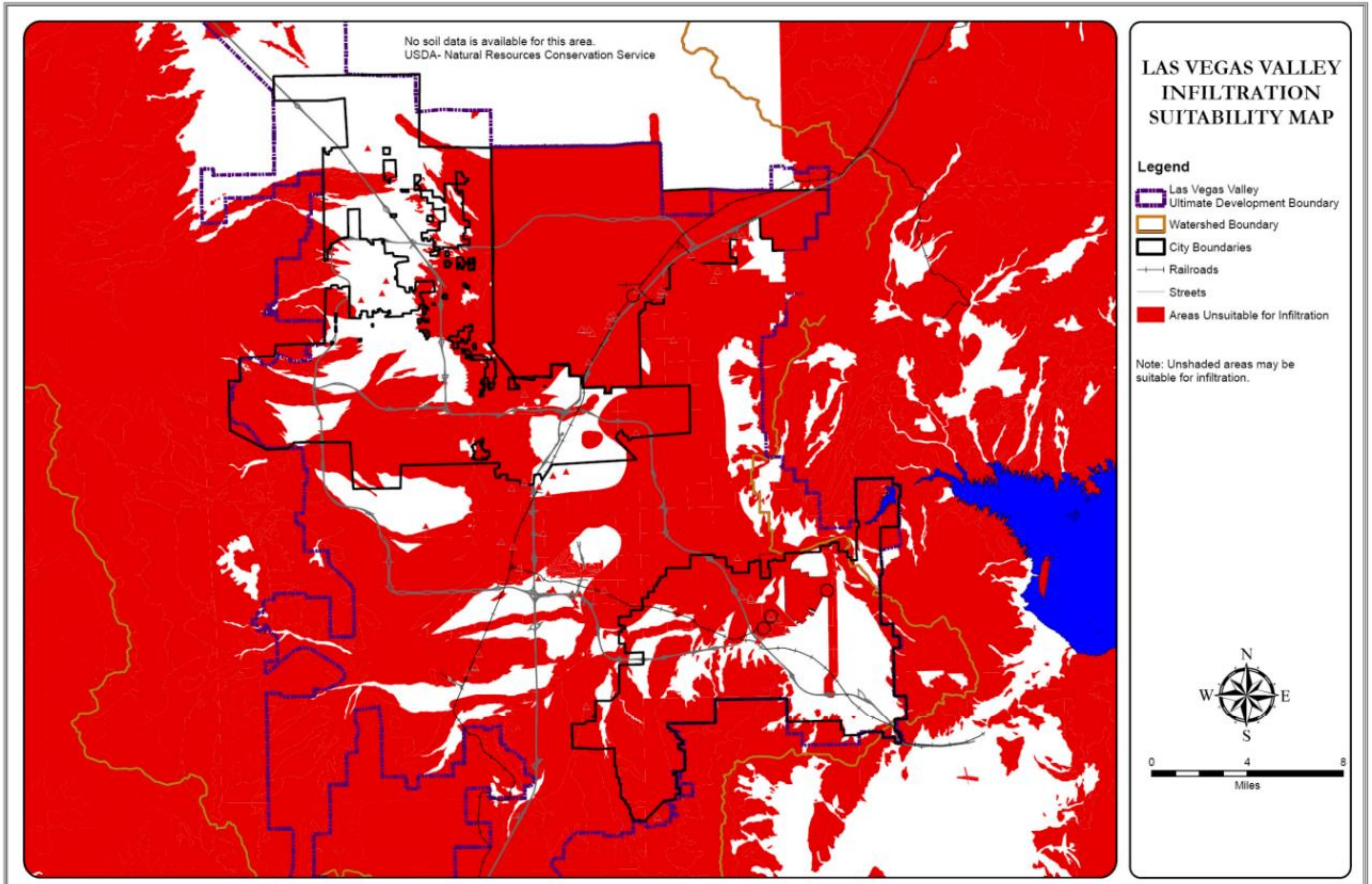

Figure 15-8. Las Vegas Valley infiltration suitability map

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15.1.5.4 Hydrogeologic Factors

The Las Vegas Wash aquitard creates a shallow alluvial aquifer and areas of perched groundwater that are of poor quality and are not beneficially used. Figure 15-9 shows the general hydrogeologic conditions in the Las Vegas Valley. A separate deep aquifer is used as a source of local water supply. Virtually all recharge to the deep aquifer occurs along the mountain front of the Spring Mountains, located on the western side of the Las Vegas Valley. The Las Vegas Wash aquitard forces groundwater to the surface in tributary channels near the lower Las Vegas Wash and in the Las Vegas Wash itself.

As described, flow of infiltrated surface water through native soils significantly increases total dissolved solids (TDS) and selenium concentrations. In the Las Vegas Valley, the shallow groundwater is high in TDS and selenium. Elevated TDS and selenium concentrations are ubiquitous across the Colorado River Basin, and the Colorado River Basin Salinity Control Program has been developed to respond to TDS issues.

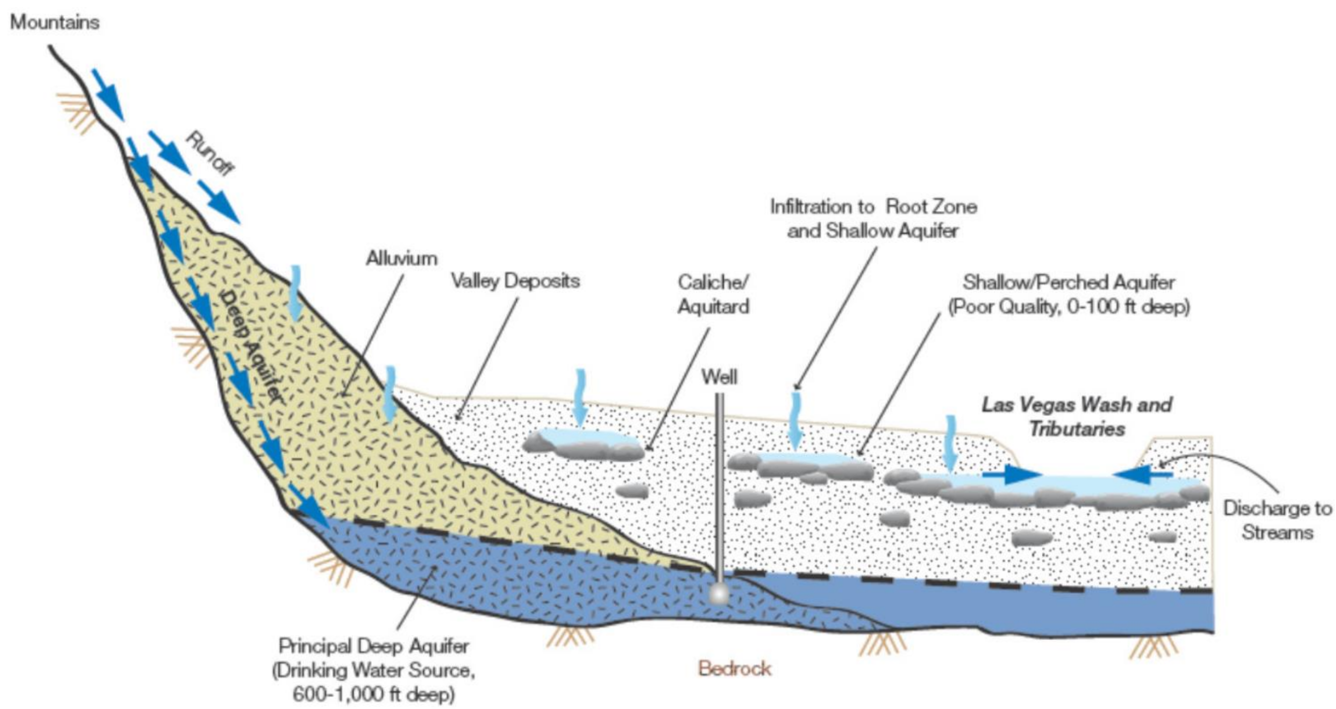


Figure 15-9. Hydrogeologic schematic of Las Vegas Valley

15.1.5.5 Watershed and Land Use Factors

High rates of erosion and sediment transport occur naturally in the Las Vegas Valley watershed and are primarily associated with high flow events (greater than the 2-year event). Land development in Las Vegas Valley tends to stabilize the watershed surface and reduce soil loss compared to native conditions. Figure 15-10 shows uphill undisturbed conditions to the left and downhill developed areas to the right.

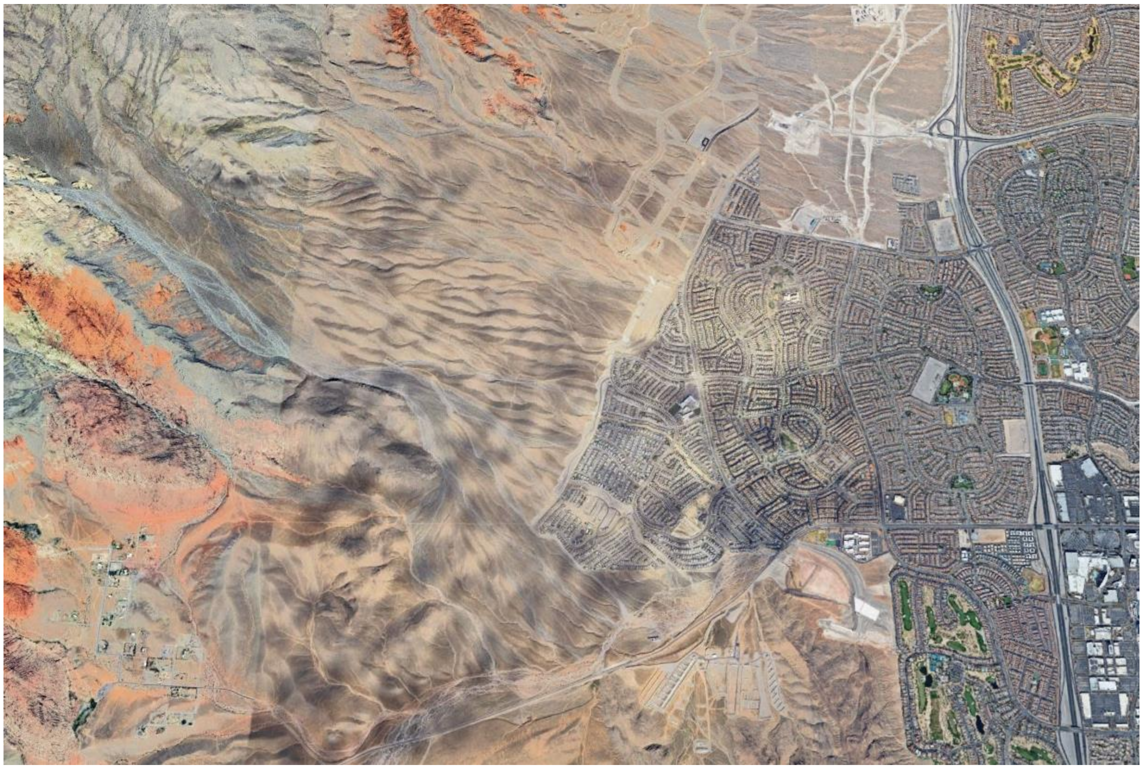


Figure 15-10. Aerial photograph of new development adjacent to undisturbed area in the Las Vegas Valley

The Las Vegas Valley has been one of the fastest growing urban areas in the nation. Almost 1.5 million people moved to the area between 1980 and 2008, a 300 percent increase in population. Since 2008, the population has increased by another 20 percent. New development is occurring in an outward pattern from the center of the Las Vegas Valley in nearly all directions. The majority of new development consists of residential housing and associated commercial development. Construction is a significant part of the Nevada economy. It employs about 110,000 workers in the state and contributes about 7.5 percent of Nevada's gross domestic product (AGC, 2023). Land use and development also includes large hotels and casinos. The majority of significant redevelopment consists of new hotels, casinos, and high-rise residential development in the vicinity of the Las Vegas Strip and Interstate 15. The Las Vegas Valley hosts over 40 million visitors per year, highlighting the importance of the hotel, casino, and tourism industries to the local economy and landscape.

15.1.5.6 Legal and Water Rights Factors

The Nevada State Engineer's Office requires permits for the capture of surface waters that are put to beneficial use and must demonstrate that current water rights holders are not injured by the proposed diversion. New developments that desire to implement onsite stormwater retention would be required to contact the State Engineer to determine if a surface water permit would be required.

15.1.5.7 Conclusions About Unique Conditions in the Las Vegas Valley

The unique factors described in this section lead to several important conclusions for developing a stormwater management program for the Las Vegas Valley in compliance with the MS4 Permit:

- The Las Vegas Valley is the driest large MS4 in the nation. Most parts of the MS4 system in the Las Vegas Valley are dry except in response to rainfall. In the lower Las Vegas Wash, about 90 percent of annual flows are from wastewater effluent. BMPs that rely on constant or frequent water flows for pollutant removal effectiveness, such as wetlands or vegetation, are not feasible in most of the Las Vegas Valley. Instead, regional watershed-level controls that capture stormwater from large drainage areas are more technically feasible and cost effective.

- Traditional BMPs that rely on vegetation for treatment are not recommended because they would require extensive artificial irrigation.
- The presence of caliche, expansive clays, and collapsible soils in the Las Vegas Valley creates unsuitable conditions for infiltration as a stormwater disposal method. In places where infiltration is feasible, it may not be desirable due to the potential to increase the shallow groundwater levels and the transport of unfavorable water quality constituents (e.g. TDS and selenium).

15.1.6 Wet Weather Monitoring Program

The CCRFCD conducts a wet-weather monitoring program for compliance with the MS4 permit on behalf of the Permittees. Sampling is conducted at the following two locations:

- Las Vegas Wash at The Club at Sunrise, located approximately 12.1 miles upstream of the confluence of the lower Las Vegas Wash and Lake Mead; and
- Las Vegas Wash at Rainbow Gardens, located approximately 3.4 miles upstream of the confluence of the Las Vegas Wash and Lake Mead.

The Las Vegas Wash at The Club at Sunrise is the new name for the site formerly referred to as Las Vegas Wash at Desert Rose. The former title is used in long term data records. The Las Vegas Wash at The Club at Sunrise site is located on the Las Vegas Wash immediately upstream of the Sloan Channel and Las Vegas Wash confluence. This part of the Las Vegas Wash is fully concreted lined. The stormwater sampler is permanently installed about 18 inches above the channel bottom. This sampling location is upstream of all wastewater treatment plant discharges in the Las Vegas Valley.

The Las Vegas Wash at Rainbow Gardens site is on the lower Las Vegas Wash at the upstream end of the concrete face of the Rainbow Gardens Weir, about 6 to 12 inches above the ordinary water level. It is downstream of all wastewater treatment plants and 99 percent of the watershed area covered by the MS4 Permit. A map of these monitoring sites is shown in Figure 15-11.

Sampling crews are mobilized to track and gather samples during potentially sampleable storm events. Due to the variability in localized rainfall, both sites are not always sampled during each storm. The CCRFCD website (www.regionalflood.org) and United States Geological Survey (USGS) website (www.waterdata.usgs.gov) are used to view stream flow stage data for numerous gauges in the Las Vegas Valley. During a sampling event, the automated samplers are activated when the water level in the channel reaches the wire actuator. The samplers are programmed to collect enough water to fill 24 bottles sized at 1,000 milliliters (also called aliquots). Currently, the Las Vegas Wash at The Club at Sunrise site is programmed to collect a sample at 3-minute intervals and the Las Vegas Wash at Rainbow Gardens site is programmed to collect at 5-minute intervals. The 24 aliquots are then combined in a carboy into a composite sample.

In the initial wet weather sampling program implemented in the 1990s, monitoring stations were located on each of the major tributary channels. At the time, some of those channels drained areas that were only lightly urbanized, whereas others drain areas that were fully urbanized. Because of the large increase in population, all tributary channels now drain urbanized areas.

Data from the original monitoring locations were highly variable, particularly for suspended solids, and useful distinctions could not be identified. In 2006, in coordination with NDEP, the sampling stations were revised to the current two sites. The current monitoring stations were located to monitor stormwater quality above and below the wastewater treatment plant discharging sites.

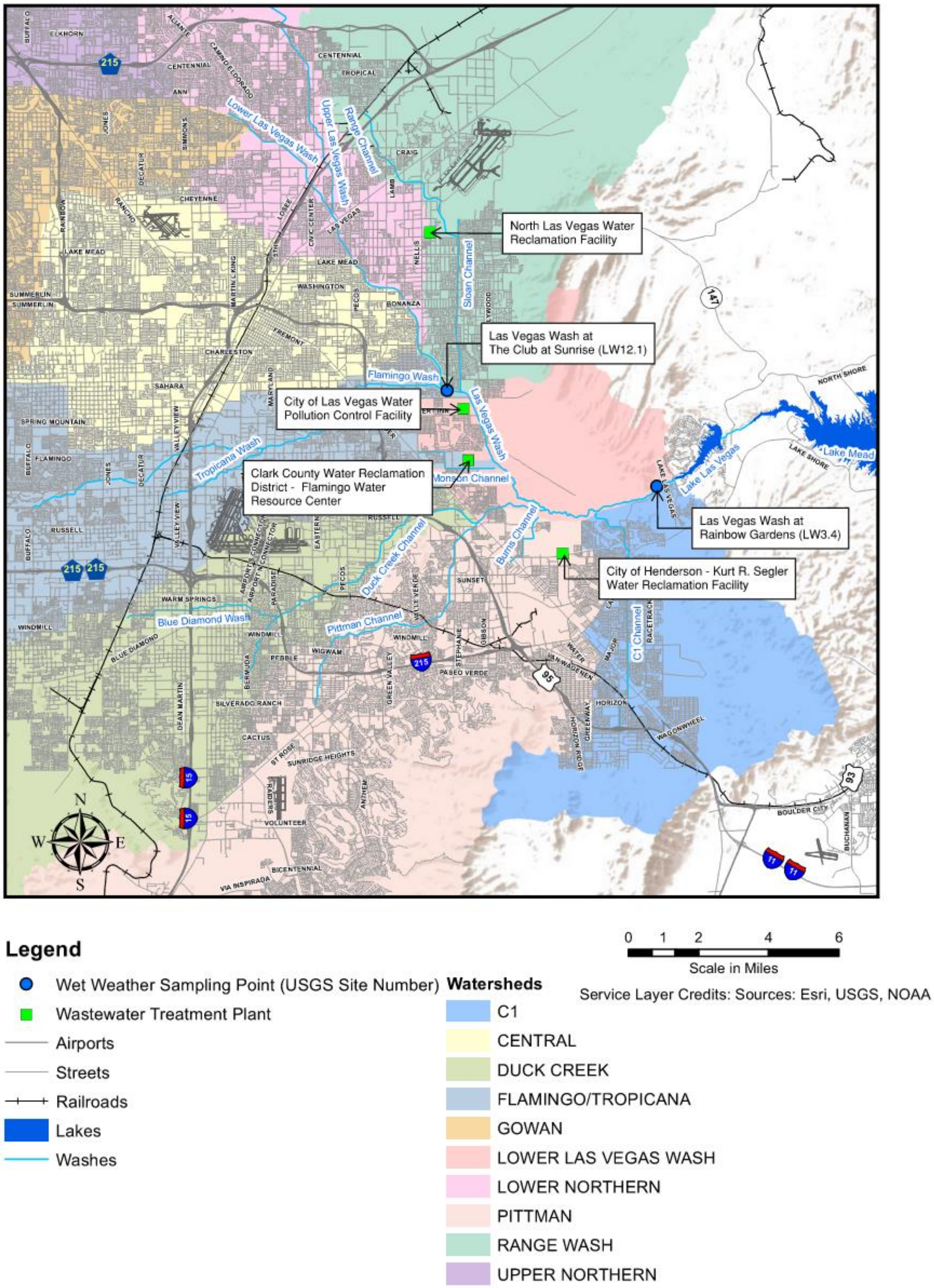


Figure 15-11. Wet weather monitoring locations and watersheds

15.2 Evaluation of Wet Weather Hydrographs

A hydrograph shows changes in flow over time at a particular location. Hydrographs for several locations in the Las Vegas Valley are available from the USGS. To evaluate wet weather monitoring data, USGS gauging stations located close to the two sampling locations were used, including:

- Las Vegas Wash Below Flamingo Wash Confluence Near Las Vegas, NV – 094196783, which is in close proximity to The Club at Sunrise; and
- Las Vegas Wash Above Three Kids Wash Below Henderson, NV – 09419753, which is in close proximity to Rainbow Gardens.

Some hydrographs at these stations showed the shape of a classic storm, with steeply rising flows at the beginning of the storm and relatively slowly decreasing flows after the peak. The hydrograph for The Club at Sunrise on August 11-12, 2022, shown in Figure 15-12, is an example. The storms in the Las Vegas Valley are generally of short duration.

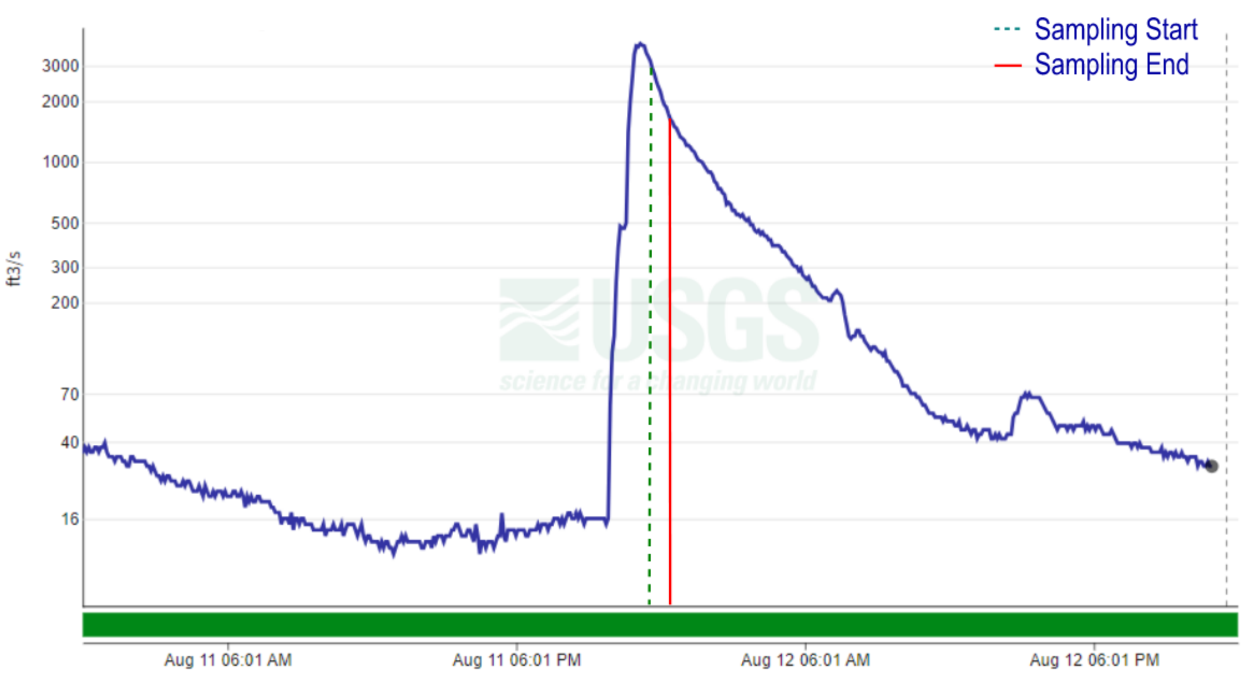


Figure 15-12. Wet weather hydrograph for August 11-12, 2022

Some storms do not show the classic shape. An example is the hydrograph for The Club at Sunrise on September 1, 2023, as shown in Figure 15-13. Multiple peaks may result from intense but short duration storms in different areas of the Las Vegas Valley or from trailing storms that occur over the same area.

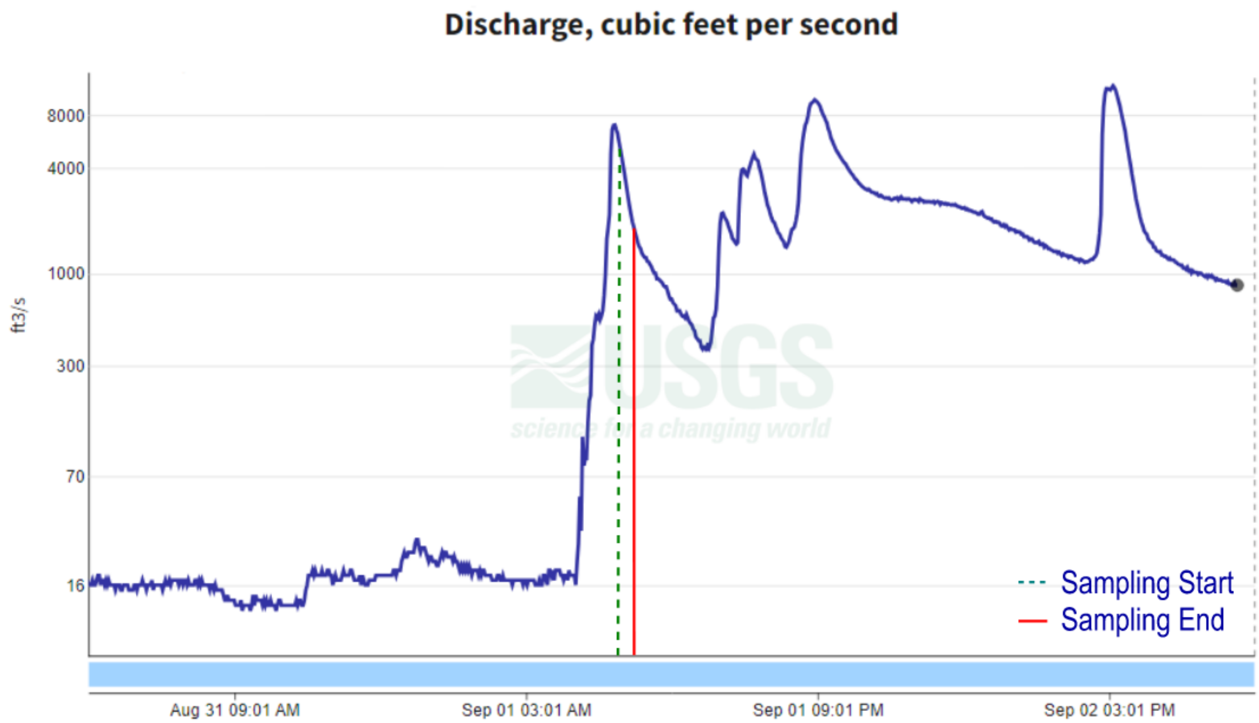


Figure 15-13. Wet weather hydrograph for September 1, 2023

When a storm is approaching, the sampling team is on alert and watches the CCRFCD and USGS rain and flow gauges to assess if there will be enough stormwater to sample. Often times, storms may peak in the middle of the night, and sampling crews must be ready to respond at any time. If the crew determines there is enough runoff to sample, the crews mobilize to the sampling site and initiate sampling when there is sufficient flow. When the team arrives at the sampling site, flows are likely to be increasing rapidly, and the sampling crew cannot determine when the peak flow will arrive. A review of the hydrographs and sampling times shows that sampling crews generally sample at the peak flow or shortly before or after. Although sampling at the peak flow is not likely to be representative of the entire storm, it may assess the highest concentrations.

Concerns have been raised in the scientific literature about the possibility that the highest concentrations during a storm may be present in the “first flush” of stormwater. The concept is that materials build up during dry weather and then are washed off quickly when rainfall is initiated. Conceptually, however, some materials will wash off quickly because they are lightweight and have not stuck to the pavement, whereas others will wash off slowly since they are heavier or stuck to the pavement. Also, the amount of material that might be present at the initiation of a storm is affected by maintenance activities, including street sweeping activities, which are designed to remove material buildup. For these reasons, perhaps, studies in the scientific literature of first flushes have been inconsistent.

The figures in Appendix B show the hydrographs for all sampling events at The Club at Sunrise and Rainbow Gardens since 2010, with the most recent first. Each figure includes a table that shows the sampling start and end times, flows at the beginning and end times, and the average flow during the sampling event. The tables also show the peak flow for the storm event. The sampling crews successfully monitored during an appropriate time in every sampleable storm.

15.3 Evaluation of Suspended Solids and Turbidity Data

This section describes the total suspended solids (TSS) and turbidity data collected as a part of the wet weather monitoring program and draws conclusions from the data.

15.3.1 Significance

A large part of the Permittees' stormwater management program is directed at the control of sediment, especially the retention of soil onsite. The wet weather monitoring program includes two parameters, TSS and turbidity, which measure sediment suspended in water. TSS and turbidity data have the potential to evaluate the effectiveness of the Permittees' stormwater management program. This data can, for example, be used to determine whether higher flows produce higher concentrations of suspended solids, whether materials build up during extended dry weather intervals, and whether suspended solids concentrations exceed background concentrations. EPA and NDEP have repeatedly focused on the transport of sediments and constituents attached to sediments when evaluating stormwater management programs.

15.3.2 Comparison of Suspended Solids and Turbidity Data

Although suspended solids measure the weight of materials suspended in the water, and turbidity measures the transmission of light through the water, both are affected by the presence of suspended material. Conceptually, if the material being suspended is relatively uniform, a consistent relationship between TSS and turbidity should be observed. When TSS is high, turbidity should also be high. Both TSS and turbidity data, however, can include measurements that do not accurately represent the actual conditions in the ambient waters. The suspended solids and turbidity data since 2010 were compared to determine whether TSS and turbidity produce a consistent relationship. Before 2010, both sampling locations have limited turbidity data.

An initial evaluation of TSS versus turbidity at The Club at Sunrise showed several points that did not conform to the expected relationship between the two parameters. For most of the data, the suspended solids concentration in milligrams per liter (mg/L) appeared to be twice as high as the turbidity in nephelometric turbidity units (NTU), plus or minus 60 percent, as shown in Figure 15-14.

A disparity between TSS and turbidity measurements in the same sample might result from different sizes in particle size and clumpiness, or from a problem with the sample collection or analysis, which might suggest that the data do not consistently represent the actual conditions. When most of the TSS and turbidity data are tightly correlated, it is preferable to use the tightly correlated data, which are not affected by differences in the two measurements. Using the disparate data may obscure underlying relationships.

With this in mind, the data were re-evaluated with the points outside of this range removed, as shown in Figure 15-15. Once the data was re-evaluated, the points within that range formed a tight relationship.

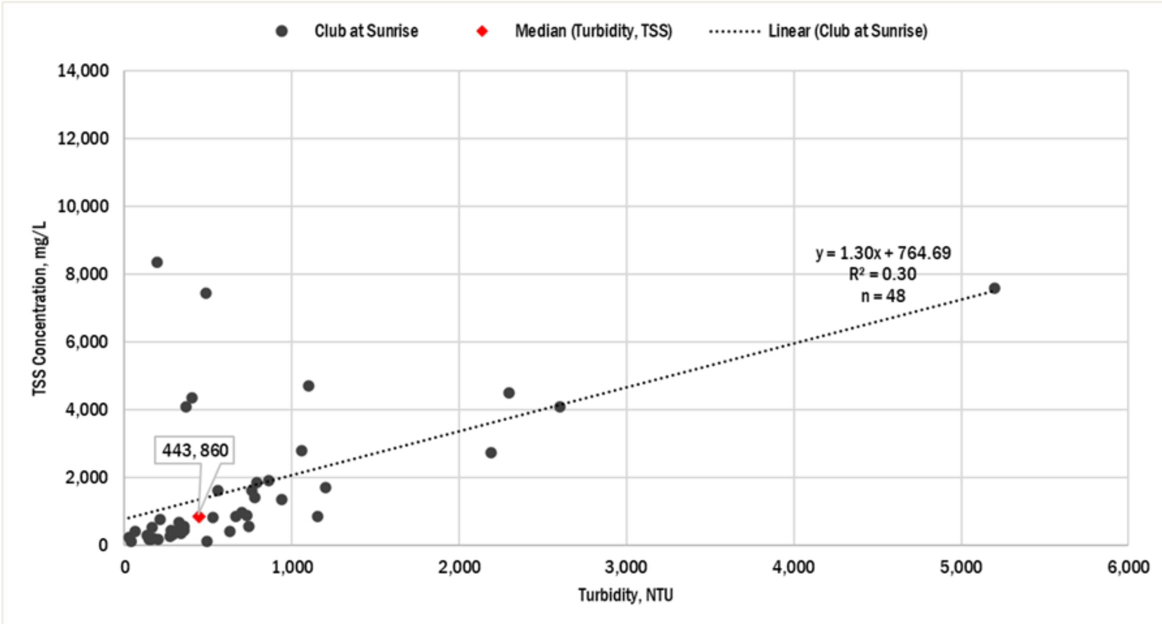


Figure 15-14. Club at Sunrise: TSS vs. turbidity during wet weather sampling events

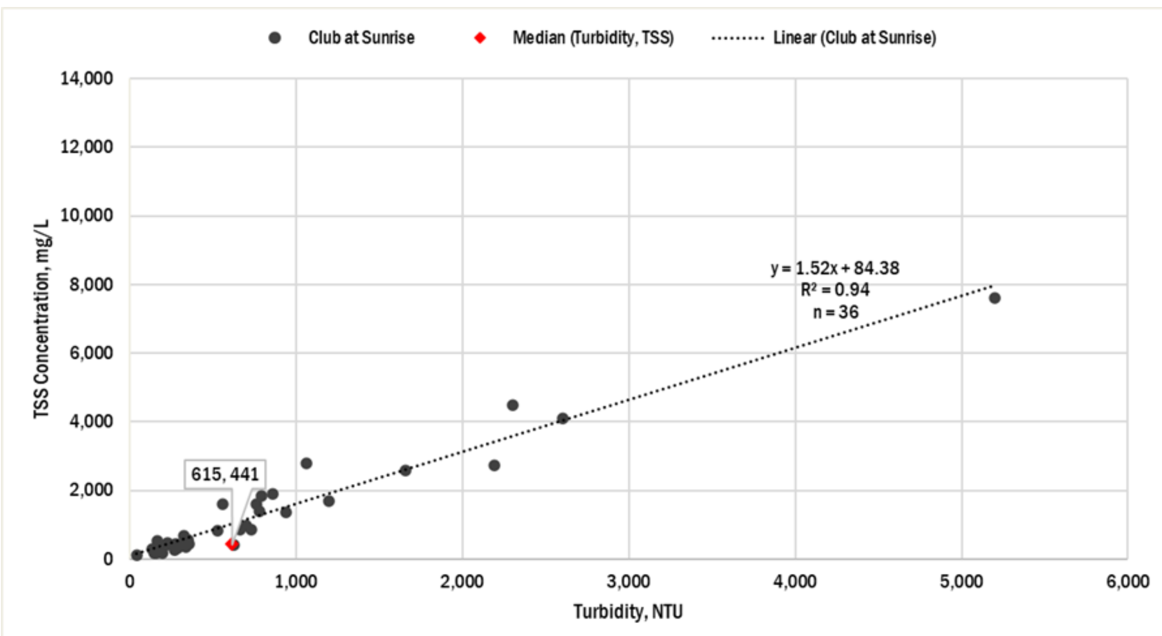


Figure 15-15. Club at Sunrise: TSS vs. turbidity during wet weather sampling events

Figure only includes data within 0.8:1 to 3.2:1 TSS:Turbidity ratios.

The same analyses were performed with data from Rainbow Gardens, as shown in Figures 15-16 and 15-17. Once again, data with a ratio within the range of 2.0 plus or minus 60 percent lined up very tightly. For the analyses that follows, data within this range were used. These data appear to be best suited to represent stormwater conditions in the Las Vegas Valley.

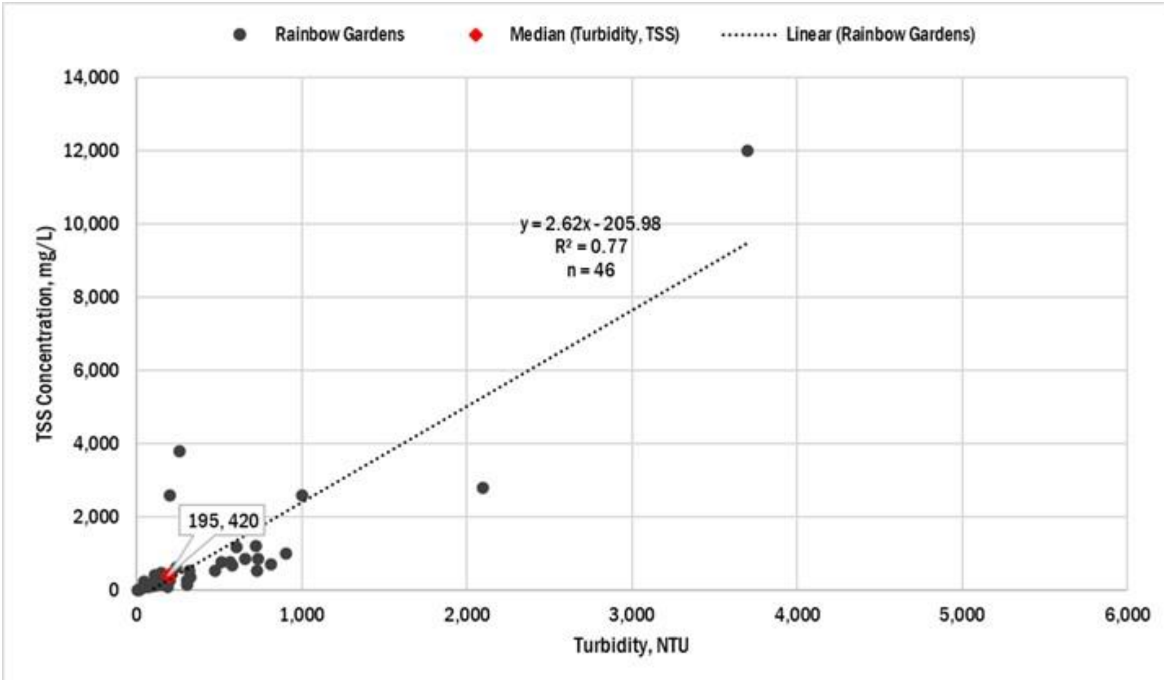


Figure 15-16. Rainbow Gardens: TSS vs. turbidity during wet weather sampling events

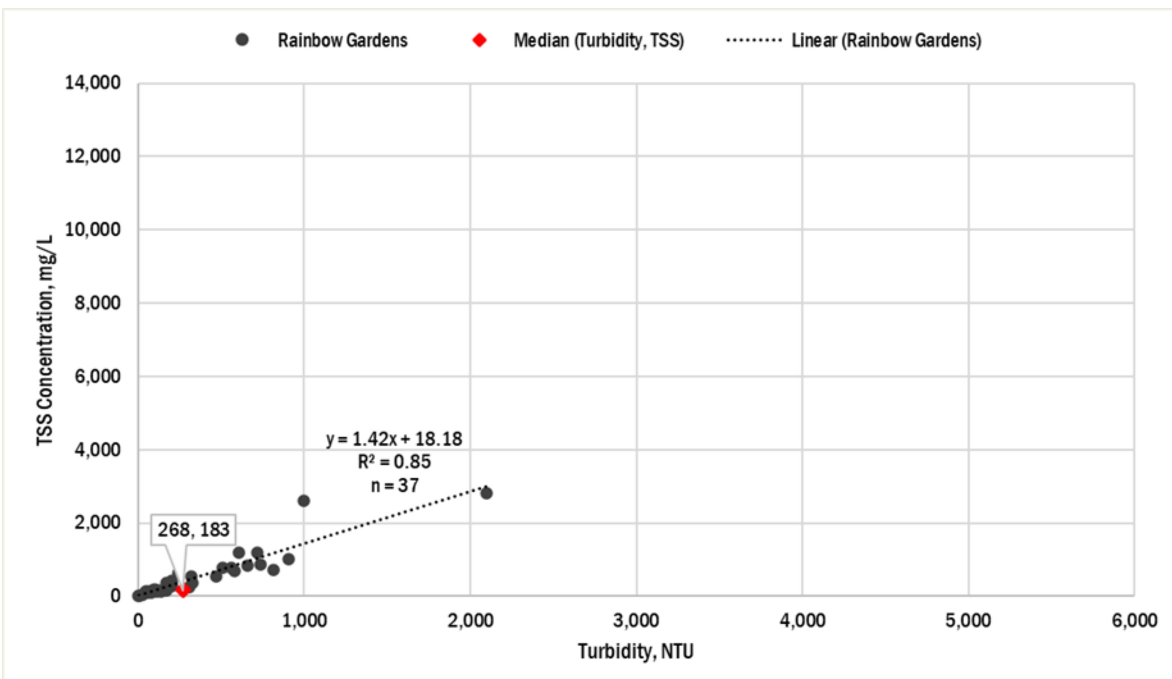


Figure 15-17. Rainbow Gardens: TSS vs turbidity during wet weather sampling events

Figure only includes data within 0.8:1 to 3.2:1 TSS:Turbidity ratios.

15.3.3 Evaluation of Effects of Increasing Flows

Generally, higher stream flows are accompanied by higher velocities, which have more energy and therefore more capacity to carry suspended materials. As a result, higher stream flows are generally expected to have higher concentrations of suspended solids than lower stream flows. Wet weather monitoring data for the Las Vegas Valley were evaluated to assess whether higher flows produced higher concentrations of suspended solids and turbidity.

At both locations, TSS concentrations and turbidity levels remained roughly constant as flow increased. At The Club at Sunrise, some elevated TSS concentrations and turbidity levels were observed at lower flows, but elevated concentrations were not observed at higher flows, as shown in Figure 15-18. At Rainbow Gardens, no unusually elevated concentrations were observed, as shown in Figure 15-19.

It appears that TSS concentrations and turbidity levels did not increase substantially with increasing flow because of the extensive channel lining and stabilization program—funded by the CCRFCD and implemented by the Permittees—throughout the Las Vegas Valley. When channels are lined in concrete, as many channels in the Las Vegas Valley are, they are protected against bed and bank erosion caused by high velocities. The regional detention basins, of which there are 87 in the Las Vegas Valley, are designed to capture peak flows and release the water slowly enough so that they do not cause damage downstream. Sediment in the water captured by the regional detention basins settles in the detention basin, which prevents it from moving downstream.

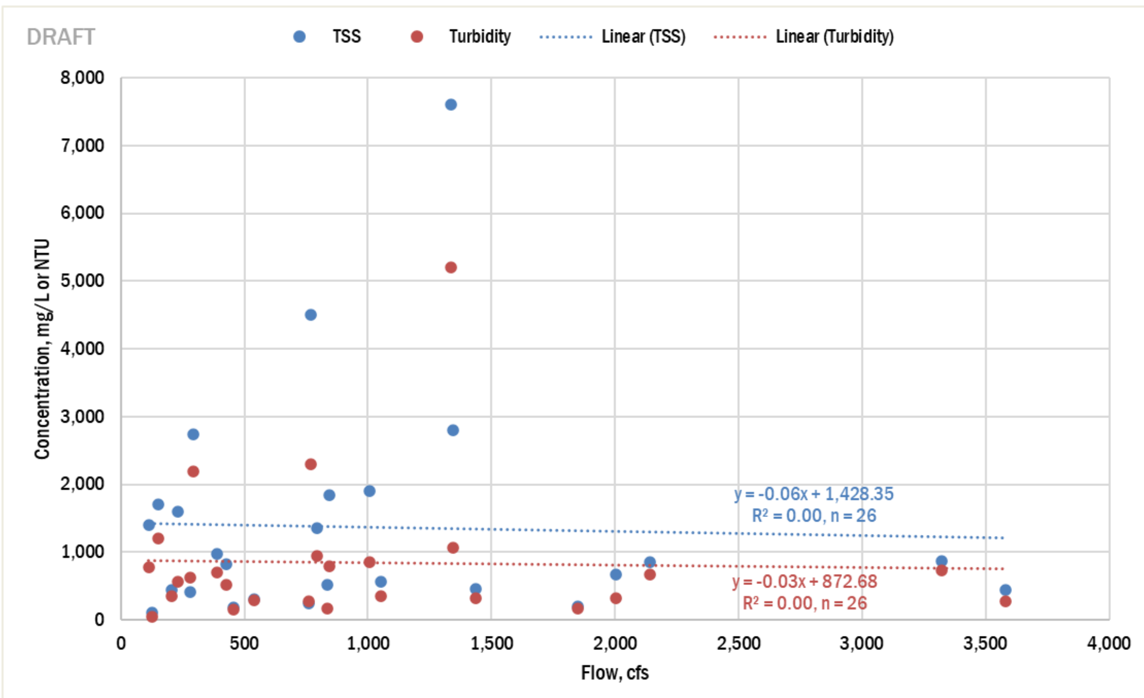


Figure 15-18. Club at Sunrise: TSS & turbidity vs. flow during wet weather sampling events

Figure only includes data within 0.8:1 to 3.2:1 TSS:Turbidity ratios.

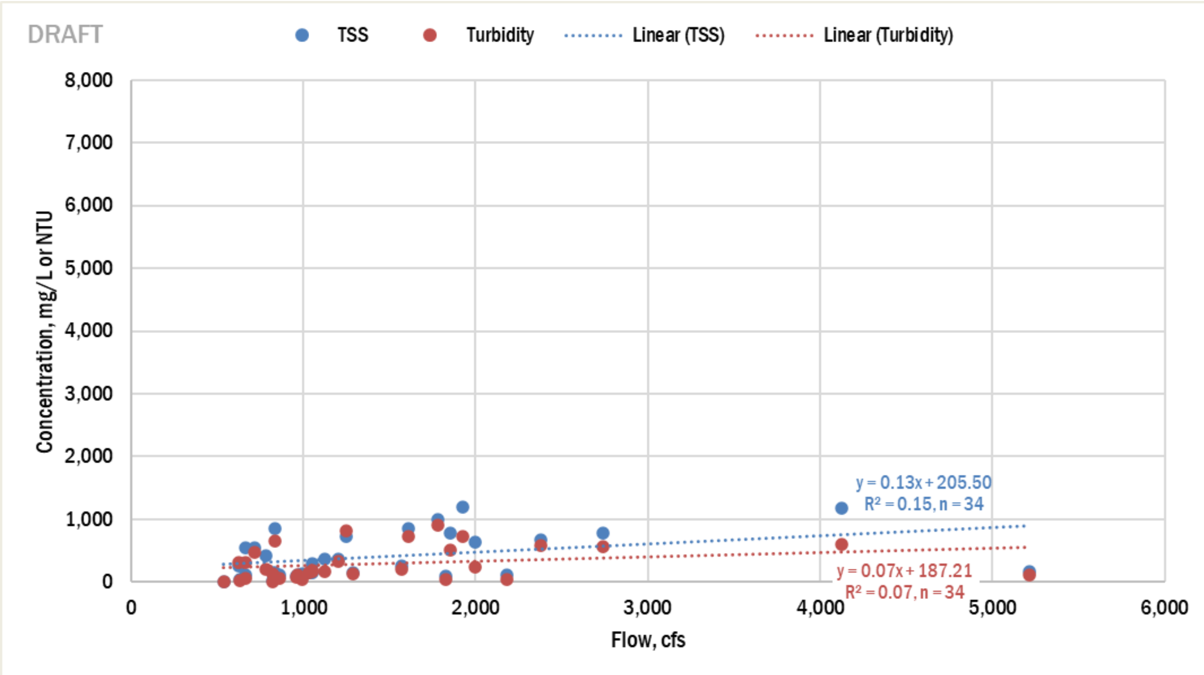


Figure 15-19. Rainbow Gardens: TSS & turbidity vs flow during wet weather sampling events

Figure only includes data within 0.8:1 to 3.2:1 TSS:Turbidity ratios.

15.3.4 Comparison of Upstream and Downstream Monitoring Points

Upstream and downstream TSS concentrations and turbidity levels were compared to assess whether there were substantial differences between the two locations. As shown in Figures 15-20 and 15-21 below, the stations are quite similar, although Rainbow Gardens has lower TSS concentrations and turbidity levels. This relationship can also be seen in Figures 15-18 and 15-19, discussed in Section 15.3.3. It appears that the erosion control structures and bank stabilization described in Section 15.1.4 protect downstream lower Las Vegas Wash against bed and bank erosion caused by high velocities.

This analysis leads to the conclusion that no additional monitoring stations are needed for the Las Vegas Valley. The Club at Sunrise location effectively monitors stormwater conditions upstream of the wastewater treatment plants, and the Rainbow Gardens location effectively monitors stormwater conditions for the whole of the Las Vegas Valley. The similarity in results for these two stations implies that stormwater quality is generally similar across Las Vegas Valley.

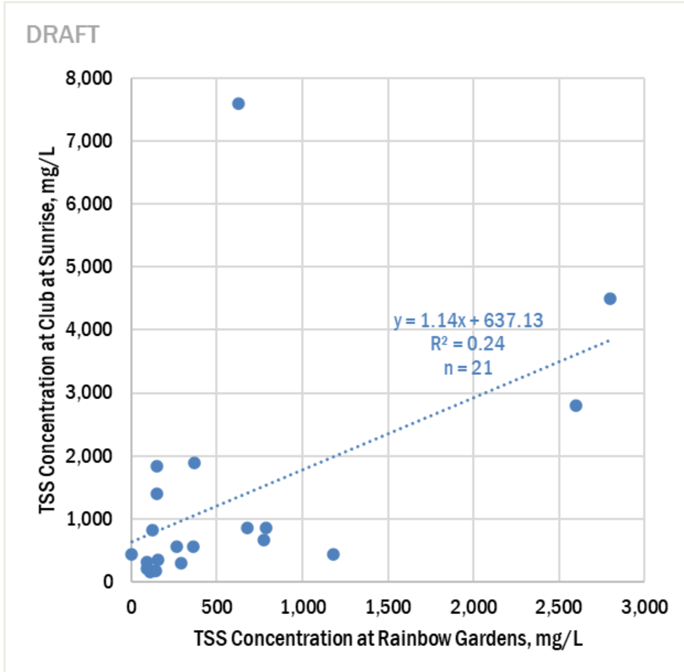


Figure 15-20. Upstream vs. downstream TSS during wet weather sampling events

Figure only includes data within 0.8:1 to 3.2:1 TSS:Turbidity ratios.

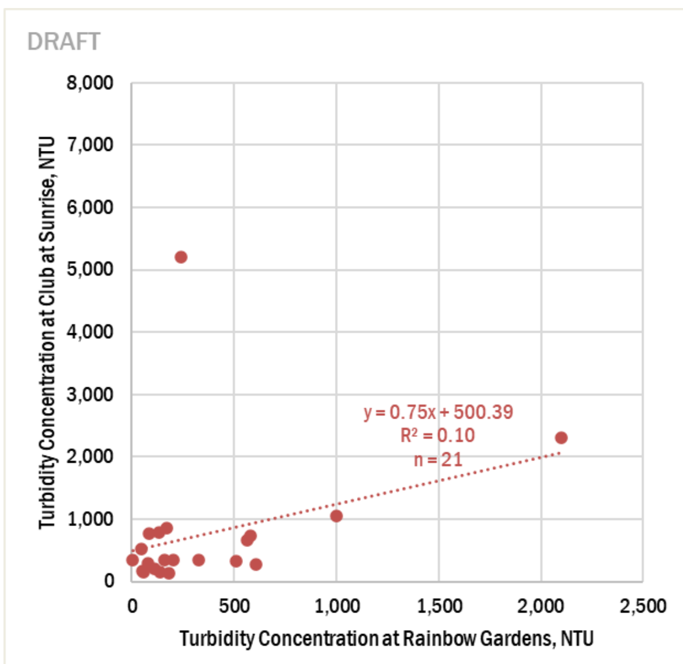


Figure 15-21. Upstream vs. downstream turbidity during wet weather sampling events

Figure only includes data within 0.8:1 to 3.2:1 TSS:Turbidity ratios.

15.3.5 Comparison of Samples Taken by Location on Hydrograph

As noted in Section 15.3, concerns have been expressed that the highest concentrations of materials in stormwater might occur during the "first flush," in other words at the beginning of the storm, rather than at peak flows. Here, the data were evaluated to assess whether TSS concentrations and turbidity levels were consistently higher when the samples were taken on the rising arm, peak, or falling arm of the hydrograph. The location of each sampling event on its respective hydrograph is shown in Appendix B.

As shown in Figure 15-22, the highest TSS concentrations and turbidity levels at The Club at Sunrise occurred during peak flows. The upper whisker, although identified as the "maximum," is not the true maximum. The Excel software identifies the maximum of points not greater than 150 percent of the interquartile range (difference between the 75th and 25th percentile). Those points that are greater than the "maximum" are identified as outliers. Each box and whisker plot represents 7 to 16 data points.

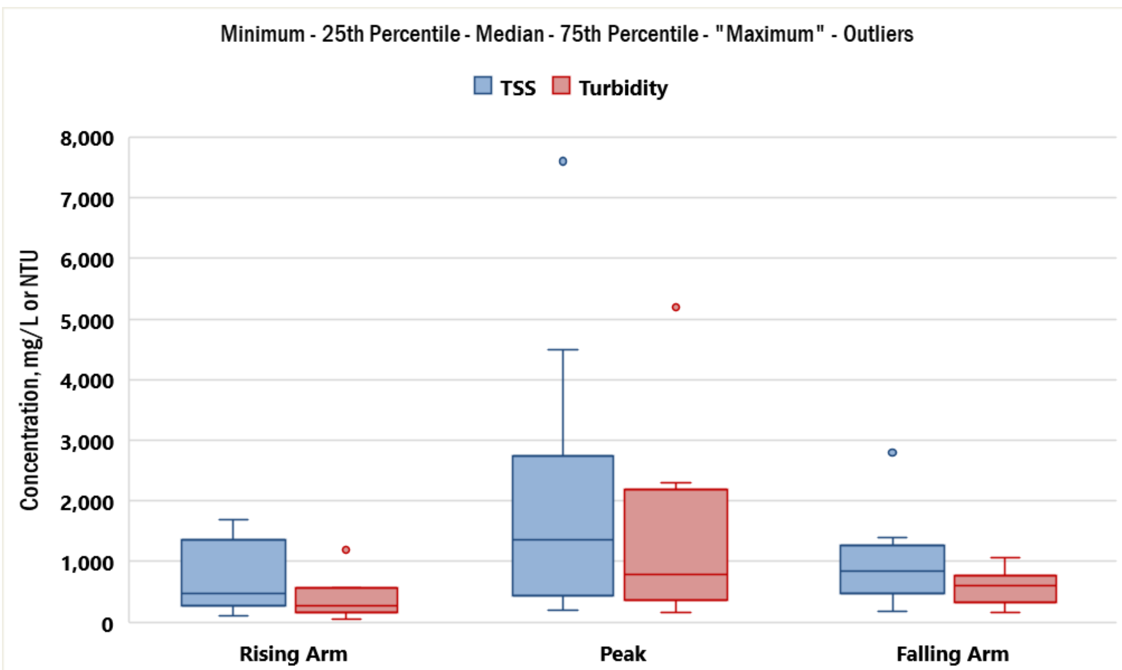


Figure 15-22. Club at Sunrise: Sample location on hydrograph

Figure only includes data within 0.8:1 to 3.2:1 TSS:Turbidity ratios.

As shown in Figure 15-23, the results were somewhat different at Rainbow Gardens. TSS concentrations and turbidity levels were not substantially higher during peak flows. Overall, TSS concentrations and turbidity levels were quite low at all locations on the hydrograph.

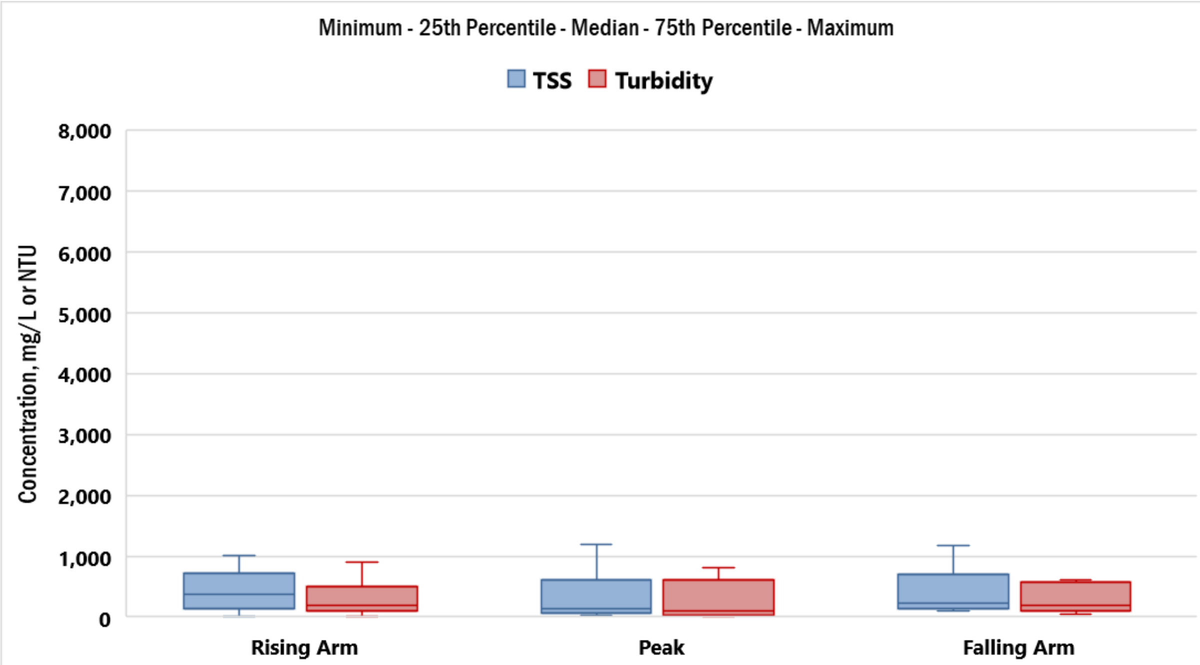


Figure 15-23. Rainbow Gardens: Sample location on hydrograph

Figure only includes data within 0.8:1 to 3.2:1 TSS:Turbidity ratios.

These figures do not identify any reason to focus the sampling on a specific portion of the hydrograph. Sampling crews cannot determine where on the hydrograph they are sampling, unless the peak has already occurred. Because of these practical difficulties and lack of differences in the data, the current sampling program should be maintained.

15.3.6 Evaluation of Effects of Extended Intervals of Dry Weather

Storms in the Las Vegas Valley can come close together or be separated by long intervals. As shown in Figures 15-24 and 15-25, the time between wet weather samples was as little as less than a week and as great as 72 weeks. When there is a long interval between storm events, there is a long time for material to build up on impervious surfaces, if it is not swept up. A greater buildup could conceptually result in greater concentrations of materials in stormwater. Figures 15-24 and 15-25, however, show that TSS concentrations and turbidity levels do not substantially increase when there are long dry periods between rain events.

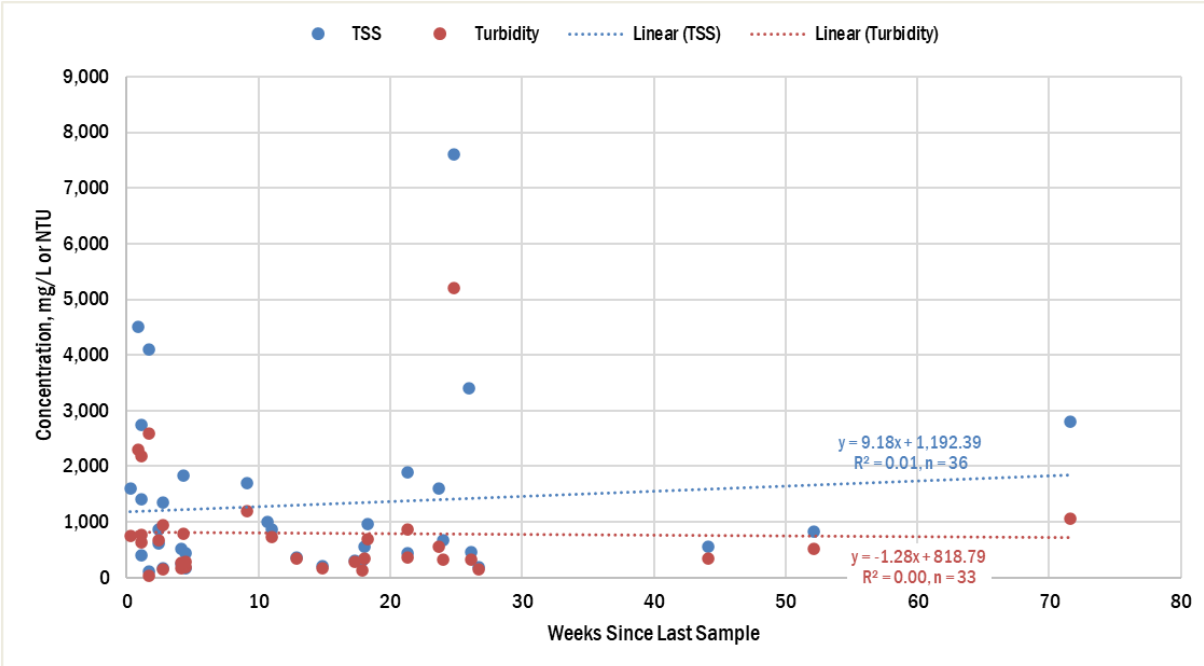


Figure 15-24. Club at Sunrise: Concentration vs. weeks since last sample

Figure only includes data within 0.8:1 to 3.2:1 TSS:Turbidity ratios.

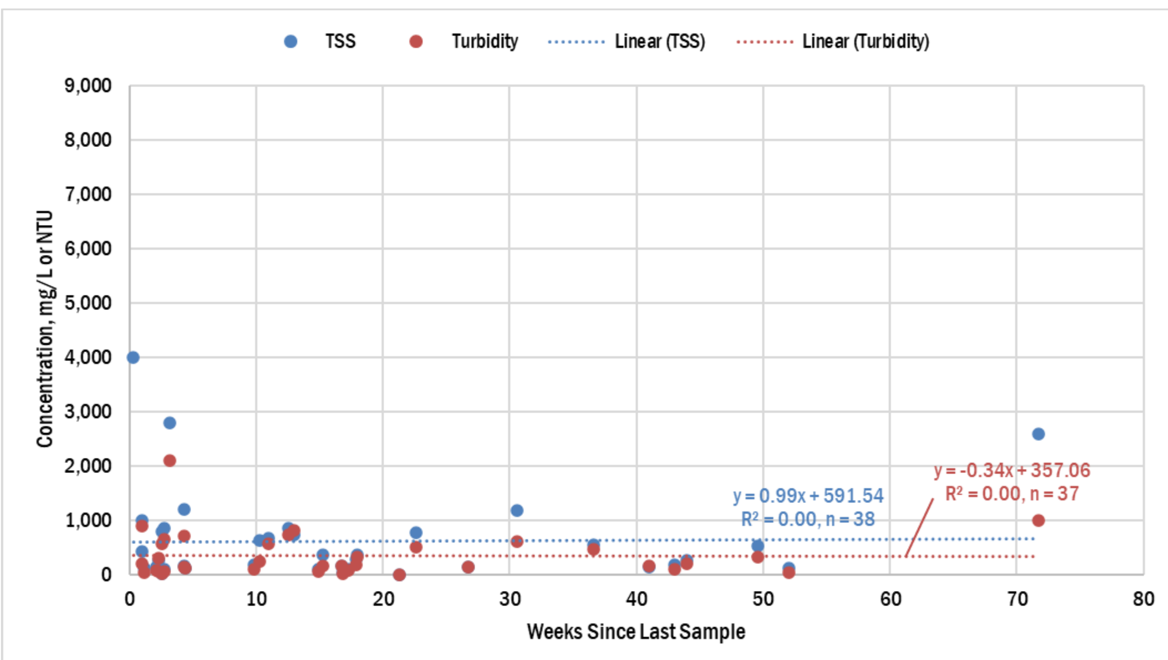


Figure 15-25. Rainbow Gardens: Concentration vs. weeks since last sample

Figure only includes data within 0.8:1 to 3.2:1 TSS:Turbidity ratios.

Higher concentrations when storms are close together may be attributed to a first storm loosening the soil and a second storm carrying it off. The Club at Sunrise shows elevated concentrations between 20 and 30 weeks. These peaks are not seen at Rainbow Gardens and may be attributed to unrepresentative data. The absence of an upwards trend may be explained either by the effectiveness of the Permittees' street sweeping program and debris cleanout, and/or because material buildup on impervious surfaces is not a significant source of solids in stormwater.

15.3.7 Comparison of Las Vegas Valley Data with Regional Data

The California State Water Resources Control Board (SWRCB) has recognized that natural or background TSS concentrations vary dramatically depending on the characteristics of an ecoregion. In the fact sheet for its General Construction Stormwater Permit, the California SWRCB provided Table 15-2.

Table 15-2: Suspended Sediment Concentration in California Ecoregions

Ecoregion	Ecoregion Name	Percent of California Land Area	Median Suspended Sediment Concentration (mg/L)
1	Coast Range	9.1	874
4	Cascades	0.2	120
5	Sierra Nevada	8.8	35.6
6	Central CA Foothills and Coastal Mountains	20.7	1,530
7	Central CA Valley	7.7	122
8	SoCal Mountains	3.0	47.4
9	Eastern Cascades Slopes and Foothills	9.4	284
13	Central Basin and Range	5.2	143
14	Mojave Basin and Range	21.7	5,150
78	Klamath Mountains/CA High North Coast Range	8.1	581
80	Northern Basin & Range	2.4	199
81	Southern CA/ Northern Baja Coast	3.7	503

Source: California State Water Resources Control Board Division of Water Quality Construction General Permit Fact Sheet (*https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_factsheet.pdf*)

The data in this table were developed by Simon et al. (Simon et al., 2004) of the U.S. Department of Agriculture. These data show that TSS concentrations in the Mojave Basin and Range are far greater than any other ecoregion. These high concentrations may result from a lack of plants holding down the dirt. The experience in Las Vegas Valley confirms that a great deal of sediment is washed off the undeveloped surrounding area and into the regional detention basins at the surrounding edges of the developed area.

Figure 15-26 shows a map of the ecoregions with southern Nevada in the Mojave Basin and Range ecoregion, which is number 14.

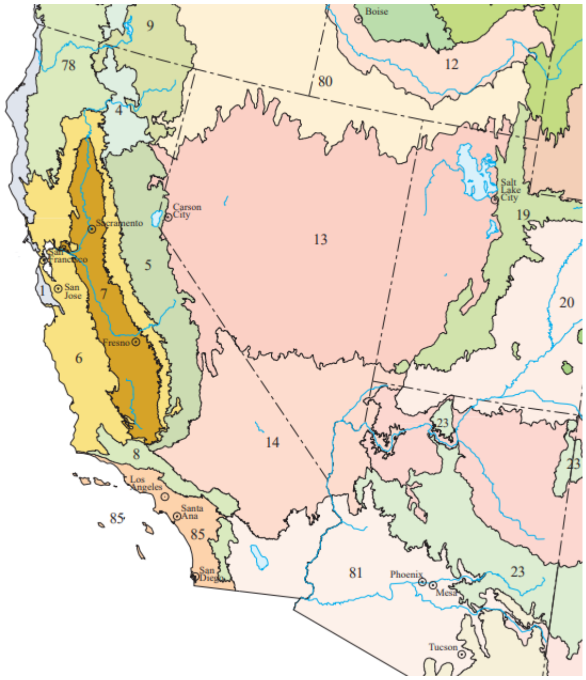


Figure 15-26. Level III ecoregions of the southwestern U.S.

Source: EPA, 2013, (https://gaftp.epa.gov/epadatacommons/ORD/Ecoregions/us/Eco_Level_III_US.pdf)

Data from the wet weather monitoring program for the Las Vegas Valley were compared to the data provided by Simon et al. for the Mojave Basin and Range. The results are shown in Figure 15-27.

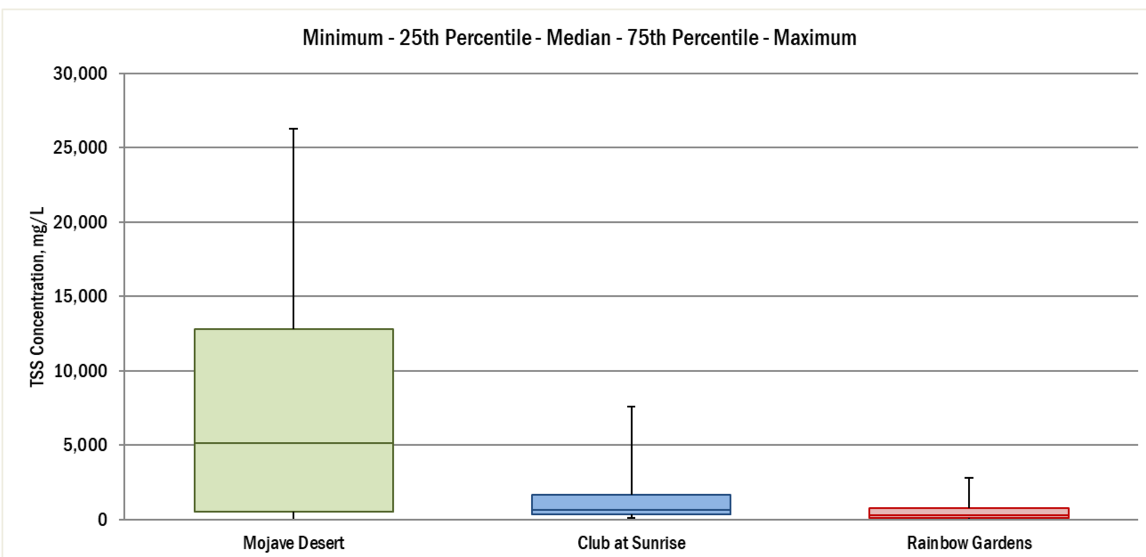


Figure 15-27. Regional TSS comparison to Las Vegas Valley wet weather monitoring stations

This comparison shows that the stormwater management program for the Las Vegas Valley is highly effective. The median TSS concentration for the Mojave Basin and Range is 5,150 mg/L (baseline), compared with the median of 615 mg/L for The Club at Sunrise and 268 mg/L for Rainbow Gardens.

Median TSS concentrations at Rainbow Gardens are therefore 1/20th of the background concentrations for the Mojave Basin and Range.

15.3.8 Sensitivity of the Las Vegas Valley and Lake Mead to Suspended Solids and Turbidity

The Las Vegas Valley is not particularly sensitive to TSS concentrations and turbidity levels because most of it is not fish habitat. Historically, there does not appear to have been perennial stream flows in the Las Vegas Valley reaching Lake Mead or the Colorado River. At present, there are fish in lower Las Vegas Wash downstream of The Club at Sunrise, but habitat degradation has not been an issue since the erosion control structures were installed.

The water potentially sensitive to TSS concentrations and turbidity levels in the area is Lake Mead, which is downstream of the Las Vegas Valley. From the 1970s through the 1990s, lower Las Vegas Wash was heavily eroded by large storms. Sediment from lower Las Vegas Wash flowed into Lake Mead, where it quickly settled out. In response, the erosion control structures described in Section 15.1.4 were constructed, and since then the lower Las Vegas Wash above Lake Las Vegas has been stabilized. The dam that formed Lake Las Vegas constructed in 1991 also helped stabilize lower Las Vegas Wash.

Beginning in approximately 2000, lowering lake levels exposed a large part of Las Vegas Bay that had previously been underwater. Lake levels dropped approximately 145 feet between 2000 and today. The former lake bottom began to be eroded away. Structures were built to stabilize these areas and stabilization efforts are continuing. Regional detention basins help protect against erosion by reducing peak flows during storm events.

As stormwater from Las Vegas Valley enters Lake Mead, the water slows down and solids fall out. Elevated levels of turbidity can be seen as a submerged plume into Lake Mead for about 1.5 kilometers until it disappears, as discussed in Section 15.4.2. Because Lake Mead is so deep, the settled out suspended solids make little difference to its depth. Areas near the mouth of Las Vegas Wash are now dry, not because they have filled in with settled out suspended solids, but because the water level has dropped 145 feet, exposing miles of former lakebed.

15.3.9 Conclusions about Suspended Solids and Turbidity

Below are the main conclusions for the evaluation of suspended solids and turbidity:

- There is a tight relationship between TSS concentrations and turbidity levels in the majority of samples.
- TSS concentrations and turbidity levels do not increase with increased flows, apparently because of the extensive channel lining, regional detention basins, and erosion control structures in the Las Vegas Valley.
- No additional monitoring stations are needed for the Las Vegas Valley. The Club at Sunrise location effectively monitors stormwater conditions upstream of the wastewater treatment plants, and the Rainbow Gardens location effectively monitors stormwater conditions for the whole of the Las Vegas Valley.
- TSS concentrations and turbidity levels are not consistently higher on the rising arm of the hydrograph as compared with peak flow and the falling arm.

- TSS concentrations and turbidity levels do not substantially increase when there are long dry periods. The absence of an upwards trend may be explained either by the effectiveness of the Permittees' street sweeping program and debris cleanout, and/or because material buildup is not a significant source of solids in stormwater.
- The stormwater management program for the Las Vegas Valley is highly effective. Median TSS concentrations at Rainbow Gardens are therefore 1/20th of the background concentrations for the Mojave Basin and Range.
- TSS concentrations and turbidity levels from the Las Vegas Valley are not having a significant effect on lower Las Vegas Wash or Lake Mead.

15.4 Evaluation of Nutrient Data

This section describes the nutrient data collected as a part of the wet weather monitoring program and draws conclusions from the data.

15.4.1 Significance

Nutrient concentrations in stormwater can be a concern if they produce nuisance algal blooms. Algae, which are microscopic plants, need a certain amount of time to assimilate nutrients and grow. Nutrients can increase algal growth in the same way that fertilizers increase plant growth in a garden.

Phosphorus and nitrogen are the nutrients that are most likely to affect algal growth and are the focus of most nutrient monitoring programs. The dissolved fraction of nutrients (orthophosphate and dissolved nitrogen) is of special interest because dissolved nutrients are more likely to be available to algae. Particulate fractions, especially those attached to sediment, are of less concern because they are buried in sediment as velocity decreases and solids fall out. In some places, release of nutrients from the sediment may be a concern, but not in Lake Mead. Most of Lake Mead is oligotrophic, which means that there are few nutrients available to grow algae, fish, or other aquatic life. Lake Mead is considered phosphorus-limited, therefore the focus of wet weather nutrient monitoring is orthophosphate.

15.4.2 Sensitivity of Lake Mead and Las Vegas Wash to Nutrients

Algae are beneficial to fish production because fish eat algae or the zooplankton that eat algae. Algae can become a nuisance to recreation when they are so plentiful that they produce inappropriate turbidities. The State of Nevada has established water quality standards for Lake Mead that balance the benefit of algae to fish and the protection of recreation. Chlorophyll-a is the typical measurement of algae, which is used in Lake Mead's water quality standards. The Lake Mead chlorophyll-a standards balance the protection of fishing and recreation. There are six standards. The standard for inner Las Vegas Bay, which is used for fishing, is highest. The standards decrease as they move towards Boulder Basin, which is used for recreation.

Owing to concerns about algae in Lake Mead, a total maximum daily load (TMDL) for phosphorus was established in the 1980s and implemented in the 1990s. As a result, the wastewater dischargers all treat the wastewater to remove phosphorus to low levels. Since the TMDLs were implemented, algal levels have been at appropriate levels except for an aberrant algal bloom in 2001. Figures 15-28 to 15-33 show that for the past five years Lake Mead has been in compliance with its chlorophyll-a standards. Station 1.85 is located in the center of the channel in Lake Mead 1.85 miles from the confluence with Las Vegas Wash. Station 2.7 is located 2.7 miles from the confluence and Station 3.5 is located 3.5 miles from the confluence. Chlorophyll-a data are compared to the applicable requirement to maintain higher quality (RMHQ).

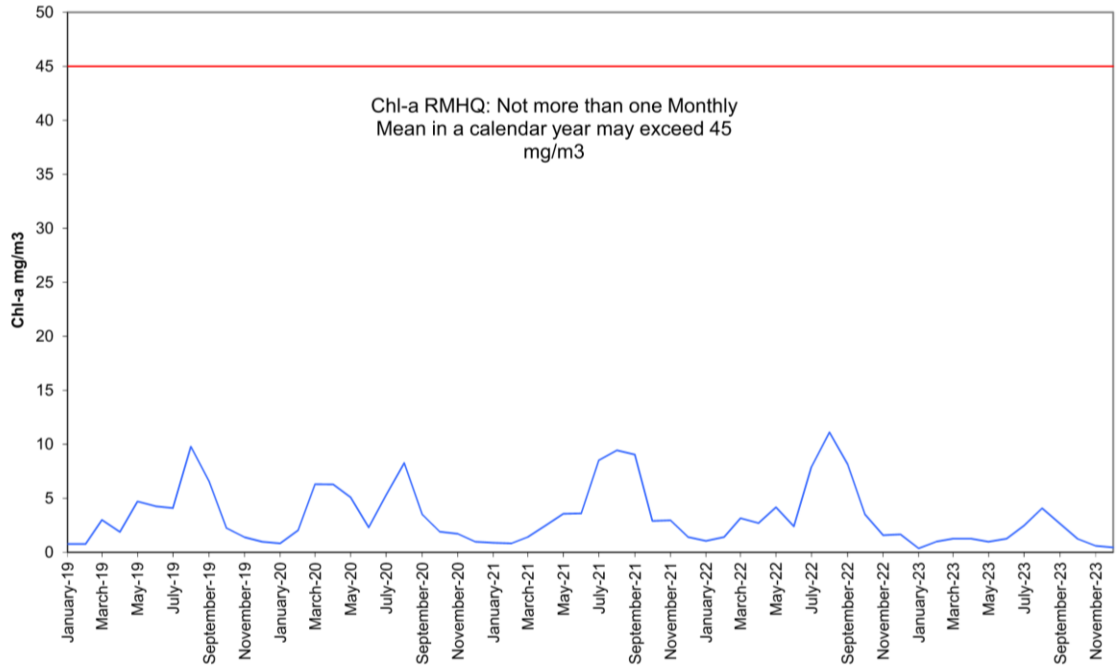


Figure 15-28. Lake Mead Station 1.85 chlorophyll-a monthly mean concentrations

Source: 2023 NDEP Lake Mead and LV Wash Ambient WQ Report

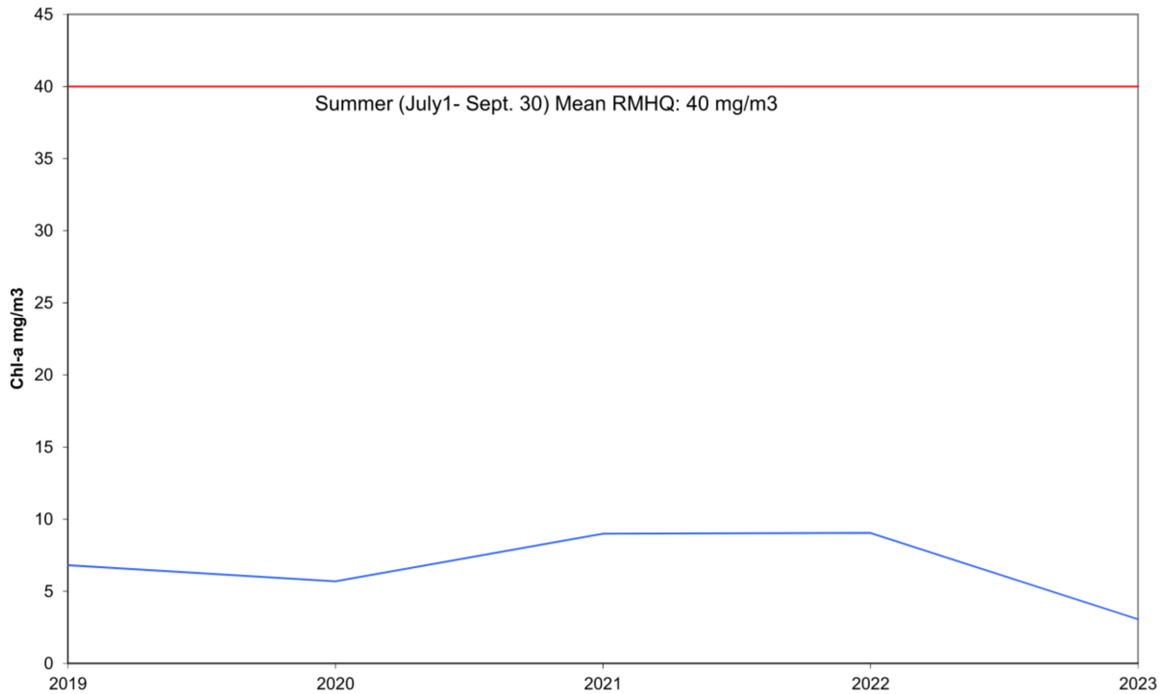


Figure 15-29. Lake Mead Station 1.85 chlorophyll-a summer mean concentrations

Source: 2023 NDEP Lake Mead and LV Wash Ambient WQ Report

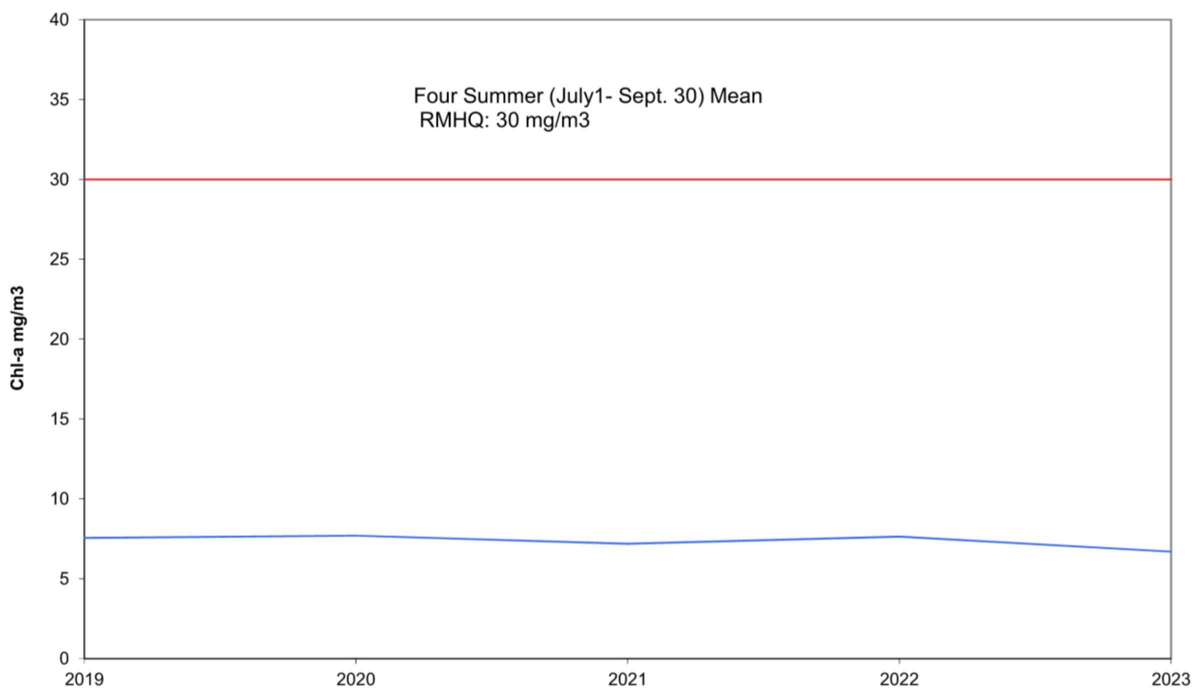


Figure 15-30. Lake Mead Station 1.85 chlorophyll-a four-summer mean concentrations

Source: 2023 NDEP Lake Mead and LV Wash Ambient WQ Report

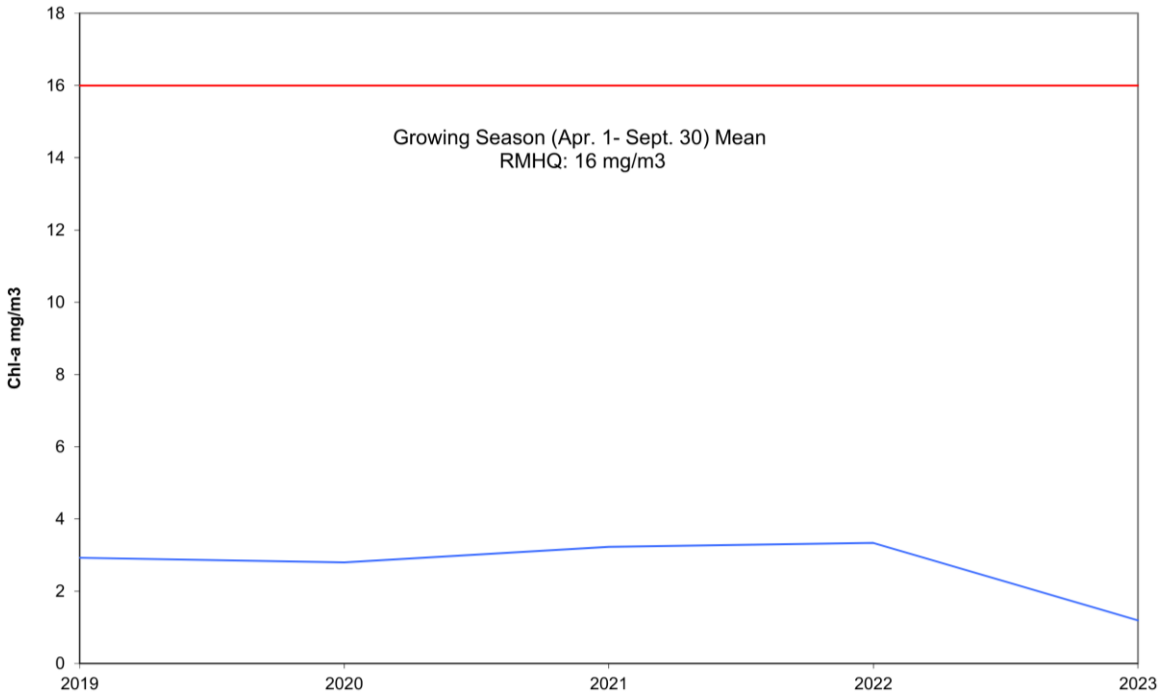


Figure 15-31. Lake Mead Station 2.7 chlorophyll-a growing season mean concentrations

Source: 2023 NDEP Lake Mead and LV Wash Ambient WQ Report

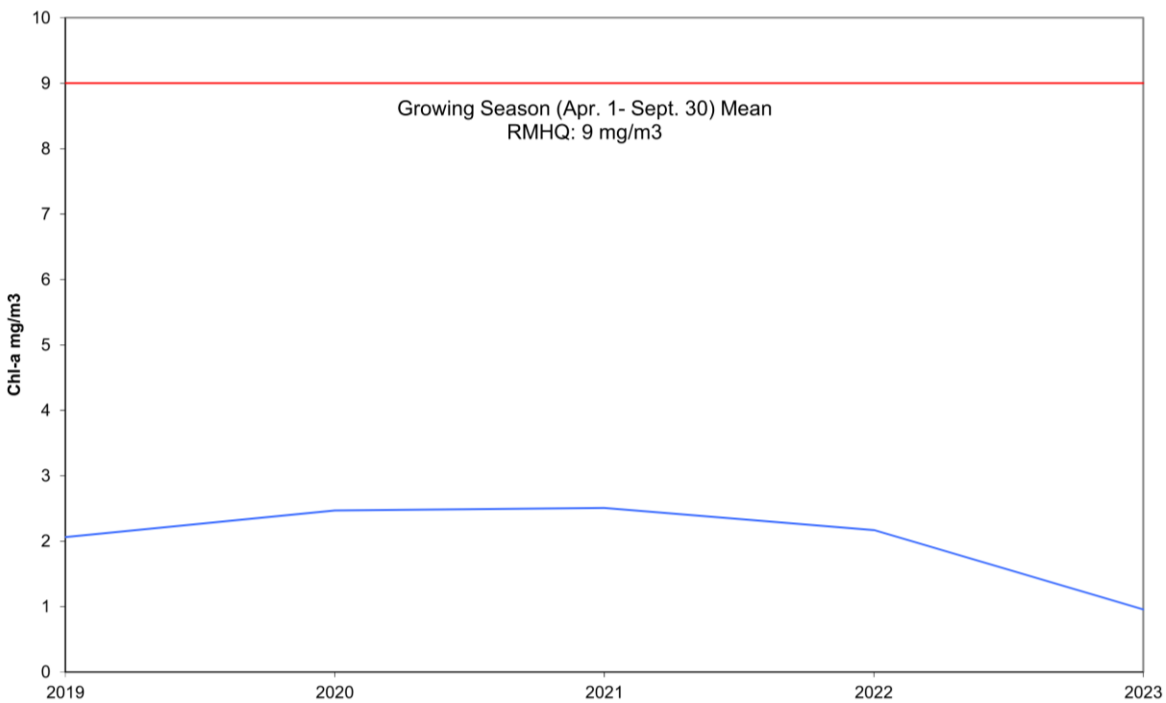


Figure 15-32. Lake Mead Station 3.5 chlorophyll-a growing season mean concentrations

Source: 2023 NDEP Lake Mead and LV Wash Ambient WQ Report

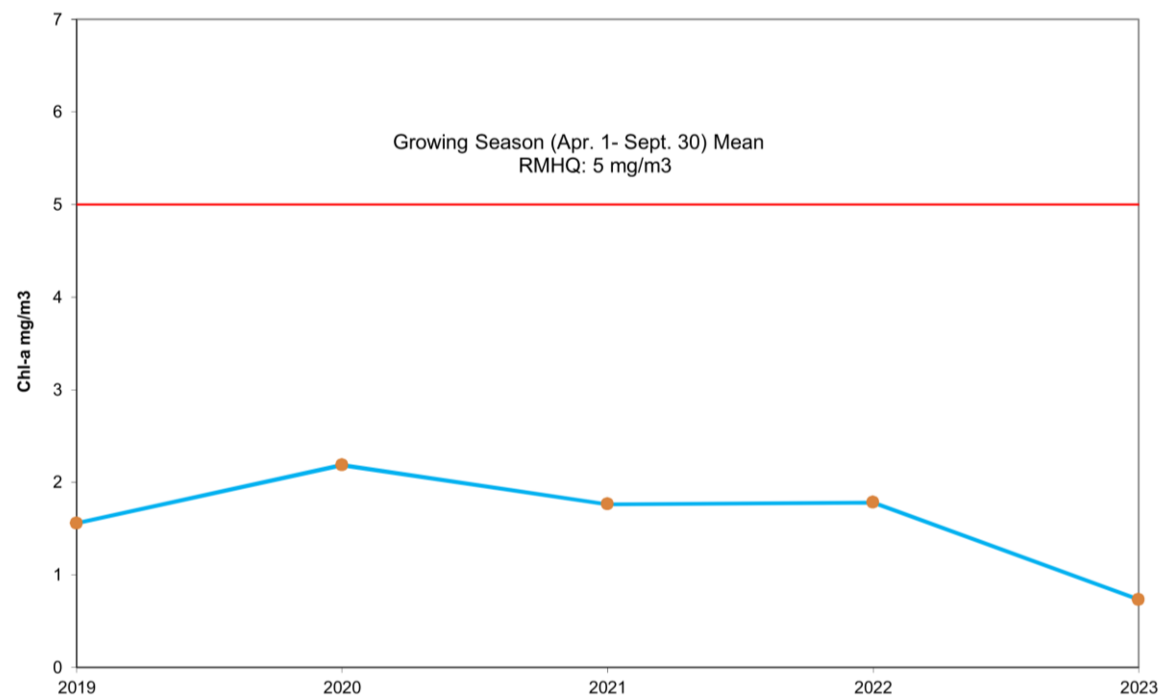


Figure 15-33. Boulder Basin chlorophyll-a growing season mean concentrations

Source: 2023 NDEP Lake Mead and LV Wash Ambient WQ Report

These figures show that nutrients from all sources, including stormwater, do not result in excessive algae in Lake Mead. Because rain is infrequent in Las Vegas Valley, stormwater contributions of orthophosphate to Lake Mead are also infrequent.

In 1998, a special study was conducted of stormwater entering Lake Mead. Samples were taken the day of the storm and additional days thereafter. These data show that the stormwater entering Lake Mead plunged to a depth of about 10 meters below the surface and continued flowing out into the Lake at the 10-meter depth. The depth of the plunge of water coming down Las Vegas Wash and flowing into Lake Mead depends on the relative density of the waters, which is determined by temperature, total dissolved solids (TDS), and TSS. During the summer, Las Vegas Wash water is denser than the surface waters of Lake Mead, but less dense than the bottom waters. During the winter, Las Vegas Wash water is denser than all the water in Lake Mead, and water from the Las Vegas Wash flows along the bottom of Lake Mead.

TDS, which is measured in the laboratory, and conductivity, which can be measured with a probe in the field, are both measures of dissolved solids. Figure 15-34 shows a cross-section of the conductivity of Lake Mead on July 21, 1998, the day after a storm in Las Vegas Valley. On the left is the confluence with Las Vegas Wash. The negative numbers on the left scale represent the depth from surface in meters.

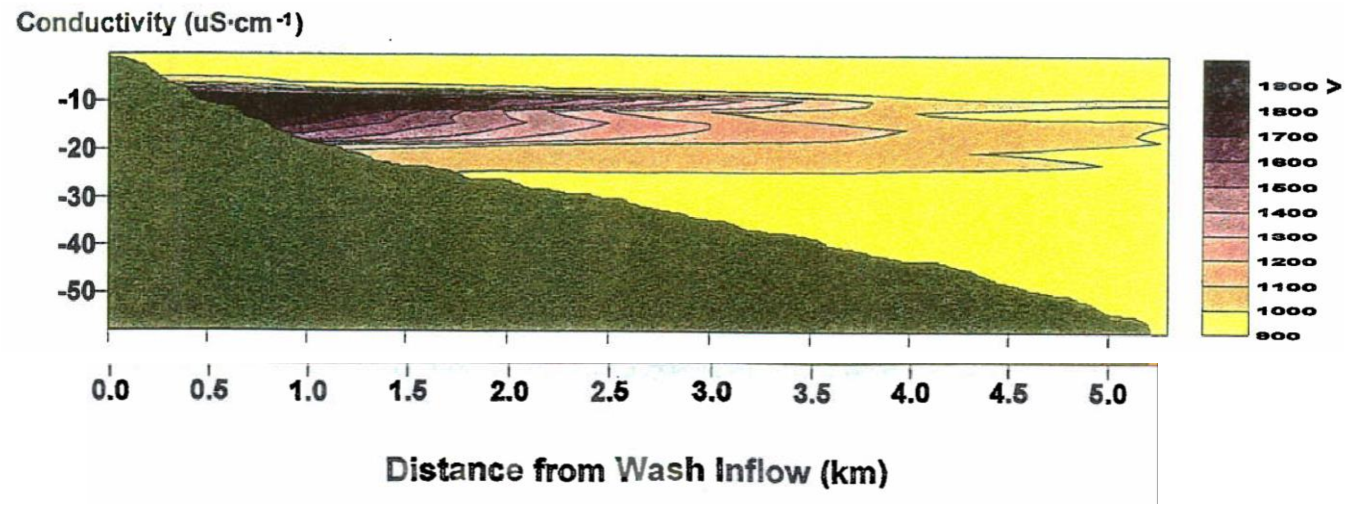


Figure 15-34. Conductivity plume at Las Vegas Wash confluence with Lake Mead

Figure 15-34 shows a plume of water with elevated conductivity entering about 10 to 20 meters below the surface from Las Vegas Wash and continuing out into Lake Mead. Figure 15-35 shows a plume of water with elevated turbidity also entering about 10 to 20 meters below the surface and continuing out into Lake Mead, although not as far out into the lake. Figure 15-35 also shows that the turbidity plume sinks further towards the lake bottom than the conductivity plume.

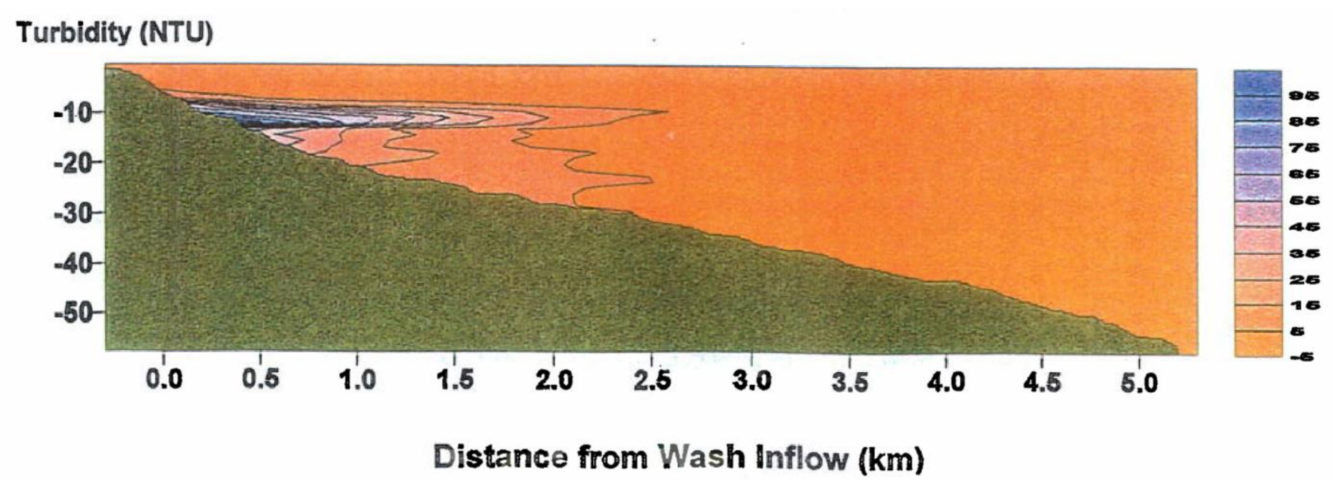


Figure 15-35. Turbidity plume at Las Vegas Wash confluence with Lake Mead

These figures show that the July 1998 storm entered Lake Mead well below the surface and stayed well below the surface. Algae, like plants, are photosynthetic organisms and they need light to grow. Most algae live in the euphotic zone, where there is sufficient light. Algae do not grow well deep in Lake Mead because there is not enough light. Stormwater flowing through Lake Mead at 10 to 20 meters depth is too deep for algal use of any nutrients that may have been in the stormwater. Because there have not been any significant changes in the relative densities of Las Vegas Wash water and Lake Mead water since the 1990s, Figures 15-34 and 15-35 should be descriptive of current conditions.

The key conclusions from these figures are that chlorophyll-a concentrations in Lake Mead are at appropriate levels, and stormwater is not likely to have any effect on chlorophyll-a concentrations. Lake Mead is therefore not sensitive to nutrients from stormwater in Las Vegas Valley.

Las Vegas Wash is not sensitive to nutrients from any source. There has never been a nuisance algal bloom in Las Vegas Wash, perhaps because of the short time that nutrients spend in the Las Vegas Wash or the high velocity and turbulent flows. Because of the short duration of storms in Las Vegas Valley, any nutrients in stormwater are unlikely to affect the growth of algae in lower Las Vegas Wash.

15.4.3 Evaluation of Orthophosphate Data

Although orthophosphate in stormwater does not have any apparent effect on algae in Lake Mead, an analysis was performed to assess whether there is a buildup of orthophosphate in Las Vegas Valley that might be affected by stormwater management programs. If the orthophosphate in stormwater came from overuse of landscape fertilizer, then it might build up between storms. Figures 15-36 and 15-37 show that there is no apparent buildup. The regression lines are very slightly positive and very slightly negative. The orthophosphate in stormwater appears to come from a background source.

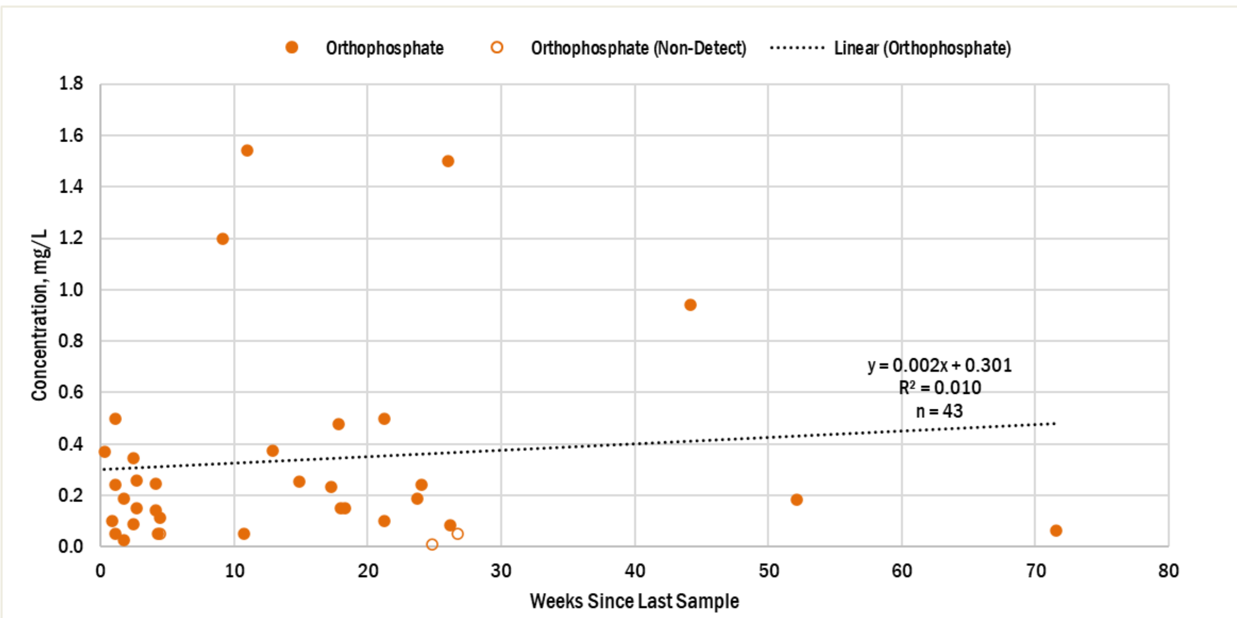


Figure 15-36. Club at Sunrise: Orthophosphate vs. weeks since last sample

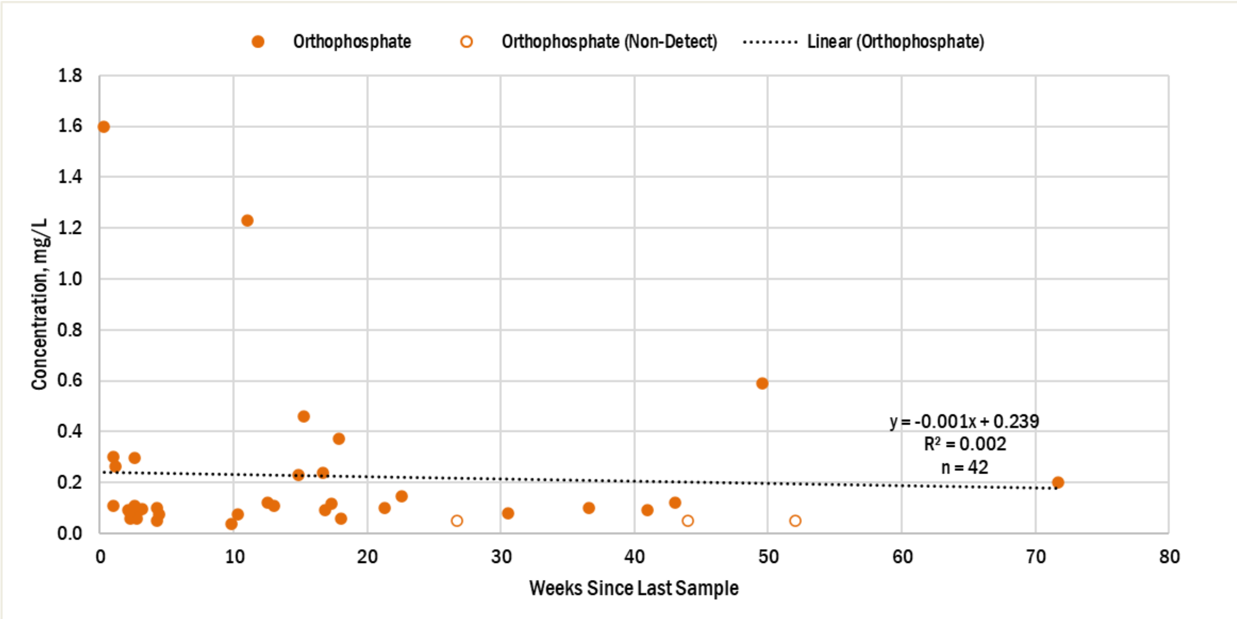


Figure 15-37. Rainbow Gardens: Orthophosphate vs. weeks since last sample

The pattern shown in Figure 15-37 is similar to the patterns for suspended solids and turbidity, as shown in Figures 15-24 and 15-25. This similarity suggests that orthophosphate in stormwater comes from widely distributed sources, rather than a few localized sources.

15.4.4 Conclusions About Nutrient Data

Below are the main conclusions for the evaluation of nutrients:

- Lake Mead and Las Vegas Wash are not sensitive to nutrients in stormwater.
- Orthophosphate concentrations do not substantially increase when there are long dry periods. The absence of an upwards trend may be explained either by the effectiveness of the Permittees' street sweeping program and debris cleanout, and/or because there is not an overuse of phosphate fertilizer.

15.5 Evaluation of Dissolved Metal Data

This section describes the dissolved metal data collected as a part of the wet weather monitoring program and draws conclusions from the data.

15.5.1 Significance

EPA reports that all metals can be toxic to fish at high concentrations, even those that are nutritionally essential for sustaining life in aquatic ecosystems in small amounts (such as copper and manganese). EPA has established recommended water quality criteria for dissolved metals, generally based on four-day and 30-day bioassays. A one-hour maximum has been established from the four-day bioassays, and a four-day maximum has been determined from the 30-day bioassays, thereby incorporating a great deal of conservatism. Because the toxicity of dissolved metals is generally dependent on hardness, the recommended criteria generally include a calculation that adjusts the standard for hardness. Higher hardness results in lower toxicity. Nevada has incorporated these recommended water quality criteria into its water quality standards.

In Las Vegas Wash, there are no fish at the Club at Sunrise sampling location, and that location is not classified for fish. Fish in lower Las Vegas Wash are not exposed to stormwater for 30 days or even four days, because stormwater flows out of the Las Vegas Valley very quickly. In Lake Mead, fish are not likely to be exposed to stormwater from Las Vegas Valley for even one hour, because the stormwater is highly diluted and occupies only a small part of Lake Mead.

There have been no recent fish kills in lower Las Vegas Wash and no fish kills at any time that were attributed to stormwater. There have never been any fish kills in the part of Lake Mead affected by stormwater from Las Vegas Valley.

The three metals typically focused on for fish toxicity are dissolved copper, dissolved lead, and dissolved zinc, which are evaluated in the next three sections.

15.5.2 Evaluation of Dissolved Copper Data

Web searching suggests that copper dust from brake pads has been a source of copper in stormwater. However, EPA and the automotive industry have signed an agreement to reduce the use of copper in motor vehicle brake pads to <5 percent by weight in 2021 and 0.5 percent by 2025 (https://www.epa.gov/npdes/copper-free-brake-initiative). To ascertain whether copper from brake dust is building up during dry intervals between storms in Las Vegas Valley, concentrations were compared with the number of weeks since the last sampling event. The results are shown in Figure 15-38. In that figure, the linear regression line treats a non-detect as though they were detected at the detection limit. The water quality criteria for dissolved copper, dissolved lead, and dissolved zinc are derived from formulae based on the hardness of the ambient water. Typical hardness in the Las Vegas Wash is approximately 1,000 mg/L. The water quality criterion for dissolved copper for a hardness of 1,000 mg/L is 0.64 mg/L.

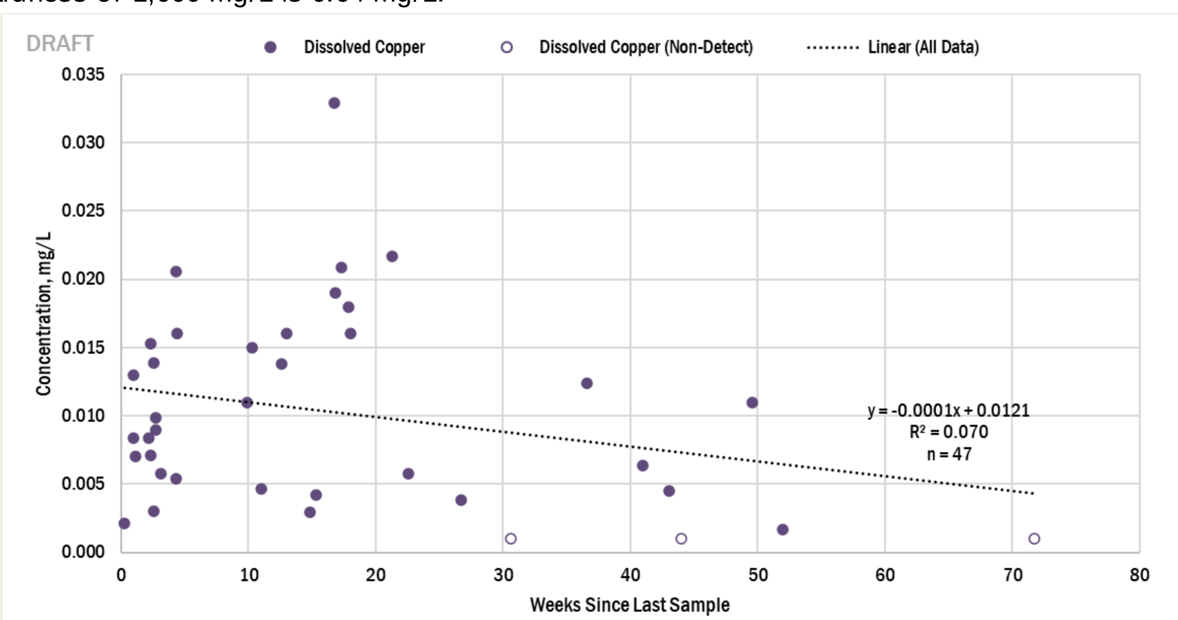


Figure 15-38. Rainbow Gardens: dissolved copper vs. weeks since last sample

Figure 15-38 shows there is no evidence of a buildup of copper dust resulting in higher copper concentrations in stormwater. Concentrations are within water quality standards. Data has not been shown for copper concentrations at the Club at Sunrise because of the absence of fish, but the results are similar.

15.5.3 Evaluation of Dissolved Lead Data

Web searching suggests that lead paint may be a source of lead in stormwater. Because so much of Las Vegas Valley is new construction, the great majority of paint postdates the ban on leaded paint. To ascertain whether lead is building up during dry intervals between storms in Las Vegas Valley, concentrations were compared with the number of weeks since the last sampling event. The results are shown in Figure 15-39. In that figure, the linear regression line treats a non-detect as though they were detected at the detection limit. The water quality criterion for dissolved lead for a hardness of 1,000 mg/L is 3.0 mg/L.

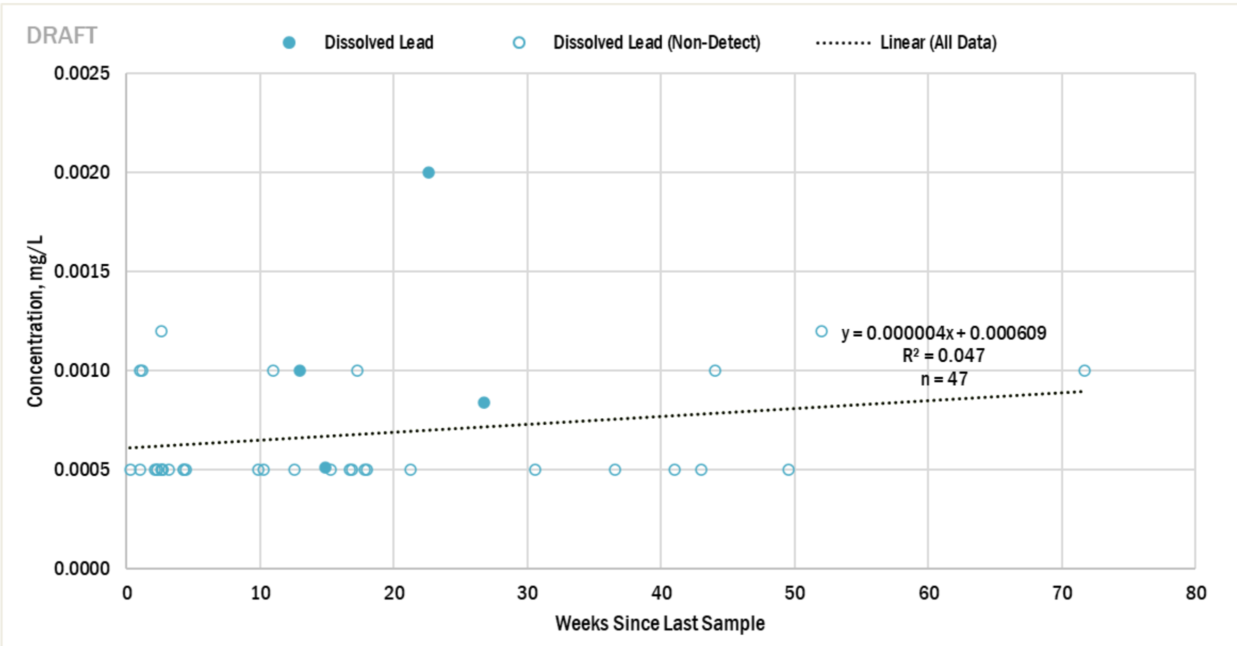


Figure 15-39. Rainbow Gardens: dissolved lead vs. weeks since last sample

Figure 15-39 shows there is no evidence of a buildup of lead. In fact, most results are non-detect. Although the linear regression line appears to trend slightly upward, the equation shows that it has almost no slope. Concentrations are within water quality standards. Data has not been shown for lead concentrations at the Club at Sunrise because of the absence of fish, but the results are similar.

15.5.4 Evaluation of Dissolved Zinc Data

Web searching suggests that galvanized metal has been a source of zinc in stormwater, but there is very little exposed galvanized metal in the Las Vegas Valley. Web searching also suggests zinc in stormwater can come from tire wear and brake pad dust. To ascertain whether zinc is building up during dry intervals between storms in Las Vegas Valley, concentrations were compared with the number of weeks since the last sampling event. The results are shown in Figure 15-40. In that figure, the linear regression line treats a non-detect as though they were detected at the detection limit. The water quality criterion for dissolved zinc for a hardness of 1,000 mg/L is 0.34 mg/L.

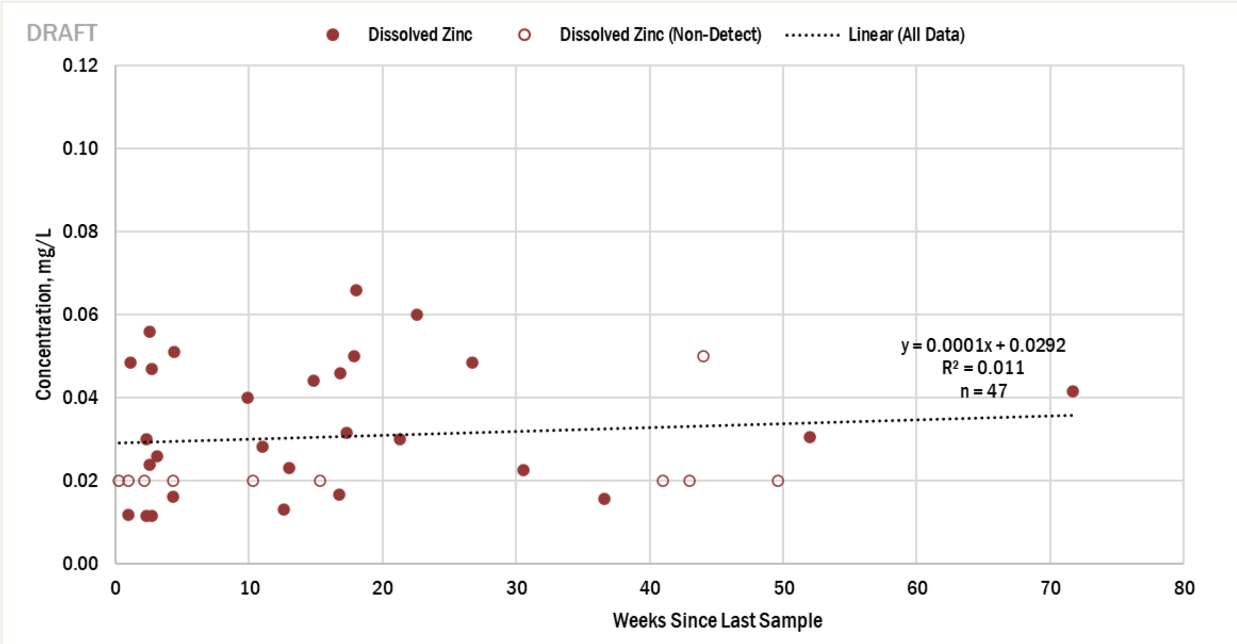


Figure 15-40. Rainbow Gardens: dissolved zinc vs. weeks since last sample

Figure 15-40 shows there is no evidence of a buildup of zinc. Although the linear regression line appears to trend slightly upward, the equation shows that it has almost no slope. Concentrations are within water quality standards. Data has not been shown for zinc concentrations at the Club at Sunrise because of the absence of fish, but the results are similar.

The pattern shown in Figures 15-38 through 15-40 is similar to the patterns for suspended solids, turbidity, and dissolved orthophosphate, as shown in Figures 15-24, 15-25, and 15-37. This similarity suggests that dissolved metals in stormwater come from widely distributed sources, rather than a few localized sources.

15.5.5 Conclusions About Dissolved Metals Data

Below are the main conclusions for the evaluation of dissolved metals:

- Dissolved metals do not substantially increase when there are long dry periods. The absence of an upwards trend may be explained either by the effectiveness of the Permittees' street sweeping program and debris cleanout, and/or because material buildup is not a significant source of dissolved metals in stormwater.
- Dissolved metals in stormwater come from widely distributed sources, rather than a few localized sources.

15.6 Evaluation of Effectiveness of Wet-Weather Monitoring Program

This section describes the evaluation and effectiveness of the wet weather monitoring program in the Las Vegas Valley.

15.6.1 Number and Location of Monitoring Stations

As explained in Section 15.3.4, no additional monitoring stations are needed for the Las Vegas Valley. The Club at Sunrise location effectively monitors stormwater conditions upstream of the wastewater treatment plants, and the Rainbow Gardens location effectively monitors stormwater conditions for the whole of the Las Vegas Valley. The similarity in results for these two stations implies that stormwater quality is generally similar across Las Vegas Valley.

15.6.2 Sufficiency of Data

The amount of wet weather monitoring data is limited by the amount of rainfall. Over the past 10 or more years, all storms that generated sufficient rainfall have been monitored. A substantial amount of wet weather data has been collected, more than enough data to inform the issues considered in this evaluation.

15.6.3 Representativeness of Samples

Data from the Club at Sunrise reflect stormwater quality in the areas upstream of that location, which are drained by Upper Las Vegas Wash, Las Vegas Creek, and Flamingo Wash. Data from Rainbow Gardens reflect stormwater quality from these areas and in addition, stormwater from Sloan Channel, Pittman Wash, Duck Creek, and the C-1 Channel, as well as highly treated discharges from the wastewater treatment plants. The similarity in data from the Club at Sunrise to the data from Rainbow Gardens implies that stormwater quality is generally uniform throughout Las Vegas Valley.

Because stormwater velocity and energy are highest at peak flow, concentrations conceptually could be higher at peak flow. As noted in Section 15.3.5, concentrations conceptually may also be higher during a first flush, although reports have been inconsistent. Samples taken at the end of the storm conceptually should have lower concentrations because velocities have decreased and materials have settled out.

Stormwater sampling in Las Vegas Valley tends to be near the peak, as explained in Section 15.3.5. There are no samples taken at or near the extreme end of a storm, when concentrations are likely to be lower. As a result, stormwater samples in Las Vegas Valley may not be representative of the entire storm. If they are unrepresentative, they are likely to be higher than the true values for the storm, thereby providing some conservatism to the data. Samples are composited equally by time rather than being adjusted for flow, which is necessary for practical purposes. This compositing practice may also produce some unrepresentativeness.

15.6.4 Program Effectiveness

Because of the sufficiency of the data and the probable conservativeness of the samples, the wet weather monitoring program can be used to evaluate the effectiveness of the stormwater management program. The data show that turbidity and suspended solids are far lower than background levels, that nutrients in stormwater are not causing algal problems, and that dissolved metals are not harming fish.

15.6.5 Conclusions

Below are the main conclusions for the evaluation of wet weather characterization data:

- There are an appropriate number of monitoring stations and they are appropriately located.

- Although the amount of data is limited by the number of sampleable storms, the amount of data collected is sufficient to inform the issues considered in this evaluation.
- Samples collected are representative of conditions in Las Vegas Valley. Samples may not perfectly represent the entirety of all storms, because the trailing end of storms are not sampled. The trailing end of storms are likely to contain lower concentrations than the sampled portions.
- The stormwater management program for the Las Vegas Valley is highly effective. Turbidity and suspended solids are far lower than background levels, that nutrients in stormwater are not causing algal problems, and that dissolved metals are not harming fish.

15.7 References

Simon et al., “Suspended-sediment transport rates at the 1.5-year recurrence interval for ecoregions of the United States: transport conditions at the bankfull and effective discharge?,” Geomorphology, 2004, 243-262.

“The Economic Impact of Construction in the United States and Nevada,” Associated General Contractors (AGC) of America, September 2023. https://www.agc.org/sites/default/files/users/user21902/NV- US%20construction%20fact%20sheet_92023.pdf

Section 16

Conclusion

16 Conclusion

The Permittees prepared this Annual Report for the 2023-2024 MS4 permit year to report to NDEP on the status of the MS4 program and to highlight compliance with the permit and current SWMP. Annual Report requirements in the MS4 permit were also satisfied as described below and all program BMP goals were achieved.

- B.6.3.3.1: Status of compliance with permit conditions – This is discussed in each Annual Report section. All permit conditions were met.
- B.6.3.3.2: Appropriateness of BMPs – Current BMPs remain appropriate. No significant additions are proposed.
- B.6.3.3.3: Progress towards reducing discharges to the maximum extent practicable (MEP) – The Permittees believe that continued implementation of current BMP programs is meeting the MEP goal given the unique conditions in the Las Vegas Valley.
- B.6.3.3.4: Achievement of measurable goals – This is discussed in each Annual Report section. All permit conditions were met.

  B.6.3.3.5: Results of information analysis – Wet weather water quality remained largely consistent with data collected historically. One of the wet weather samples at the Club at Sunrise and one at the Rainbow Gardens showed higher concentration than WQS for iron. Iron is a common and natural constituent of soil.

  There were no significant changes to the impact of stormwater runoff on attainment of water quality standards.
- B.6.3.3.6: Summary of stormwater activities planned for next permit cycle – The Permittees intend to continue all current BMP programs. While no new programs are anticipated, possible improvements to current programs will be evaluated.
- B.6.3.3.7: Changes to the SWMP – A Draft SWMP update is being submitted.
- B.6.3.3.8: Reliance on another governmental agency to satisfy permit obligations – Permittees rely on other governmental agencies (e.g., SNWA, SNHD) to perform activities for specific BMPs, but not to satisfy overall permit obligations.
- B.6.3.3.9: Estimated reductions in loadings of pollutants to surface and ground water due to MS4 program – Permittees have not found a reliable, defensible method to quantify reductions in pollutant loadings attributable to the BMPs in their MS4 program. This is not currently being reported. However, data show that population and land development have increased dramatically in the Las Vegas Valley since the MS4 program inception in 1991, without a commensurate increase in stormwater pollutant concentrations. This suggests that BMPs in the MS4 program have been effective in offsetting pollutant loading increases that could have occurred due to development.
- B.6.3.3.10: Summary of inspections – More than 850 industrial facility inspections and more than 5,000 construction site inspections were completed by the Permittees during the permit year. Inspections are documented in Section 12 and Section 13 of this Annual Report.

- B.6.3.3.11: Annual expenditures and budget for the following year – This information is provided in Section 14 of this Annual Report. Annual program expenditures for the 2023-2024 MS4 permit year were approximately $215 million for all Permittees combined. The budget for the 2024-2025 MS4 permit year is approximately $214 million.

Appendices

Appendix A-1

A-1: Historic Wet Weather Data

APPENDIX A-1

Notes for Wet Weather Monitoring Data, 1992-2024

Refer to these notes for all set of databases

1) In computing median values, concentrations below detection limits were assumed to equal the detection limit.
2) In computing average values, concentrations less than the detection limit were assumed to be 1/2 the detection limit.
3) NA = Not Available
4) Total Nitrogen = TKN + NO_3 + NO_2. If TKN, NO_3, or NO_2 are below the detection limit, the concentration was assumed to be equal to the detection limit.
5) Insitu pH used for 3/25/94 Western Trib.
6) Phenol values are Lab measurements when both lab and in-situ measurements are available.

(a) VOC detected is Acetone
(b) VOC detected is 2-Butanone
(c) Pesticide detected is Atrazine
(d) VOC detected is Chloroform
(e) VOC detected is Trichloromethane
(f) Herbicide detected is MCCP
(g) SOC detected is Butylbenzylphthalate
(h) SOC detected is Caffeine
(i) SOC detected is Di-(2-Ethylhexyl)adipate
(j) SOC detected is Di-n-Butylphthalate
(k) SOC detected is Phenanthrene
(l) SOC detected is Pyrene
(m) SOC detected is Simazine
(n) SOC detected is Dimethylphthalate
(o) SOC detected is Diethylphthalate
(p) SOC detected is Alachlor
(q) SOC detected is Benzopyrene
(s) SOC detected is Metolalchlor
(t) SOC detected is Propachlor
(u) SOC detected is Benzo(g,h,I)Perylene
(v) SOC detected is Benzo(k)Fluoranthene
(w) Denotes grab sample taken from bottle X
(x) SOC detected is Di(2-Ethylhexyl)phthalate
(y) Denotes grab sample taken from flow stream while bottle X is filling
(z) SOC detected is Heptachlor
(aa) SOC detected is Lindane
(bb) SOC detected is Metribuzin
(cc) VOC detected is Chlorodibromomethane
(dd) VOC detected is Bromodichloromethane
(ee) VOC detected is Total THM
(ff) VOCs detected is Carbon Disulfide
(gg) Pesticides detected is Glyoxal

(hh) Herbicide detected is 2,4-D
(ii) Pesticide detected is Chlorpyrifos (Dursban)
(jj) Pesticide detected is Metachlor
(kk) Pesticide detected is Malathion
(ll) Pesticide detected is Prometon
(nn) SOC detected is Fluoranthene
(oo) Pesticide detected is Dieldrin
(pp) VOC detected is Benzenaldehyde
(qq) VOC detected is Acetaldehyde
(ss) VOC detected is Butanal
(tt) VOC detected is Decanol
(uu) Herbicide detected is 2,4-DB
(vv) VOC detected is Formaldehyde
(ww) Pesticide detected is Diazinone
(xx) Pesticide detected is Dicamba
(yy) VOC detected is p-Dichloropropane
(zz) SOC detected is Methyl Glyoxal
(aaa) VOC detected is Octanal
(bbb) VOC detected is Propanal
(ccc) Herbicide detected is Pentachlorophenol
(ddd) VOC detected is Toluene
(eee) VOC detected is Dichloroacetonitrile
(fff) VOC detected is Dibromochloromethane
(ggg) VOC detected is Pentanal
(hhh) VOC Heptanal
(iii) VOC Hexanal
(jjj) VOC Dibromochloropropane
(kkk) Pesticide Duiron
(lll) Herbicide 2,4,5-T
(mmm) SOC Benzoic Acid
(nnn) VOC Naphthalene
(ooo) SOC Dimethylphenol
(ppp) VOC 2-methylphenol
(qqq) VOC 4-methylphenol
(rrr) Herbicide Picloram
(sss) SOC Benzene
(ttt) Pesticide Alpha-bhc
(uuu) Pesticide Beta-bhc
(vvv) Pesticide delta-bhc
(www) SOC Methyl isobutyl ketone
(xxx) Herbicide Bentazon
(yyy) VOC Cyclohexanone
(zzz) VOC Benzyl alcohol
(aaaa) Phenol
(bbbb) Benezene
(cccc) Herbicide Benzoic Acid
(dddd) Pesticide Methyl Glyoxal
(eeee) VOC Nonanal

1992-2024
Wet Weather Data

Location	Date	Q cfs	Temp Deg. C	Oil & Grease mg/L	TSS mg/L	TDS mg/L	Specific Conductance umho/cm	Lab pH units	Surfactants MBAS mg/L	Ortho-Phosphate mg/L	Total Phosphorous mg/L	NO3-N mg/L	NO-2 mg/L	NH3-N mg/L	TKN mg/L	Total Nitrogen mg/L
Las Vegas Wash @ The Club at Sunrise (Formerly known as Desert Rose Golf Course) (USGS)	04/02/97		12.6	< 3	480	1,060	1,549	7.1	0.63	0.55	0.91	3.30		1.30	8.50	11.80
	07/28/97		26.6	1,180	400	1,200	1,092	7.6	1.34	0.04	0.52	2.10		0.80	3.90	6.00
	02/04/98			< 3	2,590	980		7.7	0.60	0.17	1.97	0.63		0.70	7.30	7.93
	02/24/98		12.0		5,580	540		7.9	< 0.50	0.09	1.46	1.00		0.20	< 1.00	2.00
	04/24/99	112		4	1,240	1,000					0.93	2.80		0.50	7.45	10.25
	04/30/99	550		< 3	1,870	440					1.83	1.90		0.78	8.73	10.63
	02/21/00			5	1,910	100					2.10	0.64		0.18	3.20	3.84
	10/23/00	312		5	1,390	2,430					1.20	3.48		0.60	7.40	10.88
	02/26/01	400		< 3	2,940	1,250					1.70	2.64		0.40	4.90	7.54
	11/24/01	75		15	630	1,590					0.86	2.00		1.61	7.80	9.80
	09/11/02	83		< 3	110	1,300	1,570	7.1	2.18		0.49	3.90	< 2.50	1.13	5.40	11.80
	02/12/03	400		5	5,980	1,180	819	7.7	< 0.05	0.13	2.40	1.50	< 0.20		4.70	6.40
	02/25/03	775		8							0.44			0.38	3.00	3.00
	07/19/03				500	1,330			0.72			0.63	1.20		7.70	9.53
	02/21/04				340	660	274	7.5	0.48		0.42	1.80	< 0.20		2.90	4.90
	11/09/04			< 5		1,500	1,730	6.7	< 0.05		0.77	165	< 0.10		2.50	167.60
	01/04/05			< 5	1,730	290	428	7.9	< 0.05	0.22	1.20	0.70	< 0.10			0.80
	07/24/05			< 5	1,160	390	535	7.6	0.12	0.04	0.77	1.50	6.50		4.10	12.10
	10/05/06					298	446		0.09	0.19	0.75	1.10	< 0.20		2.00	3.30
	01/05/08				1,520	536	846	7.6	0.81	0.56	3.30	1.90	< 0.20		12.00	14.10
	08/07/08			7	5,810	1,450	1,890	7.4	0.19		3.90	< 5.00	< 5.00		26.00	36.00
	11/26/08			4	1,200	1,320	1,800	7.9	0.09	0.51	1.80	2.80	< 0.50		9.90	13.20
	12/17/08			7	26	294	439	7.4	0.19	0.41	0.41	0.76	0.10		2.00	2.86
	02/07/09			5	18	726	1,020	7.6	0.07	0.25	1.80	1.60	< 0.20		8.60	10.40
	07/22/09			14	500	1,300	1,700	7.4	0.74		1.60	< 0.50	< 0.25		14.00	14.75
	01/20/10			5	3,400	610	870	7.7	0.23	1.50	2.10	1.70	< 0.13		7.90	9.73
	02/06/10			6	620	230	340	7.9	0.09	0.09	0.59	0.82	0.09		2.50	3.41
	04/22/10			3	1,000	840			0.46	0.05	0.80	1.70			4.10	5.80
	10/17/10			< 5	230	1,100	1,500	7.3	1.00	0.05	0.67	< 0.25	< 0.25		7.40	7.90
	12/20/10			< 5	1,700	1,300	1,900	7.9	0.46	1.20	1.80	2.70	< 0.13		6.80	9.63
	12/22/10			< 5	1,600	130		8.2	0.09	0.37	0.74	0.54		0.09	1.60	2.14
	03/21/11			< 5	750	2,500	3,000	7.5	0.45	0.05	0.82	3.20	< 0.13		6.00	9.33
	09/11/11			< 5	7,600	1,100	1,300	7.4	< 0.05	< 0.01	3.00	1.40	1.10		9.30	11.80
	10/03/11			< 5	4,700	700	970	7.5	0.07	0.04	1.40	1.30	< 0.25		9.40	10.95
	03/17/12			5	1,600	1,100	1,500	7.4	< 0.16	0.19	1.20	< 0.25	0.51		7.30	8.06
	07/23/12			< 5	970	870	1,200	7.6	< 0.05	0.15	1.20	1.50	0.49		0.85	2.84
	07/31/12			< 5	1,400	440	600	7.8	< 0.05	0.05	0.90	1.20	< 0.25		< 0.20	1.65
	08/12/12			< 5	110	660	920	7.3	0.60	0.19	0.52	< 0.25	1.10		3.80	5.15
	08/18/12			< 5	4,500	470	NA	7.5	< 0.05	0.10	2.00	1.80	0.11		4.50	6.41
	08/30/12			< 5	4,100	920	NA	7.7	< 0.05	0.03	3.10	2.00	< 0.13		7.50	9.63
	01/26/13			< 5	1,900	360	NA	7.6	< 0.05	0.50	1.50	0.90	< 0.25		4.70	5.85
	07/19/13			< 5	8,350	590	763	7.5	0.63	0.16	0.64	< 0.10	< 0.10	0.65	22.10	21.50
	08/18/13			12	1,840	590	657	7.6	1.20	0.05	0.74	0.14	< 0.10	0.25	19.70	20.00
	08/25/13			< 5	4,090	NA	NA	7.9	NA	0.09	1.47	1.25	< 0.10	0.45	6.25	7.60
	11/21/13			< 5	555	105	698	7.9	0.76	0.21	1.32	1.30	< 0.10	1.55	2.08	3.63
	08/04/14	Samples not Taken due to Las Vegas Channel Improvements, Sloan Channel to Bonanza Road and Flamingo Wash below Nellis Boulevard Improvement Project														
	08/20/14															
	09/08/14															
	01/11/15			9	305	445	661	7.8	0.46	0.48	0.57	1.77	< 0.10	0.77	1.54	0.77
	01/30/15			6	165	265	NA	7.8	0.56	0.15	0.17	1.19	< 0.10	0.36	0.67	1.96
	03/02/15			5	175	375	567	7.3	0.50	0.11	0.33	1.25	< 0.10	0.36	0.91	0.55
	07/06/15			6	564	416	578	7.1	0.37	0.15	0.55	< 0.10	0.26	0.18	1.47	1.29
	10/05/15			< 5	7,450	450	NA	6.9	0.24	0.11	2.18	3.41	< 0.10	0.81	28.00	NA
	04/09/16			< 5	850	235	215	7.3	0.24	0.10	0.34	0.74	< 0.10	0.35	2.49	2.14
	04/28/16			6	1,360	525	NA	7.6	0.42	0.26	2.93	1.10	< 0.10	< 0.10	2.91	NA
	05/06/16			< 5	410	510	NA	7.4	0.10	0.24	1.37	1.52	< 0.10	0.55	3.81	NA
	08/04/16			5	360	165	NA	7.8	0.29	0.37	0.83	1.73	< 0.10	0.57	3.27	2.70
	08/23/16			< 5	4,340	455	NA	7.4	0.23	N/A	N/A	1.69	< 0.10	0.37	5.61	5.24
	12/22/16			< 5	310	1,820	NA	7.7	0.64	0.24	0.57	1.34	< 0.10	0.64	3.54	2.90
	01/20/17			< 5	522	230		8.6	0.89	0.25	0.60	0.57	< 0.10	0.25	2.04	
	02/18/17			< 5	248	1,260		6.8	0.21	0.14	0.39	10.20	< 0.10	< 0.10	< 1.00	
	07/17/17			6.6	444	765	N/A	7.06	1.40	0.10	0.93	0.14	< 0.10	0.38	5.22	4.84
	07/25/17			2.4	2,740	340	~	7.71	0.48	0.50	1.78	1.06	< 0.10	0.14	2.79	2.65
	01/09/18			7.1	665	255	~	7.87	< 0.07	0.24	0.91	1.01	< 0.10	1.28	2.43	1.15
	07/15/18			< 5.0	185	365	NA	7.20	< 0.10	< 0.05	0.45	1.36	< 0.10	0.62	2.80	2.18
	01/14/19			6.4	455	220	NA	7.26	0.60	0.09	3.58	0.61	< 0.10	1.10	2.68	1.58
	02/14/19			9.3	440	115	NA	7.59	0.30	< 0.05	0.47	0.40	< 0.10	0.48	3.11	2.63
	11/20/19			< 5.0	120	625	NA	7.40	0.85	0.38	1.66	1.56	< 0.10	0.99	6.10	5.11
	11/28/19			< 5.0	410	180	NA	5.92	0.28	0.48	0.58	0.58	< 0.10	0.90	2.30	1.40
	03/11/20			< 5.0	204	160	NA	7.83	0.36	0.25	0.42	0.41	< 0.10	0.34	1.55	1.21
	07/25/21		NA	< 5.0	2,800	485	NA	7.20	0.25	0.06	2.36	6.19	< 0.20	1.25	6.15	4.90
	07/25/22		NA	10.3	825	456	NA	7.41	1.53	0.18	1.57	< 0.10	< 0.10	1.74	6.99	5.25
	08/11/22		NA	7.3	860	230	NA	7.78	0.91	0.35	1.42	1.55	< 0.10	1.41	5.99	4.58
	06/16/23		22.3	3.6	560	250	NA	7.60	0.81	0.94	1.42	1.27	0.11	1.44	6.12	4.68
	09/01/23		27.3	10.0	867	93	NA	8.18	0.31	1.54	2.04	1.05	< 0.10	0.64	3.66	3.02
	Median	**356**	**22.3**	**< 5**	**860**	**531**	**870**	**7.58**	**0.34**	**0.18**	**1.07**	**1.30**	**< 0.10**	**0.59**	**4.50**	**5.24**
	Maximum	**775**	**27.3**	**1,180**	**8,350**	**2,500**	**3,000**	**8.57**	**2.18**	**1.54**	**3.90**	**165**	**6.50**	**1.74**	**28.0**	**168**
	Minimum	**75**	**12.0**	**< 2.4**	**18**	**93**	**215**	**5.92**	**< 0.05**	**< 0.01**	**0.17**	**< 0.10**	**0.089**	**0.09**	**< 0.20**	**0.55**

Location	Date	Copper mg/L	Dissolved Copper mg/L	Chromium mg/L	Lead mg/L	Dissolved Lead mg/L	Mercury mg/L	Cadmium mg/L	Zinc mg/L	Dissolved Zinc mg/L	Silver mg/L	Nickel mg/L	Selenium mg/L	Dissolved Selenium mg/L
Las Vegas Wash @ The Club at Sunrise (Formerly known as Desert Rose Golf Course) (USGS)	04/02/97	0.024			< 0.100				0.18					
	07/28/97	0.023			< 0.100				0.15					
	02/04/98	0.065			0.180				0.55					
	02/24/98	< 0.010			0.180				0.32					
	04/24/99	< 0.010	< 0.010		< 0.100	< 0.1000			0.28	< 0.02				
	04/30/99	0.130	< 0.010		< 0.100	< 0.1000			0.54	< 0.02				
	02/21/00	0.012	< 0.010		< 0.100	< 0.1000			0.83	< 0.02				
	10/23/00	0.090	< 0.010		< 0.100	< 0.1000			0.54	0.03				
	02/26/01	0.055	< 0.010		0.029	0.0006			0.28	0.04				
	11/24/01	0.012	< 0.010		< 0.100	< 0.1000			0.07	0.04				
	09/11/02	0.098	0.110	< 0.0100	0.010	< 0.1000	< 0.0002	0.0069	0.18	0.22	< 0.0005	0.019		
	02/12/03	0.110	< 0.010	0.0150	0.096	< 0.1000	< 0.0002	0.0028	0.39	< 0.02	< 0.0005	0.045	< 0.0500	
	02/25/03	0.390		0.0094	0.014			0.0006	0.19			0.012		
	07/19/03	0.075	0.020		0.020	< 0.1000			0.25	0.05				
	02/21/04	0.027	< 0.010	< 0.0100	0.077	< 0.0200	< 0.0002	< 0.0005	0.89	0.40	0.0006	< 0.050	< 0.0250	
	11/09/04	0.029		0.0180	0.031		< 0.0002	< 0.0006	0.36		< 0.0005	0.024	< 0.0500	
	01/04/05	0.019	< 0.010	< 0.0001	0.047	< 0.0200	< 0.0002	< 0.0050	2.70	0.04	< 0.0050	< 0.050	< 0.0500	
	07/24/05	0.110	0.022	0.0230	0.046	0.0460	< 0.0002	0.0008	4.60	0.38	< 0.0050	0.035	< 0.0100	
	10/05/06	0.690	0.013	15.000	0.016	< 0.0005	< 0.0002	< 0.0005	0.73	0.02		0.017		
	01/05/08	0.100	0.024	0.0170	0.017	< 0.0005	< 0.0002	0.0005	0.59	0.09	< 0.0005	0.012	< 0.0050	
	08/07/08	0.190		0.0470	0.071		< 0.0002	0.0016	0.74		0.0011	0.043	0.0160	
	11/26/08	0.120	0.018	0.0290	0.059	0.0006	< 0.0002	0.0013	0.13	0.03	< 0.0005	0.039	0.0110	
	12/17/08	0.050	0.008	0.0070	0.019	< 0.0005	< 0.0002	0.0005	0.24	0.24	< 0.0005	0.008	< 0.0050	
	02/07/09	0.094	0.004	0.0310	0.049	< 0.0005	< 0.0002	0.0016	0.70	< 0.02	< 0.0005	0.029	0.0070	
	07/22/09	0.087	0.004	0.0310	0.022	< 0.0005	< 0.0002	0.0008	0.39	0.03	< 0.0005	0.017	0.0055	
	01/20/10	0.100	0.006	0.0270	0.043	< 0.0005	< 0.0002	0.0011	0.41	< 0.02	< 0.0050	0.031	0.0063	
	02/06/10	0.038	0.006	0.0130	0.021	< 0.0005	< 0.0002	0.0005	0.18	< 0.02	< 0.0050	0.014	< 0.0050	
	04/22/10	0.088	0.013		0.012	< 0.0005			0.13	< 0.02				
	10/17/10	0.071	0.006	0.0057	0.009	< 0.0005	< 0.0002	< 0.0005	0.18	< 0.02	< 0.0005	0.012	0.0058	
	12/20/10	0.084	0.004	0.0310	0.050	< 0.0005	< 0.0002	0.0008	0.34	< 0.02	< 0.0005	0.040	0.0069	
	12/22/10	0.009	0.002		0.006	< 0.0005			0.04	< 0.02				
	03/21/11	0.048	0.002	0.0170	0.017	< 0.0005	< 0.0002	0.0006	0.19	< 0.02	< 0.0005	0.026	0.0150	
	09/11/11	0.220	< 0.002	0.1200	0.130	< 0.0005	0.0003	0.0038	0.92	< 0.02	< 0.0025	0.140	0.0110	
	10/03/11	0.092	0.005	0.0510	0.049	< 0.0005	< 0.0002	0.0011	0.30	< 0.02	< 0.0005	0.050	< 0.0100	
	03/17/12	0.060	0.004	0.0140	0.019	0.0006	< 0.0002	0.0007	0.22	0.03	< 0.0005	0.018	0.0064	
	07/23/12	0.082	0.008	0.0240	0.030	< 0.0005	< 0.0002	0.0008	0.26	< 0.02	< 0.0005	0.028	< 0.0050	
	07/31/12	0.033	0.008	0.0250	0.018	< 0.0005	< 0.0002	0.0006	0.11	< 0.02	< 0.0005	0.026	< 0.0050	
	08/12/12	0.025	0.009	0.0033	0.004	< 0.0005	< 0.0002	< 0.0005	0.07	0.03	< 0.0005	0.007	< 0.0050	
	08/18/12	0.060	0.005	NA	0.045	< 0.0005	NA	NA	0.21	< 0.02	NA	NA	< 0.0050	
	08/30/12	0.062	0.006	NA	0.056	< 0.0005	NA	NA	0.27	< 0.02	NA	NA	< 0.0050	
	01/26/13	0.042	< 0.002	NA	0.023	< 0.0005	NA	NA	0.18	< 0.02	NA	NA	< 0.0050	
	07/19/13	0.137	0.002	0.0684	0.089	< 0.0005	< 0.0002	0.0027	0.56	0.01	< 0.0005	0.054	< 0.0050	
	08/18/13	0.098	0.011	0.0382	0.040	< 0.0005	< 0.0002	0.0012	0.33	0.01	< 0.0005	0.031	0.0036	
	08/25/13	0.084	0.005	NA	0.055	< 0.0010	NA	NA	0.30	0.00	NA	NA	0.0137	
	11/21/13	0.079	0.002	0.0309	0.031	< 0.0005	< 0.0002	0.0014	0.29	0.01	< 0.0005	0.025	0.0030	
	08/04/14													
	08/20/14	Samples not Taken due to Las Vegas Channel Improvements, Sloan Channel to Bonanza Road and Flamingo Wash below Nellis Boulevard Improvement Project												
	09/08/14													
	01/11/15	0.043	0.022	0.0060	0.007	< 0.0005	0.0014	0.0009	0.11	0.05	< 0.0005	0.011	0.0030	
	01/30/15	0.031	0.014	NA	0.007	< 0.0005	NA	NA	0.10	0.05	NA	NA	< 0.0050	
	03/02/15	0.043	0.018	0.0060	0.007	< 0.0005	< 0.0002	< 0.0005	0.10	0.06	< 0.0005	0.008	0.0030	
	07/06/15	0.106	0.021	0.0070	0.029	0.0020	0.0011	< 0.0005	0.61	0.09	< 0.0005	0.015	0.0020	
	10/05/15	0.017	0.017	NA	0.004	0.0030	0.0015	NA	0.02	0.04	NA	NA	< 0.0050	
	04/09/16	0.029	0.017	0.0040	0.013	< 0.0005	< 0.0002	0.0009	0.06	< 0.001	< 0.0005	0.009	< 0.0050	
	04/28/16	0.033	0.010	NA	0.023	< 0.0005	< 0.0002	NA	0.13	0.05	NA	NA	< 0.0050	
	05/06/16	0.027	0.016	NA	0.012	< 0.0005	< 0.0002	NA	0.09	0.04	NA	NA	0.0030	
	08/04/16	0.033	0.028	0.0015	< 0.001	< 0.0005	0.0002	< 0.0005	0.04	0.01	< 0.0005	0.004	0.0011	
	08/23/16	0.005	0.004	0.0034	0.002	< 0.0005	< 0.0002	0.0015	0.04	0.03	< 0.0005	0.024	0.0026	
	12/22/16	0.051	0.022	0.0041	0.006	0.0005	< 0.0002	0.0005	0.11	0.11	< 0.0005	0.006	0.0012	
	01/20/17	0.023	0.009		0.009	0.0005			0.10	0.05			0.0015	
	02/18/17	0.012	0.007		0.004	< 0.0005			0.04	0.03			0.0041	
	07/17/17	0.026	0.013	NA	0.006	< 0.0005	< 0.0002	NA	0.13	0.02	NA	NA	0.0039	
	07/25/17	0.011	0.008	0.0199	0.001	< 0.0005	< 0.0003	< 0.00100	0.01	0.00	< 0.0010	0.023	0.0024	
	01/09/18	0.031	0.007	0.0058	0.015	0.0010	< 0.0002	< 0.00107	0.17	0.05	< 0.0010	0.014	0.0021	
	07/15/18	0.032	0.013	0.0050	0.008	0.0025	< 0.0002	< 0.00100	0.11	0.07	< 0.0005	0.0075	0.0018	
	01/14/19	0.037	0.007	0.0174	0.014	< 0.0005	< 0.0002	< 0.00100	0.14	0.04	< 0.0010	0.0194	0.0012	
	02/14/19	0.035	0.005	0.0118	0.014	0.0007	< 0.0002	< 0.00100	0.14	0.01	< 0.0010	0.0194	< 0.0010	
	11/20/19	0.088	0.009	0.0190	0.025	< 0.0020	< 0.0003	< 0.00200	0.37	0.07	< 0.0020	0.0540	< 0.0100	< 0.0100
	11/28/19	0.016	0.005	0.0031	0.007	< 0.0010	< 0.0003	< 0.00100	0.12	0.02	< 0.00100	0.0052	0.0013	< 0.0010
	03/11/20	0.035	0.006	0.0096	0.008	< 0.0005	< 0.0002	< 0.00100	0.12	0.02	< 0.00050	0.0120	< 0.0010	< 0.0005
	07/25/21	0.048	0.005	0.0278	0.034	< 0.0005	< 0.0003	0.00152	0.22	0.02	0.00148	0.0319	< 0.0020	< 0.0013
	07/25/22	0.039	0.006	0.0117	0.015	< 0.0012	< 0.0003	< 0.00125	0.16	0.10	< 0.00120	0.0159	< 0.0025	< 0.0025
	08/11/22	0.032	0.004	0.0102	0.024	< 0.0012	0.0051	< 0.00125	0.16	0.03	< 0.00120	0.0126	< 0.0012	< 0.0012
	06/16/23	0.038	0.006	0.0116	0.012	< 0.0010	< 0.0003	< 0.00100	0.24	0.05	< 0.00100	0.0101	< 0.0010	< 0.0010
	09/01/23	0.043	0.003	0.0242	0.028	< 0.0010	< 0.0003	< 0.00100	0.29	0.01	< 0.00100	0.0176	0.0011	< 0.0010
	Median	**0.043**	**0.008**	**0.0145**	**0.023**	**< 0.0005**	**< 0.0002**	**< 0.0010**	**0.20**	**< 0.0246**	**< 0.0005**	**0.0192**	**< 0.0050**	**< 0.0010**
	Maximum	**0.690**	**0.110**	**15.000**	**0.180**	**< 0.1000**	**0.0051**	**0.0069**	**4.60**	**0.40**	**< 0.0050**	**0.1400**	**< 0.0500**	**< 0.0025**
	Minimum	**0.005**	**< 0.002**	**< 0.0001**	**< 0.0005**	**< 0.0005**	**< 0.00016**	**< 0.0005**	**0.01**	**< 0.001**	**< 0.0005**	**0.0038**	**< 0.0010**	**< 0.0005**

Location	Date	Arsenic mg/L	Boron mg/L	Total Alkalinity as CaCO3 mg/L	Aluminum mg/L	Antimony mg/L	Barium mg/L	Beryllium mg/L	Bicarbonate Alkalinity as HCO3 mg/L	Bromide mg/L	Bromate mg/L	CO2 Free Calculated mg/L	Carbonate mg/L	Calcium mg/L	Chlorate mg/L	Chloride mg/L	Chlorite mg/L
Las Vegas Wash @ The Club at Sunrise (Formerly known as Desert Rose Golf Course) (USGS)	04/02/97		0.52														
	07/28/97		0.57														
	02/04/98		0.37	F													
	02/24/98		0.21														
	04/24/99		0.55														
	04/30/99		0.36														
	02/21/00		0.25														
	10/23/00		0.57														
	02/26/01		0.24														
	11/24/01		0.70														
	09/11/02	0.006	0.41	118	2.7	0.006	0.11	< 0.001	114	0.32	< 0.005	22.9	0.12	200	0.270	160	< 0.05
	02/12/03	0.034	< 0.05	106	3.1	0.005	0.41	< 0.001	129	0.11	< 0.005	5.2	0.42	89	0.031	43	< 0.04
	02/25/03	0.006	0.22														
	07/19/03		0.33	138	6.2	0.005	0.19	< 0.001	168	0.29	< 0.005	13.4	0.27	200	0.220	150	< 0.10
	02/21/04	0.005	0.24	105	2.5	0.003	0.08	< 0.001	128	0.07	< 0.005	8.2	0.27	120	0.170	80	< 0.04
	11/09/04	0.008	0.11	69	< 5.0	< 0.001	0.32	0.001	85	0.05	< 0.005	33.7	0.03	280	0.075	18	< 0.01
	01/04/05	< 0.020	0.10	55	< 2.5	< 0.100	0.41	< 0.010	67	0.03	< 0.005	1.7	0.35	410	0.035	13	< 0.01
	07/24/05	0.010	0.16	74	< 2.5	0.003	0.45	< 0.001	91	0.06	< 0.005	3.7	0.24	370	0.069	23	0.06
	10/05/06	0.006	0.12	87	7.9	0.002	0.17			0.06	< 0.005			170	0.116	21	< 0.01
	01/05/08	0.008	0.27	69	8.1	0.005	0.18	< 0.001	84	0.10	< 0.005	3.5	< 2.00	300	0.199	62	< 0.01
	08/07/08	0.023	0.57	153	24.8	0.004	0.69	0.001	187	0.27	< 0.005	12.0	< 2.00	510	0.567	140	< 0.01
	11/26/08	0.019	0.62	155	< 2.0	0.005	0.42	< 0.001	189	0.24	< 0.005	3.9	< 2.00	370	0.077	140	< 0.01
	12/17/08	0.004	0.10	141	2.4	0.002	0.12	< 0.001	172	0.05	< 0.005	11.0	< 2.00	150	0.115	23	< 0.01
	02/07/09	< 0.020	0.34	94	20.5	0.003	0.44	< 0.001	115	0.15	< 0.005	4.7	< 2.00	390	0.024	63	0.02
	07/22/09	0.018	0.46	150	15.7	0.005	0.45	< 0.002	183	0.23	< 0.005	12.0	< 2.00	420	0.370	130	< 0.05
	01/20/10	0.014	0.24	98	13.0	0.003	0.44	< 0.001	120	0.12	< 0.005	3.5	< 2.00	330	< 0.020	48	< 0.01
	02/06/10	0.007	0.11	92	7.6	0.002	0.21	< 0.001	112	0.05	< 0.005	2.3	< 2.00	150	0.019	15	< 0.01
	04/22/10																
	10/17/10	0.006	0.43	140	2.2	0.016	0.10	< 0.001	180	0.20	< 0.005	14.0	< 2.00	150	0.260	130	< 0.02
	12/20/10	0.016	0.37	130	2.9	< 0.001	0.37	< 0.001	160	0.24	< 0.005	3.5	< 2.00	370	0.280	200	< 0.01
	12/22/10																
	03/21/11	0.014	0.84	180	8.1	0.006	0.22	< 0.001	220	0.53	< 0.005	12.0	< 2.00	350	0.280	240	< 0.01
	09/11/11	0.046	0.44	100	56.0	< 0.005	1.80	0.003	130	0.15	< 0.005	7.2	< 2.00	1,400	< 0.010	70	< 0.01
	10/03/11	0.018	0.27	99	28.0	0.002	0.60	0.001	120	0.11	< 0.005	6.6	< 2.00	470	0.050	45	< 0.01
	03/17/12	0.010	0.41	140	7.0	0.004	0.18	< 0.001	170	0.27	< 0.005	< 2.0	< 2.00	190	< 0.020	100	0.01
	07/23/12	0.018	0.27	94	18.0	0.002	0.34	< 0.001	110	0.12	< 0.005	< 2.0	< 2.00	360	0.550	94	< 0.01
	07/31/12	0.015	0.19	190	15.0	< 0.001	0.23	< 0.001	230	0.09	< 0.005	< 2.0	< 2.00	260	0.110	30	< 0.01
	08/12/12	0.006	0.28	82	0.9	0.004	0.08	< 0.001	100	0.17	< 0.005	< 2.0		79	0.083	56	< 0.01
	08/18/12	NA	0.23	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	08/30/12	NA	0.29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	01/26/13	NA	0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/19/13	0.030	0.34	110	43.1	0.003	0.90	0.003	134	< 0.01	< 0.100	NA	< 10.00	886	< 0.100	54	< 0.10
	08/18/13	0.019	0.26	305	25.5	0.004	0.50	0.001	372	< 0.01	< 0.100	NA	< 10.00	425	< 0.100	34	< 0.10
	08/25/13	NA	0.21	NA	NA	NA	NA	NA	NA	< 0.01	NA	NA	NA	NA	NA	NA	NA
	11/21/13	0.012	0.18	155	17.7	0.005	0.36	0.001	189	< 0.01	< 0.005	NA	< 10.00	326	0.050	266	< 0.10
	08/04/14	Samples not Taken due to Las Vegas Channel Improvements, Sloan Channel to Bonanza Road and Flamingo Wash below Nellis Boulevard Improvement Project															
	08/20/14																
	09/08/14																
	01/11/15	0.003	0.28	65	3.2	0.004	0.08	< 0.001	79	< 0.01	< 0.005	NA	< 2.00	82	< 0.010	45	< 0.01
	01/30/15	NA	0.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	03/02/15	0.004	0.21	123	2.0	0.003	0.07	< 0.001	150	0.06	< 0.005	NA	< 2.00	69	< 0.010	41	< 0.01
	07/06/15	0.004	0.17	203	1.9	0.008	0.25	< 0.001	248	< 0.01	< 0.005	NA	< 2.00	145	< 0.010	38	< 0.01
	10/05/15	NA	0.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	04/09/16	0.003	0.09	198	1.6	0.005	0.13	< 0.0010	242	< 0.01	< 0.005		< 2.00	226	< 0.010	7	< 0.01
	04/28/16	NA	0.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	05/06/16	NA	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	08/04/16	0.001	0.11	60	0.011	0.002	0.08	< 0.0010	73	< 0.01	< 0.005	NA	< 2.00	NA	< 0.010	20	< 0.01
	08/23/16	0.010	0.12	65	0.3	0.005	0.21	< 0.0010	79	< 0.01	NA	NA	< 2.00	NA	NA	36	NA
	12/22/16	0.003	0.14	75	0.7	0.003	0.06	< 0.001	92	0.03	NA	NA	< 2.00	NA	NA	25	NA
	01/20/17		0.10														
	02/18/17		0.34														
	07/17/17	NA	0.21	125	NA	NA	NA	NA	153	NA	NA		< 5.00	NA	NA	NA	NA
	07/25/17	0.0086	0.09	75	0.07	0.0019	0.14	< 0.0010	92	0.03	~		< 2.00	~	~	26	~
	01/09/18	0.0047	0.16	90	1.11	0.0047	0.09	< 0.0010	110	0.02	~		< 5.00	~	~	17	~
	07/15/18	0.0025	0.18	85	0.48	0.0058	0.08	< 0.0010	104	0.03	NA	NA	< 2.00	NA	NA	21	NA
	01/14/19	0.0037	0.13	62	7.58	0.0036	0.12	< 0.0010	76	0.13	NA	NA	< 5.00	NA	NA	13	NA
	02/14/19	0.0033	0.09	78	4.55	0.0036	0.17	< 0.0010	95	< 0.01	NA	NA	< 5.00	NA	NA	< 10	NA
	11/20/19	0.0080	0.17	84	2.71	0.0040	0.25	< 0.0020	84	< 0.05	NA	NA	< 5.00	NA	NA	24	NA
	11/28/19	0.0036	< 0.05	60	2.70	0.0024	0.08	< 0.0010	60	< 0.05	NA	NA	< 5.00	NA	NA	6	NA
	03/11/20	0.0041	0.02	51	5.52	0.0043	0.10	< 0.0010	51	0.02	NA	NA	< 5.00	NA	NA	6	NA
	07/25/21	0.0094	0.20	960	5.18	0.0020	0.51	< 0.0020	960	0.05	NA	NA	< 5.00	NA	NA	20	NA
	07/25/22	0.0071	0.18	102	10.10	0.0041	0.47	< 0.0012	102	0.07	NA	NA	< 5.00	NA	NA	28	NA
	08/11/22	0.0041	0.09	130	12.80	0.0036	0.34	< 0.0012	130	0.03	NA	NA	< 5.00	NA	NA	10	NA
	06/16/23	0.0058	0.11	204	5.47	0.0044	0.15	< 0.0010	204	0.03	NA	NA	< 5.00	NA	NA	13	NA
	09/01/23	0.0081	0.10	228	14.10	0.0036	0.27	< 0.0010	228	< 0.05	NA	NA	< 5.00	NA	NA	9	NA
	Median	**0.0078**	**0.212**	**102**	**5.09**	**0.0039**	**0.215**	**< 0.0010**	**124**	**0.052**	**< 0.005**	**4.93**	**< 2.000**	**290**	**0.077**	**34.8**	**< 0.01**
	Maximum	**0.0460**	**0.8400**	**960**	**56.0**	**0.1000**	**1.800**	**< 0.0100**	**960.0**	**0.530**	**< 0.10**	**33.7**	**< 10.00**	**1,400**	**0.57**	**266**	**< 0.10**
	Minimum	**0.0014**	**< 0.0200**	**51.0**	**0.0113**	**< 0.0010**	**0.058**	**< 0.0010**	**51.0**	**< 0.005**	**< 0.005**	**1.68**	**< 0.028**	**69.400**	**< 0.010**	**5.86**	**< 0.01**

Location	Date	Diuron mg/L	Diquat mg/L	Paraquat mg/L	Endothall mg/L	Fluoride mg/L	Glyphosate mg/L	Hardness as CaCo3 mg/L	Hydroxide as OH mg/L	Iron mg/L	Langelier Index None	Magnesium mg/L	Manganese mg/L	Potassium mg/L	Reactive Silica mg/L
Las Vegas Wash @ The Club at Sunrise (Formerly known as Desert Rose Golf Course) (USGS)	04/02/97														
	07/28/97														
	02/04/98														
	02/24/98														
	04/24/99														
	04/30/99														
	02/21/00														
	10/23/00														
	02/26/01														
	11/24/01														
	09/11/02				< 0.020	0.810	0.020		0.002	4	0.11	71	0.14	18.0	20
	02/12/03		< 0.0004	< 0.002	< 0.005	0.550	0.010	839	0.009	2	0.32	30	0.79	9.6	11
	02/25/03														
	07/19/03				< 0.020	0.620	0.014	775	0.004	7	0.48	67	0.23	15.0	
	02/21/04					0.530		481	0.005	3	0.25	44	0.08	12.0	14
	11/09/04					0.260	< 0.006	1,060	0.001	57	-0.29	87	0.49	23.0	
	01/04/05	< 0.0010	< 0.0004	< 0.002	< 0.005	0.220	< 0.006	1,440	0.010	24	0.89	100	0.58	11.0	160
	07/24/05	0.0087	< 0.0004	< 0.002	< 0.020	0.260	0.010	1,310	0.007	17	0.68	96	0.43	11.0	10
	10/05/06						0.007	610		9		44	0.22	7.6	12
	01/05/08					0.076	0.008	1,100	13.000	13	0.60	82	0.22	14.0	9
	08/07/08	0.0011	< 0.0040	< 0.002	< 0.020	0.480	0.020	2,060	< 2.000	34	0.90	190	1.00	28.0	18
	11/26/08	< 0.0010	< 0.0040	< 0.002	< 0.020	0.530	0.029	1,500	< 2.000	19	1.30	140	0.55	33.0	14
	12/17/08	< 0.0010	< 0.0040	< 0.002	< 0.020	0.230	0.008	552	< 2.000	9	0.40	43	0.16	7.2	5
	02/07/09	< 0.0080	< 0.0040	< 0.002	< 0.020	0.470	0.062	1,430	< 2.000	23	0.80	110	0.73	19.0	12
	07/22/09	< 0.0040	< 0.0016	< 0.008	< 0.020	0.540	0.075	1,600	< 2.000	20	0.83	140	0.51	27.0	15
	01/20/10	< 0.0010	< 0.0004	< 0.002	< 0.020	0.260	0.018	1,100	< 2.000	10	0.88	79	0.53	13.0	88
	02/06/10	< 0.0010	< 0.0004	< 0.002	< 0.005	0.180	< 0.006	570	< 2.000	8	0.69	44	0.23	6.3	81
	04/22/10														
	10/17/10	< 0.0010	< 0.0004	< 0.002	< 0.009	0.390	0.240	690	< 2.000	3	0.31	77	0.12	18.0	30
	12/20/10	< 0.0010	< 0.0004	< 0.002	< 0.009	0.280	< 0.006	1,500	< 2.000	30	1.20	140	0.95	24.0	110
	12/22/10														
	03/21/11	< 0.0020	< 0.0004	< 0.002	< 0.005	0.490	0.011	1,700	< 2.000	11	0.93	200	0.41	35.0	29
	09/11/11	< 0.0010	< 0.0004	< 0.002	< 0.020	0.330	0.024	5,600	< 2.000	100	1.30	490	2.40	46.0	150
	10/03/11	< 0.0010	< 0.0004	< 0.002	< 0.020	0.220	0.008	1,900	< 2.000	30	0.78	170	0.79	20.0	120
	03/17/12	< 0.0010	< 0.0004	< 0.002	< 0.020	0.410	0.070	890	< 2.000	9	0.45	100	0.38	23.0	75
	07/23/12					0.320	0.055	1,200	< 2.000	22	0.73	82	0.58	21.0	99
	07/31/12					0.280	< 0.006	970	< 2.000	20	1.10	75	0.40	15.0	150
	08/12/12					0.270	0.014	390	< 2.000	1	-0.24	47	0.08	12.0	13
	08/18/12					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	08/30/12					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	01/26/13					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/19/13					< 0.100	NA	2,793	< 2.000	41	NA	141	2.06	34.7	119
	08/18/13					0.130	NA	1,530	< 2.000	23	NA	114	0.66	18.3	108
	08/25/13					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/21/13					0.410	NA	1,155	< 2.000	17	NA	83	0.60	13.3	87
	08/04/14	Samples not Taken due to Las Vegas Channel Improvements, Sloan Channel to Bonanza Road and Flamingo Wash below Nellis Boulevard Improvement Project													
	08/20/14														
	09/08/14														
	01/11/15					0.420	NA	362	< 2.000	4	NA	38	0.10	15.6	22
	01/30/15					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	03/02/15					< 0.100	NA	320	< 2.000	2	NA	36	0	10	21
	07/06/15					0.340	NA	500	< 2.000	2	NA	34	0.27	66.5	12
	10/05/15					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	04/09/16					0.220		707	< 2.000	1	NA	35	0.23	4.8	6
	04/28/16					NA		NA	NA	NA	NA	NA	NA	NA	NA
	05/06/16					NA	N	NA	NA	NA	NA	NA	NA	NA	NA
	08/04/16					0.186	NA	101	< 2.000	0.305	NA	6	0.03	NA	NA
	08/23/16					0.315	NA	1,410	< 2.000	0.764	NA	44	0.53	NA	NA
	12/22/16					0.699	NA	243	< 2.000	0.689	NA	18	0.10	NA	NA
	01/20/17														
	02/18/17														
	07/17/17					NA	~	NA	< 5.000	NA	~	NA	NA	NA	NA
	07/25/17					0.136	~	653	< 2.000	0.02	~	18.5	0.21	~	~
	01/09/18					0.458	~	438	< 5.000	1.47	~	28.7	0.20	~	~
	07/15/18					0.362	NA	231	< 2.000	0.76	NA	16.2	0.06	NA	NA
	01/14/19					0.201	NA	392	< 5.000	6.68	NA	27.4	0.19	NA	NA
	02/14/19					0.162	NA	344	< 5.000	5.70	NA	25	0.14	NA	NA
	11/20/19					1.080	NA	622	< 5.000	3.01	NA	37.1	0.32	NA	NA
	11/28/19					< 0.100	NA	295	< 5.000	1.91	NA	19.2	0.09	NA	NA
	03/11/20					0.324	NA	203	< 5.000	0.71	NA	13.3	0.10	NA	NA
	07/25/21					0.464	NA	1,600	< 5.000	29.30	NA	100	0.50	NA	NA
	07/25/22					0.406	NA	629	< 5.000	9.24	NA	43.1	0.17	NA	NA
	08/11/22					0.178	NA	606	< 5.000	11.60	NA	41.1	0.19	NA	NA
	06/16/23					0.265	NA	390	< 5.000	5.14	NA	26.8	0.15	NA	NA
	09/01/23					< 0.100	NA	715	< 5.000	12.30	NA	45.7	0.31	NA	NA
	Median	**< 0.001**	**< 0.0004**	**< 0.0020**	**< 0.0200**	**0.315**	**0.0125**	**715**	**< 2.000**	**8.55**	**0.71**	**46**	**0.250**	**16.80**	**22**
	Maximum	**< 0.009**	**< 0.004**	**< 0.008**	**< 0.020**	**1.080**	**0.240**	**5,600**	**13.00**	**100.0**	**1.30**	**490**	**2.400**	**66.5**	**160**
	Minimum	**< 0.001**	**< 0.0004**	**< 0.002**	**< 0.005**	**0.076**	**< 0.006**	**101**	**0.001**	**0.018**	**-0.290**	**6.2**	**0.030**	**4.8**	**5**

Location	Date	Sodium mg/L	Sulfate mg/L	Thallium mg/L	Organic Carbon mg/L	Cyanide mg/L	BOD mg/L	COD mg/L	Color ACU	Turbidity NTU	Phenol mg/L	Petroleum Hydrocarbons	TPH (diesel) MPN/100 mL	TPH (gasoline) MPN/100 mL	Total Chlorine mg/L
Las Vegas Wash @ The Club at Sunrise (Formerly known as Desert Rose Golf Course) (USGS)	04/02/97					0.015	77	290	150	230	0.010	4			
	07/28/97					0.007	35	240	180	220	< 0.010	< 1			< 0.10
	02/04/98					< 0.005	74	260	25	1,660	0.013				
	02/24/98					< 0.005	10	90	10	1,050	< 0.010	< 1			
	04/24/99														
	04/30/99														
	02/21/00														
	10/23/00														
	02/26/01														
	11/24/01														
	09/11/02	130	460	< 0.0010	116										
	02/12/03	43	230	< 0.0010	36										
	02/25/03														
	07/19/03	98	420	< 0.0010	66										
	02/21/04	64	280	< 0.0100											
	11/09/04	20	180	< 0.0010											
	01/04/05	15	130	< 0.0010	6										
	07/24/05	29	140	< 0.0010	34										
	10/05/06	23	110	< 0.0010	21										
	01/05/08	55	220	< 0.0010	55										
	08/07/08	120	660	< 0.0010	68										
	11/26/08	120	440	< 0.0010	54										
	12/17/08	439	97	< 0.0010	28										
	02/07/09	1,020	300	< 0.0010	26										
	07/22/09	110	530	< 0.0020	99										
	01/20/10	49	270	< 0.0010	28										
	02/06/10	16	64	< 0.0010	16										
	04/22/10														
	10/17/10	100	490	< 0.0010	66					28					
	12/20/10	150	580	< 0.0010	18					1,200					
	12/22/10									760					
	03/21/11	220	1,300	< 0.0010	38					210					
	09/11/11	75	500	< 0.0050	54					5,200					
	10/03/11	48	350	< 0.0010	29					1,100					
	03/17/12	95	520	< 0.0010	68					560	< 0.005				
	07/23/12	64	380	< 0.0010						700					
	07/31/12	34	150	< 0.0010						780					
	08/12/12	58	290	< 0.0010						43					
	08/18/12	NA	NA	NA			25			2,300					
	08/30/12	NA	NA	NA			18			2,600					
	01/26/13	NA	NA	NA			30			860					
	07/19/13	46	323	0.0012	47	< 0.050	36	189		193	0.810				
	08/18/13	38	162	< 0.0010	47	< 0.050	40	990		790	0.360				
	08/25/13	NA	NA	NA			< 2	566		368	NA				
	11/21/13	31	395	< 0.0010	46	< 0.050	47	160		746	0.360				
	08/04/14	Samples not Taken due to Las Vegas Channel Improvements, Sloan Channel to Bonanza Road and Flamingo Wash below Nellis Boulevard Improvement Project													
	08/20/14														
	09/08/14														
	01/11/15	39	185	< 0.0010	32	< 0.050	41	98		136	0.250				
	01/30/15	NA	NA	NA	NA	NA	22	76		147					
	03/02/15	116	167	< 0.0010	24	< 0.050	16	146		198	0.120				
	07/06/15	70	114	< 0.0010	37	< 0.050	41	275		340	0.460				
	10/05/15	NA	NA	NA	NA	NA	26	306		485	NA				
	04/09/16	11	44	< 0.0010	16	< 0.050	58	127		1,152	0.440				
	04/28/16	NA	NA	NA	NA	NA	263	243		939	NA				
	05/06/16	NA	NA	NA	NA	NA	17	232		628	NA				
	08/04/16	11	63	< 0.0010	41	< 0.050	179	103		340	0.170				
	08/23/16	30	173	< 0.0010	45	< 0.050	< 2	73		401	0.121				
	12/22/16	20	103	< 0.0010	51	< 0.050	75	522		292	0.358				
	01/20/17						15	< 39		164					
	02/18/17						29	< 39		271					
	07/17/17	NA	NA	NA	NA		42.3	130		355.0					
	07/25/17	27	111	< 0.001	131	< 0.050	23.8	< 39		2,190.0	0.38				
	01/09/18	18	55	< 0.001	64	< 0.050	44.5	269		326.0	0.13				
	07/15/18	22	76	< 0.001	39	< 0.050	< 2	95.9		160.0	0.13				
	01/14/19	11	39	< 0.001	44	< 0.010	93.0	178.0		328.0	0.07				
	02/14/19	11	21	< 0.001	15	< 0.005	< 2	45.0		278.0	0.13				
	11/20/19	21.3	72	< 0.001	64	< 0.005	54.8	282.0		495.0	0.44				
	11/28/19	6.5	20	< 0.001	15	< 0.010	5.7	98.6		62.9	0.12				
	03/11/20	6.8	19	< 0.001	16	< 0.005	25.5	76.1		169.0	0.75				
	07/25/21	23.5	99	< 0.001	56	< 0.050	35.7	102.0		1,060	< 0.05				
	07/25/22	26.2	113	< 0.001	59	< 0.050	52.8	202.0		526	0.08				
	08/11/22	9.2	40	< 0.001	22	< 0.050	27.8	256.0		666	1.29				
	06/16/23	12.9	48	< 0.001	103	< 0.050	34.7	231.0		353	0.12				
	09/01/23	9.7	42	< 0.001	19	< 0.050	< 20.0	251.0		731	3.54				
	Median	**36.1**	**165**	**< 0.001**	**41**	**< 0.050**	**32.35**	**178**	**87.5**	**443.0**	**0.13**	**< 1**			**< 0.1**
	Maximum	**1,020**	**1,300**	**< 0.010**	**131**	**< 0.050**	**263**	**990**	**180**	**5,200**	**3.540**	**4**			**< 0.1**
	Minimum	**6.5**	**19**	**< 0.001**	**6.42**	**< 0.005**	**< 2.0**	**< 38.6**	**10**	**28**	**< 0.005**	**< 1**			**< 0.1**

Location	Date	Fecal Coliform MPN/100 mL	Fecal* Coliform MPN/100 mL	Fecal** Coliform MPN/100 mL	Fecal Strep. MPN/100 mL	Fecal* Strep. MPN/100 mL	Fecal** Strep. MPN/100 mL	*E. Coli* MPN/100mL	Salmonella MPN/100 mL	VOC # of detects		Pesticides # of detects		SOC # of detects		Herbicides # of detects	
Las Vegas Wash @ The Club at Sunrise (Formerly known as Desert Rose Golf Course) (USGS)	04/02/97	7,500			90,000				< 2.0			1				4	
	07/28/97	1,600,000			1,600,000				< 2.2								
	02/04/98	8,000			28,000				< 2.2			2				1	
	02/24/98	2,400			8,000				< 2.2			1				1	
	04/24/99									1	a	0				1	hh
	04/30/99									2	a,ff	0				1	hh
	02/21/00									1	a					0	
	10/23/00											0				0	
	02/26/01	2,200			220,000					1	a	0				0	
	11/24/01									1	a	0				0	
	09/11/02	300,000			500,000												
	02/12/03	500,000			22,000					1	a	0		4	g,j,o,x	0	
	02/25/03	30,000			30,000					0		0					
	07/19/03									1		0		0		0	
	02/21/04	1,600			33,000					1	a	0		0		0	
	11/09/04	16,000			5,000					0							
	01/04/05	500			28,000					3	d,dd,ee	0		2	g,k	0	
	07/24/05	1,600,000			170,000					2	a,k	0		0		2	hh,uu
	10/05/06	300,000			50,000					14		1	c,m,ii,jj,kk,ll	0		1	
	01/05/08	3,000			28,000					14		0		1		0	
	08/07/08									7		2		1		1	
	11/26/08	130			900					5		0		2		2	
	12/17/08	14,000			90,000					6		0		7		1	
	02/07/09	17,000			9,000					10		2		2		1	
	07/22/09	160,000,000			700,000					0		1		1		0	
	01/20/10	28,000			8,000					6		0		2		0	
	02/06/10	70,000			90,000					6		0		1		0	
	04/22/10	> 16,000			30,000					0		0		0		0	
	10/17/10	16,000,000			600,000					11	a,b,pp,qq,rr,ss,	1	gg	3	h,j,o	1	ccc
	12/20/10				50,000					5	d,ee,qq,vv,bbb	0		0		0	
	12/22/10	300,000			< 16,000												
	03/21/11	< 16,000			170					5	a, d, vv, qq, bbb	1	gg	1	o		
	09/11/11	2,100,000			900,000					7	a,b,qq,pp,tt,vv,zz	1	gg	0		0	
	10/03/11	330,000			70,000					10	a,b,e,pp,qq,vv,aaa,bbb	0		0		0	
	03/17/12	50,000			3,300,000					11	a,b,d,ff,gg,ss,vv,zz,aaa,bbb,ggg	0		0		0	
	07/23/12	2,200,000			230,000					6	b, ff, pp, qq, vv, bbb	2	gg, zz	1	x	1	lll
	07/31/12	790,000			NA					10	a, b, ff, qq, ss, vv, bbb, ggg, hhh, iii	1	gg	1	j	0	
	08/12/12	1,700,000			NA					8	a, b, ff, pp, qq, ss, vv, bbb	1	gg	2	h, j	0	
	08/18/12	130,000			540,000					NA		NA		NA		NA	
	08/30/12	1,700,000			35,000					NA		NA		NA		NA	
	01/26/13	17,000			260,000					NA		NA		NA		NA	
	07/19/13	> 241,960			72,700					9	a, b, qq, vv, ddd, nnn, ooo, ppp, qqq	2	gg, zz	5	h,j,o,x, aaaa	1	mmm
	08/18/13	> 241,960			2,160					7	a, b, qq, vv, hhh, yyy, bbbb	2	gg, zz	2	h, aaaa	1	mmm
	08/25/13	> 241,960			200					NA		NA		NA		NA	
	11/21/13	5,040			24,066					9	a, b, pp, qq, vv, bbb, ggg, hhh, iii,	5	gg, zz, ttt, uuu, vvv	6	h, j, o, x, www, aaaa	3	hh, rrr, xxx
	08/04/14	Samples not Taken due to Las Vegas Channel Improvements, Sloan Channel to Bonanza Road and Flamingo Wash below Nellis Boulevard Improvement Project															
	08/20/14																
	09/08/14																
	01/11/15	3,830			6,270					8	a, b, bbb, qq, vv, qqq, yyy, eeee	2	gg, dddd	6	h, i, j, o, www, aaaa	1	hh
	01/30/15	2,210			6,510					0		0		0		0	
	03/02/15	860			20,140					7	a, b, qq, ss, vv, bbb, iii	2	gg, dddd	6	h, j, n, o, x, www	3	hh, rrr, cccc
	07/06/15	> 241,960			92,080					4	a,b,qq,vv	1	gg	4	ssss, www, h,zz	1	hh
	10/05/15	120,330			113,700												
	04/09/16	123,400			16,160					6	a, b, zzz, qq, ss, bbb			2	o, h	1	hh
	04/28/16	92,080			6,630												
	05/06/16	298,700			8,200					6		2		2		1	
	08/04/16	198,630			15,531					2		0		1		1	
	08/23/16	1,299,700			30,000					3		0		1		1	
	12/22/16	59,600			29,800					1		0		2		2	
	01/20/17	241,960			< 1												
	02/18/17	23,600			530												
	07/17/17	> 2,419,600			12,030					NA		NA		NA		NA	
	07/25/17	1,080			5,200					2	~	0	~	2	~	1	~
	01/09/18	7,710			2,590					2	~	0	~	5	~	0	~
	07/15/18	> 241,960			23,820					2		0		3		0	
	01/14/19	5,120			> 2,420					1		0		3		1	
	02/14/19	2,420			5,910					2		0		4		0	
	11/20/19	24,196			19,863					1		1		4		1	
	11/28/19	> 2,420			> 2,420					1		1		1		1	
	03/11/20	5,475			10,462					2		1		0		1	
	07/25/21	> 48,392			48,392					2		0		2		2	
	07/25/22	> 24,196			375					0		0		2		0	
	08/11/22	58,100			15,200					2		0		0		0	
	06/16/23	435,200			6,100			172,000		0		0		3		1	
	09/01/23	> 241,960			23,820			32,600		1		0		0		0	
	Median	**58,850**			**23,820**			**102,300**	**< 2.2**	**2**		**0**		**2**		**1**	
	Maximum	**160,000,000**			**3,300,000**			**172,000**	**< 2.2**	**14**		**5**		**7**		**4**	
	Minimum	**130**			**< 1**			**32,600**	**< 2.0**	**0**		**0**		**0**		**0**	

Location	Date	Q cfs	Temp Deg. C	Oil & Grease mg/L	TSS mg/L	TDS mg/L	Specific Conductance umho/cm	Lab pH units	Surfactants (MBAS) mg/L	Ortho-Phosphate mg/L	Total Phosphorous mg/L	NO3-N mg/L	NO-2 mg/L	NH3-N mg/L
	02/12/03	560			11,100	1,160	1,650	7.50	< 0.05	3.00	4.30	5.0	0.520	
	12/28/04			< 5.0	1,970	1,120	1,560	7.60	0.05	0.49	2.30	4.7	0.490	
	02/11/05			< 5.0	1,360	910	1,290	7.60	0.09	0.67	0.67	4.6	< 0.050	
	10/25/05				2,480	590				0.58	2.40		1.900	
	10/14/06				3,600	1,250	1,720	7.30	< 0.05	0.13	1.30	3.4	0.620	
	04/16/07				78	1,730	2,460	8.30	< 0.05	0.15	0.15	14.0	< 1.000	
	07/24/07			1.7	178	1,420	1,930	7.40	0.62	0.13	0.13	8.4	< 0.500	
	08/01/07			< 5.0	74	1,430	1,900	8.00	< 0.05	0.14	0.14	12.0	< 1.000	
	08/27/07			2.9	3,140	732	1,030	7.50	0.11	1.40	2.20	2.8	< 0.500	
	09/22/07			2.1	1,440	574	838	7.60	< 0.05	1.30	1.90	2.9	< 0.200	
	01/27/08			< 5.0	98	1,620	2,260	7.50	< 0.05	0.26	0.26	45.0	< 0.001	
	08/07/08			1.4	6,540	2,560	2,820	7.50	0.04	2.60	2.60	7.4	< 0.500	
	11/26/08			4.9	1,020	1,150	1,720	7.40	0.16	0.47	0.77	7.6	< 0.500	
	02/07/09			1.9	206	1,050	1,450	7.60	0.09	0.39	0.42	6.7	< 0.100	
	01/20/10			5.3	540	910	1,400	7.30	< 0.05	0.59	0.59	8.8	< 0.130	
	01/27/10			< 5.0	430	1,400	2,000	7.00	0.12	0.30	0.31	12.0	< 0.130	
	02/06/10			< 4.8	240	1,500	2,100	7.10	0.09	0.27	0.39	13.0	< 0.130	
	02/22/10			< 4.8	120	1,500				0.06	0.20	13.0		
	12/20/10			< 5.0	180	1,100	1,800	7.10	0.16	0.12	0.27	11.0	< 0.050	
	12/22/10			< 5.0	4,000	460		7.80	0.76	1.60	1.90	1.8		0.06
	07/03/11			< 5.0	3,800	2,200	2,600	7.40	< 0.05	0.14	2.70	4.2	1.500	
	09/13/11			< 5.0	630	1,000	1,400	7.60	0.07	0.08	0.84	3.7	< 0.250	
	10/03/11			< 5.0	420	1,200	1,800	7.60	0.13	0.10	0.52	8.0	< 0.250	
	07/16/12			< 4.9	150	980	1,400	7.40	0.09	0.09	0.57	7.6	< 0.250	
	07/31/12			5.2	150	1,400	NA	8.10	0.48	0.09	0.24	11.0	< 0.250	
	08/22/12			< 4.8	2,800	1,200	1,600	7.70	< 0.05	0.10	3.40	2.6	< 0.250	
	09/11/12			< 4.9	12,000	1,000	1,300	7.70	0.26	0.10	1.80	3.4	< 0.250	
	10/11/12			< 4.9	1,200	1,200	NA	7.60	< 0.05	0.05	1.20	8.9	< 0.130	
	01/26/13			5.1	370	1,300	NA	7.90	0.12	0.46	0.50	9.2	< 0.130	
	07/19/13			5.1	2,585	1,175	1,723	7.45	0.26	< 0.01	1.10	3.0	< 0.100	0.37
	08/18/13			5.1	153	1,330	1,784	8.01	< 0.20	0.10	0.51	7.0	< 0.100	< 0.10
Lake Las Vegas & Rainbow Gardens *LLV Ends 2009-2010 RG Starts 2010-2012	08/25/13			5.1	1,003	NA	NA	7.81	NA	0.11	0.74	6.6	< 0.100	< 0.10
	11/21/13			< 5.0	860	695	1,158	7.51	0.68	0.12	0.61	3.6	< 0.100	0.70
	08/04/14			5.7	548	1,140	1,766	7.97	0.14	0.10	0.55	10.8	< 0.100	< 0.10
	08/20/14			< 5.0	260	1,125	1,610	7.98	< 0.10	0.08	0.73	8.5	< 0.100	< 0.10
	09/08/14			6.7	850	915	1,375	7.13	0.30	0.08	1.20	7.4	< 0.100	< 0.10
	01/11/15			< 5.0	295	1,345	NA	7.84	0.18	0.37	0.48	9.9	< 0.100	0.27
	01/30/15			< 5.0	110	1,270	NA	7.90	< 0.10	0.06	0.09	10.8	< 0.100	< 0.10
	03/02/15			< 5.0	120	1,290	NA	7.80	0.11	0.07	0.07	11.0	< 0.100	0.14
	07/06/15			10.0	365	1,100	1,686	7.14	< 0.10	0.06	0.38	7.8	< 0.100	< 0.10
	10/05/15			< 5.0	725	1,260	NA	6.90	0.40	0.11	0.99	4.8	< 0.100	0.45
	01/31/16			< 5.0	45	1,260	2,010	7.86	0.32	0.09	0.48	10.3	< 0.100	0.28
	04/09/16			< 5.0	175	1,390		7.41	0.10	0.04	0.36	10.5	< 0.100	< 0.10
	04/28/16													
	08/04/16			5.0	155	980		7.66	0.26	0.24	0.36	9.4	< 0.100	0.12
	08/23/16			< 5.0	525	955		7.51	0.14	N/A	N/A	6.7	< 0.100	0.25
	12/22/16			< 5.0	92	1,090		7.73	0.24	0.12	0.20	10.3	< 0.100	0.15
	01/20/17			< 5.0	166	1,100		8.48	0.26	0.14	0.31	9.5	< 0.100	0.12
	02/18/17			9.7	492	270		7.33	0.57	0.15	0.60	1.2	< 0.100	0.28
	07/17/17			5.3	< 5.0	1,380	NA	7.56	0.23	0.10	0.16	7.4	< 0.1	< 0.10
	08/04/17			2.2	21	1,240	~	7.80	0.21	0.11	0.13	< 0.1	< 0.1	< 0.10
	01/09/18			< 5.0	775	1,020	~	7.70	< 0.069	0.15	0.97	7.2	< 0.1	0.74
	07/15/18			< 5.0	145	1,100	NA	7.57	< 0.10	< 0.05	0.28	8.65	< 0.100	0.19
	02/14/19			5.4	1,180	475	NA	7.23	0.10	0.08	0.79	2.38	< 0.100	0.60
	11/20/19			< 5.0	105	995	NA	7.35	0.55	0.24	0.77	5.79	< 0.100	0.55
	11/28/19			< 5.0	120	790	NA	7.33	0.19	0.26	0.40	5.32	< 0.100	0.80
	03/11/20			< 5.0	92	605	NA	7.49	0.37	0.23	0.31	4.47	< 0.100	0.17
	07/26/21		NA	< 5.0	2,600	1,020	NA	7.08	0.07	0.20	1.98	6.20	< 0.100	1.01
	07/25/22		NA	5.7	125	1,400	NA	7.91	0.29	< 0.05	0.35	9.78	< 0.100	0.33
	08/12/22		NA	6.8	786	690	NA	7.52	0.63	0.30	2.22	4.97	< 0.100	1.06
	06/16/23		25.3	< 5.0	268	940	NA	6.90	0.88	< 0.05	0.77	6.26	0.408	1.10
	09/01/23		27.1	7.6	680	335	NA	8.03	0.28	1.23	1.56	2.89	0.240	0.52
	Median	**560**	**26.2**	< **5.0**	**420**	**1,123**	**1,720**	**7.57**	**0.125**	**0.130**	**0.58**	**7.39**	< **0.100**	**0.19**
	Maximum	**560**	**27.1**	**10**	**12,000**	**2,560**	**2,820**	**8.48**	**0.88**	**3.0**	**4.30**	**45.0**	**1.900**	**1.10**
	Minimum	**560**	**25.3**	**1.4**	< **5**	**270**	**838**	**6.90**	< **0.035**	< **0.010**	**0.074**	< **0.10**	< **0.001**	**0.06**

Location	Date	TKN mg/L	Total Nitrogen mg/L	Copper mg/L	Dissolved Copper mg/L	Chromium mg/L	Lead mg/L	Dissolved Lead mg/L	Mercury mg/L	Cadmium mg/L	Zinc mg/L	Dissolved Zinc mg/L
Lake Las Vegas & Rainbow Gardens *LLV Ends 2009-2010 RG Starts 2010-2012	02/12/03	9.6	15.14	0.082		0.0430	0.0920		< 0.0002	< 0.00250	0.35	
	12/28/04	5.5	10.60	< 0.010	< 0.010	0.0330	0.0500	< 0.0200	< 0.0002	< 0.00500	0.27	< 0.020
	02/11/05	2.3	6.90	0.041	< 0.010	0.0230	0.0310	< 0.0200	< 0.0002	0.61000	0.17	< 0.020
	10/25/05			0.056	0.014	0.0570		0.1090			0.21	0.109
	10/14/06	2.3		0.120	0.007	0.0700	0.1300	0.0005	< 0.0002	0.00120	0.45	< 0.005
	04/16/07	1.0		0.150	0.011	2.5000	0.0016	< 0.0005	< 0.0002	< 0.00050	0.09	0.030
	07/24/07	1.4		0.026	0.015	0.0031	0.0041	< 0.0005	< 0.0002	< 0.00050	0.08	0.025
	08/01/07	1.1		0.023	0.022	0.0025	0.0031	0.0029	< 0.0002	< 0.00050	0.06	0.054
	08/27/07	5.0		0.006	0.008	0.0240	< 0.0005	< 0.0005	< 0.0002	< 0.00050	0.17	< 0.005
	09/22/07	4.3		0.051	0.011	0.0280	0.0160	< 0.0005	< 0.0002	< 0.01000	0.17	< 0.005
	01/27/08	1.8		0.003	0.006	0.0027	0.0016	< 0.0005	< 0.0002	< 0.00050	0.05	0.027
	08/07/08	6.5		0.027	0.008	0.0140	0.0180	< 0.0005	< 0.0002	< 0.00100	0.12	< 0.005
	11/26/08	5.6		0.034	0.011	0.0067	0.0100	< 0.0005	< 0.0002	< 0.00050	0.05	0.037
	02/07/09	2.0		0.022	0.005	0.0047	0.0120	< 0.0005	< 0.0002	< 0.00052	0.21	< 0.020
	01/20/10	2.0	10.93	0.036	0.011	0.0081	0.0140	< 0.0005	< 0.0002	< 0.00050	0.11	< 0.020
	01/27/10	2.1	14.23	0.021	0.008	0.0083	0.0068	< 0.0005	< 0.0002	< 0.00050	0.07	< 0.020
	02/06/10	1.4	14.53	0.018	0.008	0.0051	0.0035	< 0.0005	< 0.0002	< 0.00050	0.06	0.024
	02/22/10	1.6	14.60	0.013	0.007	NA	0.0017	< 0.0005	NA	NA	0.06	0.030
	12/20/10	1.2	12.25	0.011	0.005	0.0038	0.0040	< 0.0005	< 0.0002	< 0.00050	0.04	< 0.020
	12/22/10	2.4	4.20	0.031	0.002	NA	0.0230	< 0.0005	NA	NA	0.12	< 0.020
	07/03/11	6.2	11.90	0.047	0.004	0.0330	0.0470	< 0.0005	< 0.0002	0.00006	0.17	< 0.020
	09/13/11	3.5	7.45	0.100	0.015	0.0190	0.0210	< 0.0005	< 0.0002	< 0.00050	0.12	< 0.020
	10/03/11	2.4	10.65	0.032	0.011	0.0092	0.0078	< 0.0005	< 0.0002	< 0.00050	0.08	< 0.020
	07/16/12	1.7	9.55	0.010	0.006	0.0033	0.0028	< 0.0005	< 0.0002	< 0.00050	0.03	< 0.020
	07/31/12	0.9	12.17	0.011	0.008	NA	0.0022	< 0.0005	NA	NA	0.04	< 0.020
	08/22/12	4.9		0.032	0.006	0.0250	0.0350	< 0.0005	< 0.0002	< 0.00050	0.10	0.026
	09/11/12	2.6		0.170	< 0.002	0.1100	0.1400	< 0.0005	< 0.0002	0.00240	0.62	< 0.020
	10/11/12	2.9		0.034	0.005	NA	0.0180	< 0.0005	NA	NA	0.14	< 0.020
	01/26/13	1.6		0.013	0.004	NA	0.0047	< 0.0005	NA	NA	0.07	< 0.020
	07/19/13	24.5	27.62	0.218	0.013	0.0542	0.0553	< 0.0005	< 0.0002	0.00176	0.43	0.013
	08/18/13	3.5	10.57	0.034	0.021	0.0041	0.0027	< 0.0005	< 0.0002	< 0.00100	0.05	0.016
	08/25/13	3.5	10.21	0.052	0.013	NA	0.0162	< 0.0010	NA	NA	0.15	0.012
	11/21/13	< 1.0	4.69	0.069	0.014	0.0207	0.0249	< 0.0005	< 0.0002	< 0.00100	0.17	0.013
	08/04/14	< 1.0	11.90	0.048	0.012	0.0137	0.0122	< 0.0005	< 0.0002	< 0.00100	0.12	0.016
	08/20/14	< 1.0	9.56	0.043	0.015	0.0085	0.0082	< 0.0005	< 0.0002	< 0.00100	0.07	0.012
	09/08/14	1.3	8.76	0.051	0.010	0.0173	0.0143	< 0.0005	< 0.0002	< 0.00100	0.13	0.012
	01/11/15	0.7	10.67	0.020	0.018	NA	0.0030	< 0.0005	NA	NA	0.06	0.050
	01/30/15	0.5	NA	0.014	0.009	NA	0.0020	< 0.0005	NA	NA	0.05	0.047
	03/02/15	1.2	NA	0.023	0.016	NA	0.0023	< 0.0005	NA	NA	0.06	0.051
	07/06/15	< 0.2	< 0.2	0.030	0.016	0.0020	0.0110	< 0.0005	0.0019	< 0.00050	0.20	0.066
	10/05/15	5.3	NA	0.019	0.016	NA	0.0150	0.0010	< 0.0002	NA	0.06	0.023
	01/31/16	1.5	1.19	0.021	0.019	0.0010	< 0.0005	< 0.0005	< 0.0002	< 0.00100	0.05	0.046
	04/09/16	1.3		0.001	0.011		0.0200	< 0.0005	< 0.0002		0.04	0.040
	04/28/16											
	08/04/16	1.9	1.82	0.032	0.033	0.0019	< 0.0005	< 0.0005	< 0.0001	< 0.00050	0.05	0.017
	08/23/16	2.2	1.97	0.022	0.013	0.0050	0.0104	< 0.0005	< 0.0002	0.00060	0.04	0.035
	12/22/16	1.5	1.38	0.025	0.021	0.0020	0.0021	< 0.0010	< 0.0002	< 0.00050	0.05	0.032
	01/20/17	1.1		0.013	0.010		0.0029	0.0005			0.04	0.033
	02/18/17	< 1.0		0.013	0.006		0.0080	< 0.0005			0.05	0.041
	07/17/17	< 1.0	< 0.10	0.029	0.022	NA	< 0.0005	< 0.0005	< 0.0003	NA	0.05	0.030
	08/04/17	1.13	1.13	0.014	0.014	0.0044	0.0010	< 0.0005	< 0.0003	< 0.00100	0.03	0.024
	01/09/18	1.49	0.75	0.020	0.006	0.0048	0.1510	0.0020	< 0.0002	< 0.00100	0.11	0.060
	07/15/18	1.68	1.49	0.008	0.004	0.0032	0.0044	0.0008	< 0.0002	< 0.00100	0.04	0.049
	02/14/19	2.39	1.79	0.027	< 0.001	0.0177	0.0199	< 0.0005	< 0.0002	0.00142	0.10	0.023
	11/20/19	4.00	3.45	0.025	0.012	0.0090	0.0070	0.0020	< 0.0003	< 0.00200	0.10	0.100
	11/28/19	2.50	1.70	0.008	0.007	0.0013	0.0026	< 0.0010	< 0.0003	< 0.0010	0.05	0.049
	03/11/20	1.57	1.40	0.023	0.003	0.0076	0.0044	0.0005	< 0.0002	< 0.0010	0.05	0.044
	07/26/21	6.79	5.78	0.037	< 0.001	0.0200	0.0467	< 0.0010	< 0.0003	< 0.0013	0.18	0.042
	07/25/22	2.89	2.56	0.006	0.002	0.0030	0.0066	< 0.0012	< 0.0003	< 0.0012	0.05	0.031
	08/12/22	9.32	8.26	0.029	0.003	0.0095	0.0203	< 0.0012	0.0008	< 0.0012	0.16	0.056
	06/16/23	5.75	4.65	0.019	< 0.001	0.0064	0.0072	< 0.0010	< 0.0003	< 0.0010	0.14	< 0.050
	09/01/23	3.66	3.02	0.027	0.005	0.0161	0.0163	< 0.0010	< 0.0003	< 0.0010	0.17	0.028
	Median	**2.00**	**7.45**	**0.0260**	**0.010**	**0.0085**	**0.0081**	< **0.0005**	< **0.0002**	< **0.0010**	**0.08**	**0.0239**
	Maximum	**24.5**	**27.62**	**0.2180**	**0.033**	**2.500**	**0.151**	**0.1090**	**0.0019**	**0.6100**	**0.62**	**0.109**
	Minimum	< **0.20**	< **0.10**	**0.0013**	< **0.001**	**0.001**	< **0.0005**	< **0.0005**	< **0.0001**	< **0.0001**	**0.029**	< **0.005**

Location	Date	Silver mg/L	Nickel mg/L	Selenium mg/L	Dissolved Selenium mg/L	Arsenic mg/L	Boron mg/L	Alkalinity In CaCo3 mg/L	Aluminum mg/L	Antimony mg/L	Barium mg/L	Beryllium mg/L	Bicarbonate Alkalinity as HCO3 mg/L	Bromide mg/L	Bromate mg/L
Lake Las Vegas & Rainbow Gardens *LLV Ends 2009-2010 RG Starts 2010-2012	02/12/03	< 0.0025	0.0600					122	< 2.50	< 0.005	0.82	< 0.0050	149		
	12/28/04	< 0.0005	0.0560	< 0.1500		0.032	0.510	87	31.00	0.001	0.68	0.0016	106	0.15	< 0.005
	02/11/05	< 0.0005	0.0350	< 0.0100		0.017	0.330	93	15.00	0.001	0.34	< 0.0010	113	0.13	< 0.005
	10/25/05														
	10/14/06	1.0000	0.0940	< 0.0050		0.049	0.370	65	59.00	< 0.001	0.93	0.0033	79	0.09	< 0.005
	04/16/07	< 0.0005	0.0093	< 0.0050		0.009	0.700	132	0.14		0.05	< 0.0010	160	0.29	< 0.005
	07/24/07	< 0.0005	0.0100	< 0.0050		0.013	0.560	120	1.20	0.003	0.09	0.0002	150	0.18	< 0.005
	08/01/07	< 0.0005	0.0100	< 0.0050		0.009	0.580	127	0.97	< 0.001	0.08	< 0.0010	150	0.24	< 0.005
	08/27/07	< 0.0005	< 0.0050	< 0.0050		0.023	0.360	100	< 0.02	0.003	0.31	< 0.0010	120	0.07	< 0.005
	09/22/07	< 0.0100	0.0160	< 0.0010		0.017	0.260	110	12.70	< 0.020	0.22	< 0.0020	130	0.08	< 0.005
	01/27/08	< 0.0005	< 0.0050	< 0.0054		0.010	0.750	117	1.33	< 0.001	0.05	< 0.0020	140	0.26	< 0.005
	08/07/08	< 0.0005	0.0280	0.0110		0.039	0.480	257	8.84	< 0.002	0.27	< 0.0020	313	0.22	< 0.005
	11/26/08	< 0.0005	0.0150	0.0070		0.014	0.480	135	3.90	0.003	0.11	< 0.0010	165	0.19	< 0.005
	02/07/09	< 0.0005	0.0110	< 0.0050		0.015	0.410	87	2.30	0.002	0.11	< 0.0010	106	0.15	< 0.005
	01/20/10	< 0.0005	0.0140	< 0.0050		0.088	0.320	97	7.00	< 0.001	0.28	< 0.0010	120	0.14	< 0.005
	01/27/10	< 0.0005	0.0130	0.0058		0.013	0.490	120	4.60	0.003	0.15	< 0.0010	150	0.24	< 0.005
	02/06/10	< 0.0005	0.0100	< 0.0050		0.011	0.530	120	2.70	0.001	0.11	< 0.0010	120	0.23	< 0.005
	02/22/10	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/20/10	< 0.0005	0.0084	< 0.0050		0.007	0.430	130	3.50	< 0.001	0.75	< 0.0010	150	0.16	< 0.005
	12/22/10	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/03/11	< 0.0005	0.0440	< 0.0250		0.057	0.640	130	51.00	< 0.001	0.52	0.0011	150	0.20	< 0.005
	09/13/11	< 0.0005	0.0230	< 0.0050		0.020	0.410	91	13.00	0.002	0.25	< 0.0010	110	0.12	< 0.005
	10/03/11	< 0.0005	0.0140	< 0.0050		0.011	0.440	110	5.00	0.002	0.13	< 0.0010	130	0.17	< 0.005
	07/16/12	< 0.0005	0.0080	< 0.0050		0.009	0.360	120	2.30	< 0.001	0.09	< 0.0010	140	0.15	< 0.005
	07/31/12	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	08/22/12	< 0.0005	0.0380	0.0056		0.039	0.390	80	19.00	0.001	0.38	< 0.0010	98	0.10	< 0.005
	09/11/12	0.0019	0.1400	0.0075		0.099	0.380	80	69.00	< 0.001	1.60	0.0034	98	0.10	< 0.005
	10/11/12	NA	NA	< 0.0050		NA	0.460	NA	NA	NA	NA	NA	NA	NA	NA
	01/26/13	NA	NA	< 0.0050		NA	0.490	NA	NA	NA	NA	NA	NA	NA	NA
	07/19/13	< 0.0005	0.0450	< 0.0100		0.041	0.491	148	33.10	0.003	0.60	0.003	180	4.07	< 0.100
	08/18/13	< 0.0005	0.0051	0.0026		0.008	0.462	130	2.66	0.001	0.09	< 0.0010	159	< 0.10	< 0.100
	08/25/13	NA	NA	0.0077		NA	0.444	NA	NA	NA	NA	NA	NA	NA	NA
	11/21/13	< 0.0005	0.0192	0.0034		0.017	0.265	115	13.00	0.003	0.28	< 0.0010	140	< 0.01	< 0.005
	08/04/14	< 0.0005	0.0163	< 0.0010		0.012	0.413	127	9.57	0.002	0.18	< 0.0010	155	< 0.01	< 0.005
	08/20/14	< 0.0005	0.0096	0.0018		0.009	0.319	185	7.81	0.001	0.21	< 0.0010	226	< 0.01	< 0.005
	09/08/14	< 0.0005	0.0149	0.0022		0.012	0.251	346	11.60	0.003	0.18	< 0.0010	346	< 0.01	< 0.005
	01/11/15	NA	NA	0.0050		NA	0.277	NA	NA	NA	NA	NA	NA	NA	NA
	01/30/15	NA	NA	0.0040		NA	0.530	NA	NA	NA	NA	NA	NA	NA	NA
	03/02/15	NA	NA	< 0.0050		NA	0.474	NA	NA	NA	NA	NA	NA	NA	NA
	07/06/15	< 0.0005	0.0100	0.0020		0.009	0.350	213	1.08	0.003	0.15	< 0.0010	260	0.14	< 0.005
	10/05/15	NA	NA	0.0020		NA	0.560	NA	NA	NA	NA	NA	NA	NA	NA
	01/31/16	< 0.0005	0.0080	0.0030		0.005	0.190	138	2.12	0.001	0.60	< 0.0010	168	0.13	< 0.005
	04/09/16			< 0.0050			0.500								
	04/28/16														
	08/04/16	< 0.0005	0.0076	0.0029		0.005	0.347	115	0.01	0.002	0.08	< 0.0010	140	< 0.01	< 0.005
	08/23/16	< 0.0005	0.0014	0.0025		0.008	0.516	95	1.62	0.001	0.10	< 0.0010	116	< 0.01	
	12/22/16	< 0.0005	0.0067	0.0042		0.008	0.394	115	0.34	0.002	0.05	< 0.0010	140	0.13	
	01/20/17			0.0042			0.372								
	02/18/17			< 0.0010			0.052								
	07/17/17	NA	NA	0.0040		NA	0.420	130	NA	NA	NA	NA	159	NA	NA
	08/04/17	< 0.0010	0.0072	0.0040		0.009	< 0.500	130	0.19	0.001	0.06	< 0.001	159	< 0.001	~
	01/09/18	< 0.0010	0.0176	0.0030		0.031	0.398	110	1.78	0.003	0.16	< 0.001	134	< 0.20	~
	07/15/18	< 0.0005	0.0084	0.0042		0.007	0.444	110	0.45	< 0.001	0.07	< 0.0010	134	0.06	NA
	02/14/19	< 0.0010	0.0308	< 0.0010		0.011	0.267	81	8.88	0.001	0.22	< 0.0010	99	0.02	NA
	11/20/19	< 0.0020	0.0350	< 0.0100	< 0.0100	0.011	0.362	100	1.51	0.003	0.11	< 0.0020	100	0.11	NA
	11/28/19	< 0.0010	0.0052	0.00302	0.0027	0.007	0.303	98	1.69	0.002	0.04	< 0.0010	98	0.08	NA
	03/11/20	< 0.0005	0.0114	0.00185	0.0018	0.006	0.242	88	5.02	0.004	0.10	< 0.0010	88	0.14	NA
	07/26/21	< 0.0013	0.0234	< 0.00200	0.0019	0.017	0.411	420	3.78	< 0.001	0.52	< 0.0020	420	0.05	NA
	07/25/22	< 0.0012	0.0105	0.00308	0.0021	0.007	0.434	136	1.75	< 0.001	0.10	< 0.0012	136	0.17	NA
	08/12/22	< 0.0012	0.0140	< 0.0025	< 0.0020	0.007	0.258	94	13.10	0.003	0.24	< 0.0012	94	0.08	NA
	06/16/23	< 0.0010	0.0081	0.0025	0.0019	0.010	0.388	164	3.11	0.003	0.12	< 0.0010	164	0.12	NA
	09/01/23	< 0.0010	0.0128	0.0019	0.0016	0.009	0.213	256	9.86	0.003	0.19	< 0.0010	256	0.05	NA
	Median	**< 0.0005**	**0.0129**	**< 0.0050**	**0.0019**	**0.011**	**0.411**	**120**	**3.64**	**< 0.002**	**0.169**	**< 0.0010**	**140**	**0.130**	**< 0.005**
	Maximum	**1.0000**	**0.1400**	**< 0.1500**	**0.0027**	**0.099**	**0.750**	**420**	**69**	**0.020**	**1.600**	**< 0.0050**	**420**	**4.07**	**< 0.100**
	Minimum	**< 0.0005**	**0.0014**	**< 0.0010**	**0.0016**	**0.0048**	**0.052**	**65**	**0.0096**	**< 0.001**	**0.044**	**< 0.0002**	**79.0**	**< 0.001**	**< 0.005**

Location	Date	CO2 Free Calculated mg/L	Carbonate mg/L	Calcium mg/L	Chlorate mg/L	Chloride mg/L	Chlorite mg/L	Diuron mg/L	Diquat mg/L	Paraquat mg/L	Endothall mg/L	Fluoride mg/L
Lake Las Vegas & Rainbow Gardens *LLV Ends 2009-2010 RG Starts 2010-2012	02/12/03	9.42	0.31	120		160						0.64
	12/28/04	5.33	0.27	480	0.07	140	< 0.010	0.005	< 0.0040	< 0.002	< 0.020	0.58
	02/11/05	5.68	0.29	240	0.08	120	< 0.040	0.003	< 0.0040	< 0.002	< 0.020	0.55
	10/25/05											
	10/14/06	6.50	< 2.00	510	0.05	97	< 0.010				< 0.020	0.42
	04/16/07	< 2.00	2.10	150	0.39	350	< 0.010				< 0.020	1.00
	07/24/07	9.80	< 2.00	180	0.15	230	< 0.020	0.007			< 0.020	0.80
	08/01/07	2.50	< 2.00	140	0.28	280	< 0.010	0.003			< 0.020	0.86
	08/27/07	6.20	< 2.00	450	0.06	66	< 0.010	0.161			< 0.020	0.39
	09/22/07	5.40	< 2.00	230	0.06	68	0.012				< 0.020	0.39
	01/27/08	7.30	< 2.00	160	0.11	251	0.117				< 0.020	0.79
	08/07/08	16.00	< 2.00	660	0.06	290	< 0.010	0.003	< 0.0040	< 0.002	< 0.020	0.58
	11/26/08	11.00	< 2.00	180	0.14	190	< 0.010	0.002	< 0.0040	< 0.002	< 0.020	0.62
	02/07/09	4.40	< 2.00	260	0.14	67	< 0.010	0.007	< 0.0040	< 0.002	< 0.020	0.55
	01/20/10	2.80	< 2.00	120	0.18	180	< 0.010	0.001	< 0.0004	< 0.002	< 0.020	0.51
	01/27/10	2.80	< 2.00	170	0.28	240	< 0.010	< 0.001	< 0.0004	< 0.002	< 0.009	0.70
	02/06/10	< 2.00	< 2.00	150	0.39	260	< 0.010	< 0.001	< 0.0004	< 0.002	< 0.020	0.74
	02/22/10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/20/10	2.30	< 2.00	130	0.36	230	< 0.010	< 0.001	< 0.0004	< 0.002	< 0.005	0.64
	12/22/10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/03/11	10.00	< 2.00	650	0.06	230	< 0.010	< 0.001	< 0.0004	< 0.002	< 0.005	0.69
	09/13/11	4.70	< 2.00	220	0.09	130	< 0.010	< 0.001	< 0.0004	< 0.002	< 0.020	0.36
	10/03/11	6.20	< 2.00	170	0.24	190	< 0.010	< 0.001	< 0.0004	< 0.002	< 0.020	0.70
	07/16/12	< 2.00	< 2.00	130	0.30	170	< 0.010	NA	NA	NA	NA	0.32
	07/31/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	08/22/12	< 2.00	< 2.00	460	0.11	93	< 0.010	0.001	NA	NA	NA	0.34
	09/11/12	< 2.00	< 2.00	900	0.05	84	< 0.010	< 0.001	NA	NA	NA	0.35
	10/11/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	01/26/13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/19/13	NA	< 10.00	558	< 0.1	201	< 0.100	NA	NA	NA	NA	0.86
	08/18/13	NA	< 10.00	144	< 0.1	199	< 0.100	NA	NA	NA	NA	0.60
	08/25/13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/21/13	NA	< 10	225	< 0.01	173	< 0.0100	NA	NA	NA	NA	0.34
	08/04/14	NA	< 2	210	< 0.01	266	< 0.0050	NA	NA	NA	NA	0.36
	08/20/14	NA	< 2	149	< 0.01	181	< 0.0050	NA	NA	NA	NA	0.47
	09/08/14	NA	< 2	223	< 0.01	369	< 0.0050	NA	NA	NA	NA	0.42
	01/11/15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	01/30/15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	03/02/15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/06/15	NA	< 2.00	159	< 0.01	229	< 0.010	NA	NA	NA	NA	0.25
	10/05/15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	01/31/16	NA	< 2.00	116	0.09	266	< 0.010					0.82
	04/09/16											
	04/28/16											
	08/04/16		< 2.00		< 0.01	203	< 0.010					0.46
	08/23/16		< 2.00			181						0.45
	12/22/16		< 2.00			264						0.76
	01/20/17											
	02/18/17											
	07/17/17		< 5.00	NA	NA	NA	NA					NA
	08/04/17		< 5.00	~	~	215	~					< 0.10
	01/09/18		< 5.00	~	~	171	~					0.71
	07/15/18	NA	< 2.00	NA	NA	202	NA	NA	NA	NA	NA	0.46
	02/14/19	NA	< 5.00	NA	NA	59	NA	NA	NA	NA	NA	0.32
	11/20/19	NA	< 5.00	NA	NA	192	NA	NA	NA	NA	NA	0.87
	11/28/19	NA	< 5.00	NA	NA	125	NA	NA	NA	NA	NA	< 0.10
	03/11/20	NA	< 5.00	NA	NA	95	NA	NA	NA	NA	NA	0.52
	07/26/21	NA	< 5.00	NA	NA	152	NA	NA	NA	NA	NA	0.55
	07/25/22	NA	< 5.00	NA	NA	259	NA	NA	NA	NA	NA	0.63
	08/12/22	NA	< 5.00	NA	NA	98	NA	NA	NA	NA	NA	0.32
	06/16/23	NA	< 5.00	NA	NA	159	NA	NA	NA	NA	NA	0.99
	09/01/23	NA	< 5.00	NA	NA	56	NA	NA	NA	NA	NA	0.44
	Median	**5.330**	< **2.00**	**180**	< **0.09**	**186**	< **0.010**	< **0.0014**	< **0.0004**	< **0.002**	< **0.020**	**0.55**
	Maximum	**16.00**	< **10.00**	**900**	**0.390**	**369**	**0.117**	**0.161**	< **0.004**	< **0.002**	**0.020**	**1.00**
	Minimum	< **2.00**	**0.27**	**116**	**0.005**	**56**	< **0.005**	< **0.001**	< **0.0004**	< **0.002**	< **0.005**	< **0.100**

Location	Date	Glyphosate mg/L	Hardness as CaCO3 mg/L	Hydroxide as OH mg/L	Iron mg/L	Langelier Index 25 degree None	Magnesium mg/L	Manganese mg/L	Potassium mg/L	Reactive Silica mg/L	Sodium mg/L	Sulfate mg/L	Thallium mg/L	Organic Carbon mg/L
	02/12/03		1,980	0.005	56.00	0.95	33	2.80	14		75	490	< 0.005	
	12/28/04	< 0.006	1,600	0.007	26.00	0.84	120	1.30	26	150	120	520	< 0.001	29
	02/11/05	< 0.006	908	0.007	11.00	0.59	75	0.54	16	14	110	370	< 0.001	14
	10/25/05													
	10/14/06	< 0.006	1,600	< 2.000	16.00	0.50	71	2.60	22	130	82	700	< 0.001	14
	04/16/07	< 0.006	690	< 2.000	0.31	1.20	76	0.06	28	20	290	650	< 0.001	6
	07/24/07	0.009	730	< 2.000	0.67	0.40	68	0.22	26	17	190	540	< 0.001	12
	08/01/07	< 0.006	620	< 2.000	0.40	0.90	66	0.21	22	20	240	240	< 0.001	8
	08/27/07	0.013	1,400	< 2.000	11.00	0.80	64	0.93	19	9	64	320	< 0.001	31
	09/22/07	< 0.006	830	< 2.000	12.00	0.60	61	0.64	17	15	64	210	< 0.001	21
	01/27/08	< 0.006	720	< 2.000	0.67	0.40	79	0.15	25	23	210	650	< 0.001	12
	08/07/08	0.016	2,140	< 2.000	2.10	1.40	120	1.21	37	17	210	1,100	< 0.002	29
	11/26/08	0.026	738	< 2.000	6.90	0.40	70	0.66	26	15	160	440	< 0.001	38
	02/07/09	0.011	913	< 2.000	1.40	0.60	64	0.75	19	12	130	380	< 0.001	15
	01/20/10	< 0.006	510	< 2.000	7.70	0.56	49	0.41	19	77	150	320	< 0.001	9
	01/27/10	< 0.006	740	< 2.000	5.10	0.89	74	0.27	21	61	200	530	< 0.001	8
	02/06/10	< 0.006	650	< 2.000	2.60	1.00	68	0.18	22	41	220	510	< 0.001	7
	02/22/10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	12/20/10	< 0.006	560	< 2.000	3.40	0.91	56	0.15	21	37	190	410	< 0.001	8
	12/22/10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	07/03/11	< 0.006	2,200	< 2.000	45.00	0.94	140	1.30	45	88	170	1,100	< 0.001	24
	09/13/11	0.012	800	< 2.000	10.00	0.52	64		21	91	100	420	< 0.001	27
	10/03/11	< 0.006	630	< 2.000	4.90	0.46	65	0.29	20	59	160	440	< 0.001	15
	07/16/12	< 0.006	530	< 2.000	2.00	0.21	48	0.01	19	34	140	370	< 0.001	
	07/31/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	08/22/12	< 0.006	1,400	< 2.000	17.00	0.93	73	1.20	24	120	98	540	< 0.001	
	09/11/12	< 0.006	3,000	< 2.000	71.00	1.20	200	3.60	37	150	83	520	< 0.002	
	10/11/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	01/26/13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	07/19/13	NA	1,999	< 2.000	33.20	NA	147	1.68	45	106	172	497	0.004	21
	08/18/13	NA	616	< 2.000	2.35	NA	62	0.16	22	33	183	369	< 0.001	8
Lake Las Vegas & Rainbow Gardens *LLV Ends 2009-2010 RG Starts 2010-2012	08/25/13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/21/13	NA	564	< 2.000	12.40	NA	64	0.56	16	72	89	273	< 0.001	27
	08/04/14	NA	835	< 2.000	8.90	NA	75	0.44	34	67	143	395	< 0.001	11
	08/20/14	NA	612	< 2.000	6.48	NA	58	0.30	29	55	129	342	< 0.001	6
	09/08/14	NA	843	< 2.000	10.70	NA	69	0.52	30	79	120	729	< 0.001	14
	01/11/15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	01/30/15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	03/02/15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/06/15	NA	598	< 2.000	0.80	NA	49	0.42	32	15	293	420	< 0.001	14
	10/05/15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	01/31/16		459	< 2.000	0.09		41	0.05	31	16	303	299	< 0.001	6
	04/09/16													
	04/28/16													
	08/04/16		384	< 2.000	0.14		33	0.07			303	421	< 0.001	40
	08/23/16		616	< 2.000	0.74		36	0.28			94	466	< 0.001	68
	12/22/16		437	< 2.000	0.31		39	0.14			163	599	< 0.001	36
	01/20/17													
	02/18/17													
	07/17/17		NA	< 5.000	NA		NA	NA	NA	NA	NA	NA	NA	NA
	08/04/17		520	< 5.000	0.16		43	0.07	~	~	167	457	< 0.001	42
	01/09/18		675	< 5.000	1.66		52	1.36	~	~	172	417	< 0.001	52
	07/15/18	NA	441	< 2.000	0.56	NA	40	0.12	NA	NA	207	410	< 0.001	8.22
	02/14/19	NA	628	< 2.000	12.90	NA	48	0.33	NA	NA	74	165	< 0.001	11.10
	11/20/19	NA	534	< 5.000	1.41	NA	48	0.31	NA	NA	141	394	< 0.001	41.90
	11/28/19	NA	394	< 5.000	0.72	NA	35	0.09	NA	NA	119	273	< 0.001	13.30
	03/11/20	NA	323	< 5.000	0.58	NA	29	0.16	NA	NA	84	208	< 0.001	12.50
	07/26/21	NA	957	< 5.000	24.90	NA	73	0.98	NA	NA	120	334	< 0.001	16.90
	07/25/22	NA	514	< 5.000	1.32	NA	48	0.24	NA	NA	201	440	< 0.001	8.88
	08/12/22	NA	678	< 5.000	12.00	NA	49	0.51	NA	NA	81	233	< 0.001	17.40
	06/16/23	NA	539	< 5.000	2.95	NA	48	0.32	NA	NA	133	350	< 0.001	82.70
	09/01/23	NA	570	< 5.000	8.67	NA	38	0.29	NA	NA	53	156	< 0.001	15.70
	Median	**< 0.006**	**663**	**< 2.000**	**4.15**	**0.8**	**63**	**0.321**	**22**	**39**	**142**	**419**	**< 0.001**	**14.7**
	Maximum	**0.026**	**3,000**	**< 5.000**	**71.0**	**1.40**	**200**	**3.60**	**45**	**150**	**303**	**1,100**	**< 0.005**	**82.7**
	Minimum	**< 0.006**	**323**	**0.005**	**0.090**	**0.210**	**29.0**	**0.012**	**14**	**9**	**53**	**156**	**< 0.001**	**5.6**

Location	Date	Cyanide mg/L	BOD mg/L	COD mg/L	Color ACU	Turbidity NTU	Phenol mg/L	Petroleum Hydrocarbons	TPH (diesel) MPN/100 mL	TPH (gasoline) MPN/100 mL	Total Chlorine mg/L	Fecal Coliform MPN/100 mL	Fecal* Coliform MPN/100 mL
Lake Las Vegas & Rainbow Gardens *LLV Ends 2009-2010 RG Starts 2010-2012	02/12/03											1,600,000	
	12/28/04											7,000	
	02/11/05											50,000	
	10/25/05					2,140						220,000	
	10/14/06											220,000	
	04/16/07											23	
	07/24/07											> 1,600,000	
	08/01/07											5,000	
	08/27/07											900,000	
	09/22/07											1,600,000	
	01/27/08											11,000	
	08/07/08											24,000	
	11/26/08											900,000	
	02/07/09											22,000	
	01/20/10					320						170,000	
	01/27/10					200						3,000	
	02/06/10					48						2,200	
	02/22/10					61						2,000	
	12/20/10					100						NA	
	12/22/10											30,000	
	07/03/11					260						5,000,000	
	09/13/11					240						2,600,000	
	10/03/11					110						300,000	
	07/16/12					170						230,000	
	07/31/12		3			83						14,000	
	08/22/12					2,100						790,000	
	09/11/12					3,700						330,000	
	10/11/12		10			720						680,000	
	01/26/13		9			170						11,000	
	07/19/13	< 0.050	20	176		203	1.08					> 241,960	
	08/18/13	< 0.050	5	909		133	0.06					> 241,960	
	08/25/13	NA	4	804		906	NA					> 241,960	
	11/21/13	< 0.050	24	128		734	0.66					25,820	
	08/04/14	< 0.050	36	302		473	< 0.05					68,670	
	08/20/14	< 0.050	4	48		305	0.25					5,780	
	09/08/14	< 0.050	13	80		658	0.13					86,640	
	01/11/15	NA	26	67		183						2,130	
	01/30/15	NA	4	36		54						310	
	03/02/15	NA	< 2	34		112						2,420	
	07/06/15	< 0.050	13	42		324	0.3					173,250	
	10/05/15	NA	15	222		813	NA					209,800	
	01/31/16	< 0.050	< 2	51		25	< 0.05					81,640	
	04/09/16		< 2	72		111						155,300	
	04/28/16												
	08/04/16	< 0.050	< 2	26		157	0.089					241,960	
	08/23/16	< 0.050	< 2	89		730	0.113					980,400	
	12/22/16	< 0.050	63	108		80	0.392					40,000	
	01/20/17		9	64		308						196,630	
	02/18/17		77	184		152						20,870	
	07/17/17		27	39		3						~	
	08/04/17	< 0.050	< 2	55		10	0.101					32,550	
	01/09/18	< 0.050	42	184		512	0.101					12,500	
	07/15/18	< 0.050	< 2	19		137	0.184					> 241,960	
	02/14/19	< 0.005	9	28		605	0.128					2,099	
	11/20/19	< 0.005	44	161		190	0.283					> 24,196	
	11/28/19	< 0.010	56	62		47	0.497					> 2,420	
	03/11/20	< 0.005	< 50	48		52	0.522					19,863	
	07/26/21	< 0.050	13	232		1,000	0.05					> 48,392	
	07/25/22	< 0.050	16	40		45	0.262					> 24,196	
	08/12/22	< 0.050	19	186		564	< 0.05					648,800	
	06/16/23	< 0.050	80	182		202	0.208					2,419,600	
	09/01/23	< 0.050	< 20	174		581	2.24					198,630	
	Median	**< 0.050**	**13**	**76**		**200**	**0.18**					**81,640**	
	Maximum	**< 0.050**	**80**	**909**		**3,700**	**2.24**					**5,000,000**	
	Minimum	**< 0.005**	**< 2**	**19.3**		**3**	**< 0.05**					**23**	

Location	Date	Fecal** Coliform MPN/100 mL	Fecal Strep. MPN/100 mL	Fecal* Strep. MPN/100 mL	Fecal** Strep. MPN/100 mL	*E. Coli* MPN/100 mL	Salmonella MPN/100 mL	VOC # of detects	Pesticides # of detects	SOC # of detects	Herbicides # of detects
Lake Las Vegas & Rainbow Gardens *LLV Ends 2009-2010 RG Starts 2010-2012	02/12/03		300,000								
	12/28/04		17,000					4 x,o,d,ee	0	2 o,g	1 uu
	02/11/05		50,000					3 a,d,ee	1 oo	0	0
	10/25/05		5,000								
	10/14/06		50,000					12	0	0	1
	04/16/07		110					5	0	1	0
	07/24/07		500,000					9	0	2	2
	08/01/07		16,000					5	0	1	0
	08/27/07		110,000					4	0	0	4
	09/22/07		110,000					3	0	1	0
	01/27/08		17,000					7	0	1	0
	08/07/08		30,000					9	1	0	1
	11/26/08		160,000					10	2	2	1
	02/07/09		16,000					5	1	1	1
	01/20/10		9,000					5	1	0	1
	01/27/10		2,200					5	0	0	0
	02/06/10		1,100					11	1	0	0
	02/22/10		300					0	0	0	0
	12/20/10		5,000					8 d, e, cc, dd, ee, ddd, eee, fff	0	0	0
	12/22/10		50,000								
	07/03/11		30,000								
	09/13/11		16,000					4 d,ff,vv,bbb	1 gg	2 x,i	0
	10/03/11		> 1,600					7 d,e,dd,ee,qq,vv,bbb	0	1 x	0
	07/16/12		13,000					8 d, e, dd, ee, qq, vv, bbb, ddd	0	2 x, j	0
	07/31/12		16,000					NA	NA	NA	NA
	08/22/12		28,000					3 ff, qq, vv	0	1 x	1 kkk
	09/11/12		54,000					5 a, ff, qq, vv, jjj	0	0	0
	10/11/12		170					NA	NA	NA	NA
	01/26/13		22,000					NA	NA	NA	NA
	07/19/13		11,000					7 a, b,d,qq,vv,ddd, qqq	2 gg,zz	5 h,j,o,x, aaaa	0
	08/18/13		100					3 a,vv, yyy	2 gg,zz	3 j,x, aaaa	0
	08/25/13		100					NA	NA	NA	NA
	11/21/13		20,924					9 a,b,d,qq,vv,bbb,ggg,iii,zzz	3 gg,zz, uuu	5 h,j,o,x, aaaa	3 hh,rrr,xxx
	08/04/14		6,830					3 a, d, qq	2 gg, dddd	3 h, j, x	0
	08/20/14		1,080					3 a, d, vv	0	3 j, x, aaaa	0
	09/08/14		2,560					5 a, b, d, qq, vv	2 gg, dddd	2 x, aaaa	1 hh
	01/11/15		1,105					0	0	0	0
	01/30/15		310					0	0	0	0
	03/02/15		1,850					0	0	0	0
	07/06/15		11,780					4 qq, vv, b, a, d,	1 gg	3 zz, j, o	1 hh
	10/05/15		15,760					NA	NA	NA	NA
	01/31/16		14,670					2 qq, vv,	1 gg	3 o, j, zz	0
	04/09/16		1,460					2	2	4	0
	04/28/16										
	08/04/16		17,329					4	0	3	1
	08/23/16		41,400					4	0	1	2
	12/22/16		10,000					4	0	1	1
	01/20/17		< 1								
	02/18/17		83								
	07/17/17		~					NA	NA	NA	NA
	08/04/17		410					2 ~	0	3	0
	01/09/18		3,950					3 ~	0	2	0
	07/15/18		2,380					0	0	1	0
	02/14/19		3,873					1	0	0	0
	11/20/19		> 24,196					1	1	1	2
	11/28/19		> 2,420					1	1	0	2
	03/11/20		9,804					3	0	1	1
	07/26/21		48,392					1	0	1	0
	07/25/22		> 24,196					0	0	0	0
	08/12/22		21,600					3	0	0	0
	06/16/23		7,300			1,410,000		0	0	2	1
	09/01/23		13,330			130,000		1	0	0	0
	Median		**12,390**			**770,000**		**4**	**0**	**1**	**0**
	Maximum		**500,000**			**1,410,000**		**12**	**3**	**5**	**4**
	Minimum		**< 1**			**130,000**		**0**	**0**	**0**	**0**

Location	Date	Q cfs	Temp Deg. C	Oil & Grease mg/L	TSS mg/L	TDS mg/L	Specific Conductance umho/cm	Lab pH units	Surfactants (MBAS) mg/L	Ortho-Phosphate mg/L	Total Phosphorous mg/L
Western Tributary at Civic Center	08/30/92		26.3	4	92	1,110		7.2	2.67	< 0.05	0.29
	10/24/92		17.3	3	66	760		7.3	1.02	0.18	0.50
	02/08/93		12.0	3	950	300		7.9	0.24	0.26	0.55
	05/14/93	839	26.4	4	110	600		7.2	1.64	0.19	0.51
	08/04/93	211	26.0	3	840	980		7.6	1.13	0.06	0.88
	02/04/94	181	8.2	6	3,720	400	465	7.5	0.44	2.34	2.10
	03/25/94	353	12.9	10	2,800	520	2,530		0.73	0.75	1.40
	07/19/94		23.6	< 3	81	400	535	7.8	1.49	0.11	0.23
	08/09/94	4	29.5	< 3	5,550	370	525	7.9	0.35	0.18	0.87
	01/24/95	624	9.7	< 3	880	5,210	187	8.0	0.24	0.06	
	05/24/95		19.7	6	125	300	488	7.5	1.35	0.08	0.32
	08/12/95	583	27.5	4	450	690	633	7.2	1.50	0.09	0.83
	03/13/96			4	510	780		7.5		0.45	0.97
	11/21/96	163	15.6	< 3	2,500	290	498	7.8	< 0.05	0.59	2.80
	07/28/97		25.7	6	890	380	588	7.7	1.84	0.11	0.30
	09/01/97			4	290	580		7.5	1.75	< 0.01	0.33
	Median	**282**	**21.7**	**4**	**675**	**550**	**525**	**7.5**	**1.13**	**0.15**	**0.55**
	Maximum	**839**	**29.5**	**10**	**5,550**	**5,210**	**2,530**	**8.0**	**2.67**	**2.34**	**2.80**
	Minimum	**4**	**8.2**	< **3**	**66**	**290**	**187**	**7.2**	< **0.05**	< **0.01**	**0.23**

Location	Date	NO3-N mg/L	NO-2 mg/L	NH3-N mg/L	TKN mg/L	Total Nitrogen mg/L	Copper mg/L	Dissolved Copper mg/L	Chromium mg/L	Lead mg/L	Dissolved Lead mg/L	Mercury mg/L
Western Tributary at Civic Center	08/30/92	3.9		0.66	9.8	13.7	0.024		< 0.010	< 0.010		< 0.0002
	10/24/92	2.9		0.73	6.2	9.1	0.017		< 0.010	< 0.010		< 0.0002
	02/08/93	1.1		0.30	1.1	2.2	0.018		0.024	0.018		< 0.0002
	05/14/93	2.4		1.30	5.5	7.9	0.015		< 0.010	0.009		< 0.0002
	08/04/93	2.1		1.40	6.6	8.7	0.033		0.027	0.022		< 0.0002
	02/04/94	1.1		1.10	16.0	17.1	0.092		0.050	0.150		0.0008
	03/25/94	1.2		1.10	6.7	7.9	0.058		0.033	0.076		< 0.0002
	07/19/94	1.4		0.47	< 1.0	2.4	0.016		< 0.010	0.006		< 0.0002
	08/09/94	1.4		0.47	2.7	4.1	0.052		0.035	0.140		< 0.0002
	01/24/95	4.5		< 0.05	< 1.0	5.5	0.012		< 0.010	< 0.100		< 0.0002
	05/24/95	1.2		0.60	4.9	6.1	0.023		< 0.010	0.020		< 0.0002
	08/12/95	0.9		0.60	7.2	8.1	0.042		0.013	0.025		< 0.0002
	03/13/96	1.7		0.90	6.2	2.6	0.041					
	11/21/96	1.7		0.80	11.0	12.7	0.038			< 0.100		
	07/28/97	1.6		1.20	4.8	6.4	0.100			0.170		
	09/01/97	1.0		0.90	7.2	8.2	0.044			< 0.100		
	Median	**1.5**		**0.77**	**6.2**	**7.9**	**0.04**		**0.012**	**0.03**		< **0.0002**
	Maximum	**4.5**		**1.40**	**16.0**	**17.1**	**0.10**		**0.050**	**0.17**		**0.0008**
	Minimum	**0.9**		< **0.05**	< **1.0**	**2.2**	**0.01**		< **0.010**	< **0.01**		< **0.0002**

Location	Date	Cadmium mg/L	Zinc mg/L	Dissolved Zinc mg/L	Silver mg/L	Nickel mg/L	Selenium mg/L	Arsenic mg/L	Boron mg/L	Cyanide mg/L	BOD mg/L
Western Tributary at Civic Center	08/30/92	< 0.005	0.06		< 0.01	< 0.040		< 0.025	0.42	0.029	85
	10/24/92	< 0.005	0.07		< 0.01	< 0.040		< 0.025	0.25	0.009	31
	02/08/93	< 0.005	0.27		< 0.01	< 0.040	< 0.005	0.010	0.14	< 0.005	25
	05/14/93	< 0.005	0.08		< 0.01	< 0.040	< 0.005	0.005	0.27	0.010	63
	08/04/93	< 0.005	0.18		< 0.01	0.021	< 0.005	0.011	0.05	0.008	83
	02/04/94	< 0.005	0.44		< 0.01	0.023	< 0.020	0.027	0.23	< 0.005	57
	03/25/94	< 0.005	0.32		< 0.01	0.020	< 0.005	0.016	0.17	< 0.005	59
	07/19/94	< 0.005	0.05		< 0.01	0.011	< 0.005	< 0.005	0.16	0.009	110
	08/09/94	< 0.005	0.24		< 0.01	0.025	< 0.005	0.050	0.19	< 0.005	19
	01/24/95	< 0.005	0.06		< 0.01	< 0.010	< 0.005		2.40	0.007	< 6
	05/24/95	< 0.005	0.09		< 0.01	0.011	< 0.005	< 0.005	0.18	0.010	35
	08/12/95	< 0.005	0.20		< 0.01	0.020	< 0.005	0.007	0.28	0.030	77
	03/13/96		0.12						0.27	0.009	52
	11/21/96		0.24						0.19	< 0.005	45
	07/28/97		0.63						0.21	< 0.005	36
	09/01/97		0.16						0.25	0.052	38
	Median	**< 0.005**	**0.17**		**< 0.01**	**0.022**	**< 0.005**	**0.011**	**0.22**	**0.009**	**49**
	Maximum	**< 0.005**	**0.63**		**< 0.01**	**0.040**	**< 0.020**	**0.050**	**2.40**	**0.052**	**110**
	Minimum	**< 0.005**	**0.05**		**< 0.01**	**< 0.010**	**< 0.005**	**< 0.005**	**0.05**	**< 0.005**	**< 6**

Location	Date	COD mg/L	Color ACU	Turbidity NTU	Phenol mg/L	Petroleum Hydrocarbons	TPH (diesel) MPN/100 mL	TPH (gasoline) MPN/100 mL	Total Chlorine mg/L
Western Tributary at Civic Center	08/30/92	559	313	60	0.09				< 0.10
	10/24/92	210	90	45	0.04				< 0.10
	02/08/93	98	25	750	0.10				< 0.10
	05/14/93	220	200	70	0.10				< 0.10
	08/04/93	390	400	130	0.20				< 0.10
	02/04/94	475	750	950	0.10				< 0.10
	03/25/94	310	1,000	1,200	0.04				< 0.10
	07/19/94	215	150	44	0.08				0.10
	08/09/94	300	75	7	< 0.01				0.10
	01/24/95	23	10	100	0.10		< 1	< 1	< 0.01
	05/24/95	215	40	68	0.02	< 1			< 0.01
	08/12/95	345	250	11	< 0.10		< 2	< 2	< 0.01
	03/13/96	250	100	32					0.05
	11/21/96	400	80	5,600	< 0.01	< 1			< 0.01
	07/28/97	930	110	600	< 0.01	< 1			< 0.10
	09/01/97	160	128	160	0.02				
	Median	**275**	**119**	**85**	**0.08**	**< 1**	**< 2**	**< 2**	**< 0.1**
	Maximum	**930**	**1,000**	**5,600**	**0.20**	**< 1**	**< 2**	**< 2**	**0.1**
	Minimum	**23**	**10**	**7**	**< 0.01**	**< 1**	**< 1**	**< 1**	**< 0.01**

Location	Date	Fecal Coliform MPN/100 mL	Fecal* Coliform MPN/100 mL	Fecal** Coliform MPN/100 mL	Fecal Strep. MPN/100 mL	Fecal* Strep. MPN/100 mL	Fecal** Strep. MPN/100 mL	Salmonella MPN/100 mL
Western Tributary at Civic Center	08/30/92	< 160,000			> 16			
	10/24/92	130,000			300,000			
	02/08/93	30,000	5,000		22,000	30,000		
	05/14/93	5,000,000	240,000	13,000	1,700,000	160,000	50,000	
	08/04/93	30,000	110,000	500,000	160,000	500,000	700,000	
	02/04/94	3,000	500		90,000	28,000		
	03/25/94	< 2	8,000	8,000	50,000	230,000	90,000	< 2.0
	07/19/94		> 160,000	1,600,000		50,000	140,000	8.0
	08/09/94		80,000	2,300		130,000	50,000	< 2.0
	01/24/95			5,000			22,000	< 2.0
	05/24/95			> 160,000			> 160,000	2.0
	08/12/95						> 1,600	6.0
	03/13/96	5,000			11,000			< 2.2
	11/21/96	40,000			50,000			< 2.2
	07/28/97	160,000			90,000			5.1
	09/01/97	160,000			90,000			< 2.2
	Median	**40,000**	**80,000**	**13,000**	**90,000**	**130,000**	**70,000**	**< 2.2**
	Maximum	**5,000,000**	**240,000**	**1,600,000**	**1,700,000**	**500,000**	**700,000**	**8.0**
	Minimum	**< 2**	**500**	**2300**	**16**	**28,000**	**1,600**	**< 2.0**

Location	Date	VOC # of detects	Pesticides # of detects	SOC # of detects	Herbicides # of detects
Western Tributary at Civic Center	08/30/92				
	10/24/92				
	02/08/93				
	05/14/93				
	08/04/93				
	02/04/94				
	03/25/94				
	07/19/94				
	08/09/94				
	01/24/95				
	05/24/95				
	08/12/95				
	03/13/96				
	11/21/96		0		1 hh
	07/28/97		0		1
	09/01/97		0		1
	Median				
	Maximum				
	Minimum				

Location	Date	Q cfs	Temp Deg. C		Oil & Grease mg/L	TSS mg/L	TDS mg/L	Specific Conductance umho/cm	Lab pH units
Las Vegas Creek at Pecos or Lena	08/30/92	75	27.1		4	550	830		7.2
	10/24/92	204	17.5		4	500	530		7.3
	10/28/92	76	18.1	<	3	460	440		7.4
	02/08/93	454	11.1		64	300	190		7.8
	05/14/93	138	26.9		7	220	490		7.1
	08/04/93	34	30.7	<	3	560	1,070		7.1
	02/04/94	114	8.2		5	1,050	320	984	7.6
	09/19/94		22.0		5	230	880	950	7.3
	03/11/95	23	13.4		4	93	150	1,150	7.6
	05/24/95	24	26.5		12	330	270	680	7.5
	08/20/95	4	26.7		4	42	520	883	7.3
	05/24/96		17.8		15	490	500	500	7.0
	07/15/96	148	27.0		23	480	470		7.4
	02/24/98		12.0	<	3	200	100		8.0
	03/26/98		15.2	<	3	1,390	200	570	8.2
	09/22/99				4	950	100		
	02/12/03			<	3	110	130	200	7.4
	07/25/03					880	580		
	08/16/03					1,570	580		
	08/16/04			<	5	3,020	340	401	7.6
	01/03/05				5	51	120	177	7.7
	Median	**76**	**18.1**		**4**	**480**	**440**	**625**	**7.4**
	Maximum	**454**	**30.7**		**64**	**3,020**	**1,070**	**1,150**	**8.2**
	Minimum	**4**	**8.2**	**<**	**3**	**42**	**100**	**177**	**7.0**

Location	Date	Surfactants (MBAS) mg/L	Ortho-Phosphate mg/L	Total Phosphorous mg/L	NO3-N mg/L	NO-2 mg/L	NH3-N mg/L	TKN mg/L	Total Nitrogen mg/L
Las Vegas Creek at Pecos or Lena	08/30/92	3.10	0.06	1.10	1.80		0.42	9.5	11.3
	10/24/92	1.89	0.55	< 0.05	1.80		1.20	8.8	10.6
	10/28/92	1.12	0.18	0.51	1.40		0.33	3.7	5.1
	02/08/93	0.17	0.25	0.55	0.70		0.22	1.1	1.8
	05/14/93	1.34	0.36	1.00	0.10		2.30	6.5	6.6
	08/04/93	1.41	0.12	0.96	1.50		2.40	10.0	11.5
	02/04/94	0.83	0.87	1.50	1.30		0.92	5.3	6.6
	09/19/94	1.00	0.78	1.50	4.30		1.70	13.0	17.3
	03/11/95	0.25	0.21	0.36	0.40		0.20	1.6	2.0
	05/24/95	0.87	0.21	1.15	1.40		0.70	7.2	8.6
	08/20/95	1.55	0.20	0.55	1.10		0.30	5.0	6.1
	05/24/96	4.74	6.50	7.00	3.40		1.90	10.0	11.9
	07/15/96		0.68	0.94			1.20	8.5	8.7
	02/24/98	< 0.50	0.20	0.46	0.58		0.30	< 1.0	0.6
	03/26/98	0.73	0.54	0.85	0.56		0.23	3.2	3.8
	09/22/99			0.61	0.68		0.32	2.9	3.6
	02/12/03	0.36			0.71	< 0.10		1.9	2.6
	07/25/03				2.70	0.23		18.0	20.9
	08/16/03		0.29	2.40	1.40	0.13		10.0	11.5
	08/16/04	0.22	0.15	1.70	2.40	< 0.50		8.9	11.3
	01/03/05	0.41	0.10	0.20	0.50	< 0.10		1.0	1.5
	Median	**0.87**	**0.23**	**0.94**	**1.35**	**0.13**	**0.56**	**6.5**	**6.6**
	Maximum	**4.74**	**6.50**	**7.00**	**4.30**	**0.50**	**2.40**	**18.0**	**20.9**
	Minimum	**0.17**	**0.06**	< **0.05**	**0.10**	< **0.10**	**0.20**	< **1.0**	**0.6**

Location	Date	Copper mg/L	Dissolved Copper mg/L	Chromium mg/L	Lead mg/L	Dissolved Lead mg/L	Mercury mg/L	Cadmium mg/L	Zinc mg/L	Dissolved Zinc mg/L	Silver mg/L
Las Vegas Creek at Pecos or Lena	08/30/92	0.010		0.019	0.072		< 0.0002	< 0.0050	0.32		< 0.0100
	10/24/92	0.190		0.057	0.280		0.0060	< 0.0050	0.96		< 0.0100
	10/28/92	0.055		0.019	0.071		< 0.0002	< 0.0050	0.28		< 0.0100
	02/08/93	0.019		< 0.010	0.036		< 0.0002	< 0.0050	0.29		< 0.0100
	05/14/93	0.027		< 0.010	0.026		< 0.0002	< 0.0050	0.15		< 0.0100
	08/04/93	0.078		0.021	0.078		< 0.0002	< 0.0050	0.38		< 0.0100
	02/04/94	0.047		0.018	0.057		0.0003	< 0.0050	0.23		< 0.0100
	09/19/94	0.057		0.015	0.053		< 0.0002	< 0.0050	0.30		< 0.0100
	03/11/95	< 0.010		< 0.010	0.017		< 0.0002	< 0.0050	0.08		< 0.0100
	05/24/95	0.098		0.023	0.140		< 0.0002	< 0.0050	0.59		< 0.0100
	08/20/95	0.024		< 0.010	0.008		< 0.0002	< 0.0050	0.12		< 0.0100
	05/24/96	0.070							0.43		
	07/15/96	0.091			< 0.100				0.35		
	02/24/98	0.013			< 0.100				0.07		
	03/26/98	0.012			< 0.100				0.11		
	09/22/99	0.049	< 0.010		< 0.100	< 0.10			0.29	< 0.200	
	02/12/03	0.020	< 0.010	0.004	0.008	< 0.10	< 0.0002	0.0011	0.09	< 0.200	< 0.0005
	07/25/03	0.066	< 0.010		0.043	< 0.10			0.45	0.042	
	08/16/03	0.220	< 0.010		0.120	< 0.10			1.00	0.020	
	08/16/04	0.170	< 0.010	0.004	0.099	< 0.02	0.0002	< 0.0025	0.85	0.021	< 0.0025
	01/03/05	0.020	< 0.010	0.004	0.006	< 0.02	< 0.0002	< 0.0005	0.07	< 0.020	< 0.0005
	Median	**0.049**	**< 0.010**	**0.013**	**0.072**	**< 0.10**	**< 0.0002**	**< 0.005**	**0.290**	**0.032**	**< 0.010**
	Maximum	**0.220**	**< 0.010**	**0.057**	**0.280**	**< 0.10**	**0.006**	**< 0.005**	**1.0**	**0.2**	**0.010**
	Minimum	**< 0.010**	**< 0.010**	**0.004**	**0.006**	**< 0.02**	**< 0.0002**	**< 0.001**	**0.070**	**< 0.02**	**< 0.001**

Location	Date	Nickel mg/L	Selenium mg/L	Arsenic mg/L	Boron mg/L	Cyanide mg/L	BOD mg/L	COD mg/L	Color ACU	Turbidity NTU	Phenol mg/L
Las Vegas Creek at Pecos or Lena	08/30/92	< 0.040		< 0.025	0.43	0.032	80	760	300	275	0.10
	10/24/92	< 0.040		< 0.025	0.26	0.024	69	500	120	340	0.10
	10/28/92	< 0.040		< 0.025	0.22	0.015	35	195	5	300	0.03
	02/08/93	< 0.040	< 0.005	< 0.005	0.08	< 0.005	27	230	15	180	0.10
	05/14/93	< 0.020	< 0.005	< 0.005	0.27	0.011	86	400	320	90	0.20
	08/04/93	0.020	0.017	0.015	0.30	0.011	115	690	560	65	0.10
	02/04/94	< 0.020	< 0.010	0.008	0.15	0.006	57	360	100	350	0.10
	09/19/94	0.026	< 0.005	0.008	0.40	0.016	99	720	500	20	0.06
	03/11/95	< 0.010	< 0.005	< 0.005	0.10	< 0.005	10	85	50	62	< 0.10
	05/24/95	0.016	< 0.005	0.007	0.13	0.005	34	295	30	270	0.02
	08/20/95	0.011	< 0.005	0.007	0.19	< 0.005	29	245	200		0.10
	05/24/96				0.30	0.010	265	550	175	8	0.09
	07/15/96				0.19	< 0.005	58	380	300	190	< 0.01
	02/24/98				0.06	< 0.005	17	100	15	132	< 0.01
	03/26/98				0.08	< 0.005	27	130	30	720	< 0.01
	09/22/99				0.06						
	02/12/03	< 0.005	< 0.005	< 0.002	< 0.05						
	07/25/03				0.22						
	08/16/03				0.15						
	08/16/04	0.036	< 0.025	0.015	0.14						
	01/03/05	< 0.005	< 0.010	< 0.002	0.06						
	Median	**< 0.020**	**< 0.005**	**0.008**	**0.15**	**0.006**	**57**	**360**	**120**	**185**	**< 0.10**
	Maximum	**< 0.040**	**< 0.025**	**0.025**	**0.43**	**0.032**	**265**	**760**	**560**	**720**	**0.20**
	Minimum	**< 0.005**	**< 0.005**	**< 0.002**	**< 0.05**	**< 0.005**	**10**	**85**	**5**	**8**	**< 0.01**

Location	Date	Petroleum Hydrocarbon	TPH (diesel) MPN/100 mL	TPH (gasoline) MPN/100 mL	Total Chlorine mg/L	Fecal Coliform MPN/100 mL	Fecal* Coliform MPN/100 mL	Fecal** Coliform MPN/100 mL	Fecal Strep. MPN/100 mL	Fecal* Strep. MPN/100 mL
Las Vegas Creek at Pecos or Lena	08/30/92				< 0.10	160,000			> 16	
	10/24/92				< 0.10	700,000			500,000	
	10/28/92				< 0.10	80,000			500,000	
	02/08/93				< 0.10	17,000	8,000	13,000	160,000	30,000
	05/14/93				< 0.10	5,000,000	1,700,000	300,000	6,000,000	1,300,000
	08/04/93				< 0.10	5,000,000	300,000	1,300,000	160,000	1,700,000
	02/04/94				< 0.10	2,200	2,400		35,000	1,300
	09/19/94				< 0.01			900,000		
	03/11/95		< 1	< 1	< 0.01			24,000		
	05/24/95	< 1			< 0.01			160,000		
	08/20/95		< 1	< 1	0.20			28,000		
	05/24/96					11,000			> 16,000	
	07/15/96				< 0.01	3,000,000			80,000	
	02/24/98	< 1			0.10	5,000			13,000	
	03/26/98	< 1			< 0.10	160,000			90,000	
	09/22/99					8,000			170,000	
	02/12/03					5,000			90,000	
	07/25/03					900,000			500,000	
	08/16/03					1,600,000			240,000	
	08/16/04					> 1,600,000			220,000	
	01/03/05					1,300			11,000	
	Median	**< 1**	**< 1**	**< 1**	**< 0.10**	**160,000**	**154,000**	**160,000**	**160,000**	**665,000**
	Maximum	**< 1**	**< 1**	**< 1**	**0.20**	**5,000,000**	**1,700,000**	**1,300,000**	**6,000,000**	**1,700,000**
	Minimum	**< 1**	**< 1**	**< 1**	**< 0.01**	**1,300**	**2,400**	**13,000**	**16**	**1,300**

Location	Date	Fecal** Strep. MPN/100 mL	Salmonella MPN/100 mL	VOC # of detects	Pesticides # of detects	SOC # of detects	Herbicides # of detects
Las Vegas Creek at Pecos or Lena	08/30/92						
	10/24/92						
	10/28/92						
	02/08/93	5,000					
	05/14/93	3,000,000					
	08/04/93	3,000,000					
	02/04/94						
	09/19/94	160,000	< 2				
	03/11/95	160,000	22				
	05/24/95	> 160,000	< 2				
	08/20/95	90,000	7				
	05/24/96		160		1		
	07/15/96		9		0		0
	02/24/98		< 2		0		1
	03/26/98		< 2		1		4
	09/22/99			1 e			0
	02/12/03			1 a	0	4 g,k,n,x	0
	07/25/03			1 k	4	7	2
	08/16/03			2 k,l	0	7	0
	08/16/04			1 a	0	5 x,h,o,l	3 y,uu,xx
	01/03/05			0	0	8 x,o,i, nn,g,l.k	3 hh,uu.xx
	Median	**160,000**	**5**				
	Maximum	**3,000,000**	**160**				
	Minimum	**5,000**	**< 2**				

Location	Date	Q cfs	Temp Deg. C	Oil & Grease mg/L	TSS mg/L	TDS mg/L	Specific Conductance umho/cm	Lab pH units	Surfactants (MBAS) mg/L	Ortho-Phosphate mg/L
Duck Creek at Boulder Highway	08/30/92	30	27.1	< 3	120	4,590		7.8	0.64	< 0.05
	10/24/92	73	17.7	< 3	130	4,670		7.6	0.62	0.06
	02/08/93	43	11.5	< 3	23	4,700		8.1	< 0.10	< 0.05
	08/04/93	15	27.5	< 3	150	5,150		7.3	0.54	< 0.05
	02/04/94	22	9.0	< 3	4,430	3,360	7,380	7.5	0.15	2.26
	03/25/94	22	17.3	< 3	240	3,990	17,480	7.7	0.23	0.11
	07/19/94	38	23.0	< 3	280	3,350	4,930	7.3	2.25	0.07
	01/24/95	21	9.4	3	360	230	2,520	8.0	0.30	0.11
	02/20/96			4	2,170	2,910		7.4		0.33
	07/14/96	177	29.1	3	1,270	2,450	2,900	7.1		0.65
	04/02/97		12.3	< 3	170	1,660	2,050	7.2	0.77	< 0.05
	07/22/97		24.8	375	6,540	2,960	389	7.5		0.04
	02/03/98		12.0	< 3	2,020	2,290	290	7.5	< 0.50	0.09
	09/08/98	171		< 3	5,720	1,520				
	06/02/99	10		< 3	50	1,100				
	09/22/99			< 3	210	870				
	02/16/00			< 3	1,920	1,240				
	08/30/00	108		< 3	4,360	1,300				
	07/06/01	242		< 3	8,420	1,610				
	02/12/03	489		< 3	2,580	1,270	1,580	7.4	0.23	0.08
	07/24/03				1,080	3,290				
	08/16/04			5	3,960	1,920	2,320	7.2	0.28	0.09
	09/09/04			< 5	26,300	2,040	2,080	7.7	0.22	0.04
	Median	**41**	**18**	**< 3**	**1,270**	**2,290**	**2,320**	**7.5**	**0.30**	**0.08**
	Maximum	**489**	**29**	**375**	**26,300**	**5,150**	**17,480**	**8.1**	**2.25**	**2.26**
	Minimum	**10**	**9**	**< 3**	**23**	**230**	**290**	**7.1**	**< 0.10**	**0.04**

Location	Date	Total Phosphorous mg/L	NO3-N mg/L	NO-2 mg/L	NH3-N mg/L	TKN mg/L	Total Nitrogen mg/L	Copper mg/L	Dissolved Copper mg/L
Duck Creek at Boulder Highway	08/30/92	0.12	3.5		0.06	2.6	4.5	< 0.010	
	10/24/92	0.16	3.8		0.42	3.7	7.5	< 0.010	
	02/08/93	0.06	4.6		< 0.10	< 1.0	5.6	< 0.010	
	08/04/93	0.13	4.1		0.68	3.1	7.2	< 0.010	
	02/04/94	1.30	4.5		0.69	4.3	8.8	0.044	
	03/25/94	0.20	< 2.0		0.40	3.4	5.4	0.016	
	07/19/94	0.37	4.1		2.30	5.5	9.6	0.025	
	01/24/95		1.0		0.20	1.5	2.5	0.022	
	02/20/96	1.00	3.6		1.00	8.1	9.1	0.062	
	07/14/96	5.60	2.3		1.20	11.0	13.3	0.046	
	04/02/97	0.38	3.2		1.00	5.2	8.4	0.016	
	07/22/97	0.41	< 1.0		0.60	6.8	7.8	0.140	
	02/03/98	1.34	3.8		0.60	5.2	9.0	< 0.010	
	09/08/98	1.20	2.2		0.44	13.0	2.3	0.240	0.02
	06/02/99	0.58	2.4		0.79	4.7	7.1	0.040	< 0.01
	09/22/99	0.44	1.9		0.40	2.5	4.3	< 0.010	< 0.01
	02/16/00	2.29	3.0		0.89	6.9	9.9	0.150	< 0.01
	08/30/00	3.60	1.8		0.26	4.9	6.7	0.240	< 0.01
	07/06/01	7.50	2.0		< 0.05	11.0	13.0	0.240	< 0.01
	02/12/03	2.70	1.3	< 0.5		9.7	11.0	0.094	< 0.01
	07/24/03		2.8	1.8		6.2	10.8	< 0.200	< 0.02
	08/16/04	1.70	3.6	2.6		11.0	17.2	0.280	0.53
	09/09/04	2.40	2.4	< 0.4		8.9	11.3	0.094	< 0.01
	Median	**1.00**	**2.80**	**1.15**	**0.60**	**5.20**	**8.40**	**0.04**	**< 0.01**
	Maximum	**7.50**	**4.60**	**2.60**	**2.30**	**13.00**	**17.20**	**0.28**	**0.53**
	Minimum	**0.06**	**< 1.00**	**< 0.40**	**< 0.05**	**< 1.00**	**2.33**	**< 0.01**	**< 0.01**

Location	Date	Chromium mg/L	Lead mg/L	Dissolved Lead mg/L	Mercury mg/L	Cadmium mg/L	Zinc mg/L	Dissolved Zinc mg/L	Silver mg/L
Duck Creek at Boulder Highway	08/30/92	< 0.0100	< 5.000		< 0.0002	< 0.0050	0.053		< 0.010
	10/24/92	< 0.0100	< 0.010		< 0.0002	< 0.0050	0.038		< 0.010
	02/08/93	< 0.0100	< 0.004		< 0.0002	< 0.0050	0.097		< 0.010
	08/04/93	< 0.0100	< 0.004		< 0.0002	< 0.0050	0.035		< 0.010
	02/04/94	0.0450	0.031		0.0002	< 0.0050	0.200		< 0.010
	03/25/94	0.0100	0.006		< 0.0002	< 0.0050	0.053		< 0.010
	07/19/94	0.0100	0.007		< 0.0002	< 0.0050	0.073		< 0.010
	01/24/95	< 0.0100	< 0.100		0.0002	< 0.0050	0.110		< 0.010
	02/20/96						0.160		
	07/14/96		< 0.100				0.210		
	04/02/97		< 0.100				0.083		
	07/22/97		< 0.100				0.190		
	02/03/98		0.120				0.340		
	09/08/98		0.220	< 0.100			0.730	< 0.020	
	06/02/99		< 0.100	< 0.100			0.130	< 0.020	
	09/22/99		< 0.100	< 0.100			0.079	< 0.020	
	02/16/00		< 0.100	< 0.100			0.500	< 0.020	
	08/30/00		< 0.100	< 0.100			0.910	< 0.020	
	07/06/01		0.150	< 0.100			0.850	0.029	
	02/12/03	0.0091	0.040	< 0.100	< 0.0002	0.0011	0.270	< 0.020	< 0.001
	07/24/03		0.019	< 0.200			0.140	< 0.040	
	08/16/04	0.0450	0.046	< 0.020	< 0.0002	0.0030	0.530	0.025	< 0.003
	09/09/04	0.0670	0.077	0.020	< 0.0002	0.0016	0.480	< 0.020	0.013
	Median	**< 0.0100**	**< 0.100**	**< 0.1000**	**< 0.0002**	**< 0.0050**	**0.160**	**< 0.020**	**< 0.010**
	Maximum	**0.0670**	**< 5.000**	**< 0.2000**	**0.0002**	**< 0.0050**	**0.910**	**0.040**	**0.013**
	Minimum	**0.0091**	**< 0.004**	**< 0.0200**	**< 0.0002**	**0.0011**	**0.035**	**< 0.020**	**< 0.001**

Location	Date	Nickel mg/L	Selenium mg/L	Arsenic mg/L	Boron mg/L	Cyanide mg/L	BOD mg/L	COD mg/L	Color ACU
Duck Creek at Boulder Highway	08/30/92	< 0.04		0.060	2.70	0.013	19	99	100
	10/24/92	< 0.04		0.038	2.50	0.007	21	125	225
	02/08/93	< 0.04	< 0.025	0.042	2.30	< 0.005	< 6	30	25
	08/04/93	< 0.02		0.037	3.00	< 0.005	77	230	200
	02/04/94	0.03	< 0.020	0.100	1.50	< 0.005	28	175	225
	03/25/94	< 0.01	0.019	0.046	1.80	< 0.005	15	89	60
	07/19/94	0.01	< 0.010	0.034	1.60	0.011	67	445	60
	01/24/95	< 0.01	< 0.005		0.08	0.009	12	90	30
	02/20/96				1.20	0.030	50	245	30
	07/14/96				1.60	< 0.005	110	780	200
	04/02/97				0.79	0.006	40	280	150
	07/22/97				1.60	0.022	20	170	150
	02/03/98				1.20	< 0.005	48	190	75
	09/08/98				0.72				
	06/02/99				0.77				
	09/22/99				0.46				
	02/16/00				0.77				
	08/30/00				0.56				
	07/06/01				0.79				
	02/12/03	0.03	< 0.050	0.089	0.33				
	07/24/03				1.30				
	08/16/04	0.05	< 0.025	0.063	0.70				
	09/09/04	0.12	< 0.025	0.190	0.84				
	Median	**< 0.03**	**< 0.023**	**0.053**	**1.20**	**< 0.006**	**28**	**175**	**100**
	Maximum	**0.12**	**< 0.050**	**0.190**	**3.00**	**0.030**	**110**	**780**	**225**
	Minimum	**< 0.01**	**< 0.005**	**0.034**	**0.08**	**< 0.005**	**< 6**	**30**	**25**

Location	**Date**	**Turbidity** NTU	**Phenol** mg/L	**Petroleum Hydrocarbons**	**TPH (diesel)** MPN/100 mL	**TPH (gasoline)** MPN/100 mL	**Total Chlorine** mg/L	**Fecal Coliform** MPN/100 mL	**Fecal* Coliform** MPN/100 mL	**Fecal** Coliform** MPN/100 mL
Duck Creek at Boulder Highway	08/30/92	55	0.02				< 0.10	50,000		
	10/24/92	55	0.50				< 0.10	50,000		
	02/08/93	14	0.10				< 0.10	400	800	
	08/04/93	34	0.02				< 0.10	1,700,000	1,400,000	1,300,000
	02/04/94	650	0.10				< 0.10	1,100	2,300	220
	03/25/94	70	< 0.01				< 0.10	3,000		3,000
	07/19/94	45					< 0.10	900,000	300,000	500,000
	01/24/95	120	< 0.10		< 1	< 1	< 0.01			5,000
	02/20/96	14	< 0.01	< 1				3,000		
	07/14/96	3,800	< 0.01				< 0.01	5,000,000		
	04/02/97	72	< 0.01	< 1				7,000		
	07/22/97	2,300	< 0.01	< 1			0.40	22,000		
	02/03/98	370	< 0.01	< 1			< 0.10	1,100		
	09/08/98							17,000		
	06/02/99							7,900		
	09/22/99							160,000		
	02/16/00							8,000		
	08/30/00							110,000		
	07/06/01							900,000		
	02/12/03							30,000		
	07/24/03							1,600,000		
	08/16/04							900		
	09/09/04							900,000		
	Median	**70**	**< 0.02**	**< 1**	**< 1**	**< 1**	**< 0.10**	**26,000**	**151,150**	**5,000**
	Maximum	**3800**	**0.50**	**< 1**	**< 1**	**< 1**	**0.40**	**5,000,000**	**1,400,000**	**1,300,000**
	Minimum	**14**	**< 0.01**	**< 1**	**< 1**	**< 1**	**< 0.01**	**400**	**800**	**220**

Location	Date	Fecal Strep. MPN/100 mL	Fecal* Strep. MPN/100 mL	Fecal** Strep. MPN/100 mL	Salmonella MPN/100 mL	VOC # of detects	Pesticides # of detects	SOC # of detects	Herbicides # of detects
	08/30/92	> 16							
	10/24/92	30,000							
	02/08/93	3,000	13,000						
	08/04/93	160,000	160,000	3,000,000					
	02/04/94	8,000	2,300	230					
	03/25/94	13,000		30,000	< 2.0				
	07/19/94	240,000	240,000	240,000	2.0				
	01/24/95			17,000	< 2.0				
	02/20/96	13,000			5.0				
	07/14/96	500,000			2.2		0		0
	04/02/97	90,000			4.0		0		3
	07/22/97	17,000			9.2		0		1
Duck Creek at Boulder Highway	02/03/98	50,000			< 2.2		0		1
	09/08/98	24,000			< 2.2	0	0		0
	06/02/99	130,000				1 a	0		0
	09/22/99	35,000				1 a	0		0
	02/16/00	80,000				1 a	0		0
	08/30/00	90,000				0	0		0
	07/06/01	300,000				2 a,b	0		2 f
	02/12/03	160,000				1 a	0	3 g,m,x	0
	07/24/03	80,000				1	0	7	0
	08/16/04	70,000				1 a	0	2 x,o	0 y,hh
	09/09/04	> 160,000				1 a	0	2 o,g	1 uu
	Median	**75,000**	**86,500**	**30,000**	**< 2.2**				
	Maximum	**500,000**	**240,000**	**3,000,000**	**9.2**				
	Minimum	**16**	**2,300**	**230**	**< 2.0**				

Location	Date	Q cfs	Temp Deg. C	Oil & Grease mg/L	TSS mg/L	TDS mg/L	Specific Conductance umho/cm	Lab pH units	Surfactants (MBAS) mg/L	Ortho-Phosphate mg/L	Total Phosphorous mg/L
Flamingo Wash at Nellis	10/24/92	115	18.0	< 3.0	1,710	1,270		7.4	1.51	0.18	1.20
	02/08/93	160	12.3	< 3.0	1,130	130		8.2	< 0.05	0.46	0.66
	06/05/93	41	17.7	3.9	1,420	1,520		7.5	1.84	0.44	0.82
	08/05/93	57	26.1	< 3.0	5,910	2,290		7.6	1.18	0.06	1.20
	02/04/94	45	9.0	5.3	620	1,180	2,300	7.4	0.69	0.61	0.68
	03/25/94	79	17.4	6.5	3,860	1,140	7,570	7.4	0.78	0.84	1.80
	07/19/94		24.4	7.0	6,710	1,200	1,501	7.4	3.49	0.19	2.10
	08/19/94	37	26.0	3.8	4,750	1,060	2,080	7.7	0.05	< 0.05	1.00
	01/24/95	125	9.3	4.5	1,960	600	389	7.9	0.22	0.08	
	05/24/95	30	18.3	< 3.0	255	1,160	1,302	7.5	0.71	0.06	0.32
	08/12/95	335	26.4	7.2	1,050	1,010	1,003	7.2	1.70	0.14	1.50
	01/31/96			18.0	560	1,920		7.0	1.99	0.44	1.30
	11/21/96	184	17.3	< 3.0	2,620	440	3,830	7.8	< 0.05	0.15	1.50
	09/25/97		19.7	< 3.0	324	580	710	7.3	1.75	0.57	0.66
	02/04/98		11.2	5.2	1,800	680	240	7.6	0.92	0.22	2.94
	02/24/98		12.0	< 3.0	660	380		7.8	< 0.50	0.08	0.88
	02/12/03	538		< 3.0	1,900	260	415	7.6	0.33	0.15	1.05
	04/14/03	411			3,410	505	650	7.4	< 0.05		
	07/24/03	120			2,230	790					
	08/16/03	366			19,200	810				0.34	1.00
	08/13/04			< 5.0	18,800	940	1,020	7.2	0.06	0.11	5.00
	08/16/04			< 5.0	5,760	1,040	1,210	7.3	0.59	0.09	3.20
	Median	**120**	**17.7**	**< 4**	**1,930**	**975**	**1,115**	**7.5**	**0.70**	**0.17**	**1.20**
	Maximum	**538**	**26.4**	**18**	**19,200**	**2,290**	**7,570**	**8.2**	**3.49**	**0.84**	**5.00**
	Minimum	**30**	**9.0**	**< 3**	**255**	**130**	**240**	**7.0**	**< 0.05**	**< 0.05**	**0.32**

Location	Date	NO3-N mg/L	NO-2 mg/L	NH3-N mg/L	TKN mg/L	Total Nitrogen mg/L	Copper mg/L	Dissolved Copper mg/L	Chromium mg/L	Lead mg/L
Flamingo Wash at Nellis	10/24/92	2.30		1.40	7.6	9.9	0.100		0.038	0.079
	02/08/93	0.40		0.13	< 1.0	1.4	0.020		0.031	0.019
	06/05/93	3.20		1.10	4.9	8.1	0.059		0.031	0.051
	08/05/93	4.30		1.90	6.6	10.9	0.067		0.040	0.086
	02/04/94	2.60		1.00	3.7	6.3	0.046		0.011	0.014
	03/25/94	< 0.50		0.80	7.1	7.6	0.094		0.048	0.100
	07/19/94	3.00		2.50	6.1	9.1	0.130		0.050	0.130
	08/19/94	2.00		0.82	9.1	11.1	0.094		0.043	0.125
	01/24/95	1.30		0.30	2.6	3.9	0.061		0.028	< 0.100
	05/24/95	2.10		0.40	3.1	5.2	0.027		< 0.010	0.018
	08/12/95	< 0.30		1.00	9.3	9.6	0.069		0.017	0.049
	01/31/96	5.10		2.50	13.0	18.1	0.070			0.130
	11/21/96	1.00		0.60	3.8	4.8	0.057			< 0.100
	09/25/97	0.50		0.30	2.7	3.2	0.026			< 0.100
	02/04/98	1.70		0.80	19.0	20.7	0.065			0.120
	02/24/98	0.98		0.30	2.2	3.2	0.020			< 0.100
	02/12/03	0.97	< 0.10		3.2	4.2	0.039	< 0.010	0.006	0.030
	04/14/03	1.23	0.13		7.6	9.0	0.100	< 0.010	34.000	0.047
	07/24/03	1.80	< 0.50		6.6	8.4	0.170	< 0.010		0.074
	08/16/03	2.00	< 0.20		5.4	7.4	0.320	< 0.010		0.120
	08/13/04	2.20	< 0.20		16.0	2.2	0.270	< 0.020	< 0.100	0.410
	08/16/04	2.60	0.09		11.0	14.5	0.220	< 0.010	0.066	0.220
	Median	**1.90**	**0.17**	**0.81**	**6.4**	**7.9**	**0.068**	**< 0.010**	**0.038**	**0.100**
	Maximum	**5.10**	**0.50**	**2.50**	**19.0**	**20.7**	**0.320**	**0.020**	**34.000**	**0.410**
	Minimum	**< 0.30**	**0.09**	**0.13**	**< 1.0**	**1.4**	**0.020**	**< 0.010**	**0.006**	**0.014**

Location	Date	Dissolved Lead mg/L	Mercury mg/L	Cadmium mg/L	Zinc mg/L	Dissolved Zinc mg/L	Silver mg/L	Nickel mg/L	Selenium mg/L	Arsenic mg/L
Flamingo Wash at Nellis	10/24/92		0.0002	< 0.0050	0.43		< 0.010	< 0.040		< 0.0250
	02/08/93		< 0.2000	< 0.0050	0.18		< 0.010	< 0.040	< 0.025	0.0150
	06/05/93		0.0002	< 0.0050	0.26		< 0.010	< 0.020	< 0.015	0.0160
	08/05/93		< 0.0002	< 0.0050	0.27		< 0.010	0.030		0.0270
	02/04/94		< 0.0002	< 0.0050	0.09		< 0.010	< 0.020	< 0.010	0.0080
	03/25/94		0.0004	< 0.0050	0.37		< 0.010	0.032	< 0.015	0.0310
	07/19/94		0.0004	< 0.0050	0.55		< 0.010	0.054	< 0.010	0.0320
	08/19/94		0.0002	< 0.0050	0.44		< 0.010	0.026	< 0.005	0.0310
	01/24/95		< 0.0002	< 0.0050	0.26		< 0.010	0.016	< 0.005	
	05/24/95		< 0.0002	< 0.0050	0.09		< 0.010	0.011	0.007	< 0.0050
	08/12/95		< 0.0002	< 0.0050	0.37		< 0.010	0.027	< 0.005	0.0090
	01/31/96				0.86					
	11/21/96				0.28					
	09/25/97				0.13					
	02/04/98				0.36					
	02/24/98				0.15					
	02/12/03	< 0.100	< 0.0002	0.0007	0.17	0.100	< 0.050	0.015	< 0.050	0.0120
	04/14/03	< 0.100	< 0.0002	< 0.0025	0.45	< 0.020	0.006	0.038	< 0.040	0.0140
	07/24/03	< 0.100			1.10	0.023				
	08/16/03	< 0.100			1.50	< 0.020				
	08/13/04	< 0.020	0.0003	< 0.0500	< 0.01	1.900	< 0.005	0.500	< 0.025	< 0.0120
	08/16/04	< 0.020	0.0026	0.0030	1.10	0.026	< 0.003	0.062	< 0.025	0.0270
	Median	**< 0.100**	**< 0.0002**	**< 0.0050**	**0.32**	**0.025**	**< 0.010**	**0.030**	**< 0.015**	**0.016**
	Maximum	**< 0.100**	**0.2000**	**< 0.0500**	**1.50**	**1.900**	**0.050**	**0.500**	**< 0.050**	**0.032**
	Minimum	**< 0.020**	**< 0.0002**	**0.0007**	**< 0.01**	**< 0.020**	**< 0.003**	**0.011**	**< 0.005**	**< 0.005**

Location	Date	Boron mg/L	Cyanide mg/L	BOD mg/L	COD mg/L	Color ACU	Turbidity NTU	Phenol mg/L	Petroleum Hydrocarbons	TPH (diesel) MPN/100 mL
Flamingo Wash at Nellis	10/24/92	0.49	0.008	54	555	175	750.0	0.020		
	02/08/93	0.09	< 0.005	< 6	57	15	700.0	0.100		
	06/05/93	0.58	< 0.005	56	375	320	390.0	< 0.010		
	08/05/93	0.97	0.008	85	415	320	200.0	0.020		
	02/04/94	0.41	< 0.005	37	185	100	190.0	0.100		
	03/25/94	0.37	0.008	55	395	1,000	1,400.0	0.010		
	07/19/94	0.44	0.013	22	630	150	0.2	0.130		
	08/19/94	0.35	< 0.005	40	465	150	950.0	< 0.100		
	01/24/95	0.18	< 0.005	33	155	25	510.0	0.100		< 1
	05/24/95	0.50	0.007	19	115	35	180.0	0.010	< 1.00	
	08/12/95	0.34	< 0.005	78	450	250	8.0	< 0.100		< 1
	01/31/96	0.71	0.030	116	660	230	520.0	0.020	< 1.00	
	11/21/96	0.12	< 0.005	18	220	30	3,300.0	< 0.010	< 1.00	
	09/25/97	0.30	< 0.005	42	160	60	280.0	< 0.010	1.50	
	02/04/98	0.22	< 0.005	63	570	75	2,200.0	< 0.010	< 1.00	
	02/24/98	0.13	< 0.005	13	98	15	740.0	< 0.010	< 1.00	
	02/12/03	< 0.05								
	04/14/03	0.18								
	07/24/03	0.24								
	08/16/03	0.27								
	08/13/04	0.56								
	08/16/04	0.28								
	Median	**0.32**	**< 0.005**	**41**	**385**	**125**	**515**	**0.020**	**< 1.00**	**< 1**
	Maximum	**0.97**	**0.030**	**116**	**660**	**1,000**	**3,300**	**0.130**	**1.50**	**< 1**
	Minimum	**< 0.05**	**< 0.005**	**< 6**	**57**	**15**	**0.2**	**< 0.010**	**< 1.00**	**< 1**

Location	Date	TPH (gasoline) MPN/100 mL	Total Chlorine mg/L	Fecal Coliform MPN/100 mL	Fecal* Coliform MPN/100 mL	Fecal** Coliform MPN/100 mL	Fecal Strep. MPN/100 mL	Fecal* Strep. MPN/100 mL	Fecal** Strep. MPN/100 mL	Salmonella MPN/100 mL
Flamingo Wash at Nellis	10/24/92		< 0.10	80,000			80,000			
	02/08/93		< 0.10	1,700	3,000		90,000	30,000		
	06/05/93		< 0.10	8,000	28,000	5,000	50,000	160,000	90,000	
	08/05/93		< 0.10	300,000	500,000	50,000	90,000	160,000	90,000	
	02/04/94		< 0.10	1,300	500	2,300	22,000	1,300	500	
	03/25/94		< 0.10	24,000	30,000	30,000	160,000	160,000	90,000	< 2
	07/19/94		< 0.10		1,600,000	500,000		500,000	170,000	13
	08/19/94		< 0.10	170,000	80,000	140,000	300,000	130,000	130,000	8
	01/24/95	< 1	< 0.01			3,000			22,000	8
	05/24/95		< 0.01			160,000			90,000	2
	08/12/95	< 1	< 0.01			> 160,000			> 1,600	2
	01/31/96			13,000			3,000			< 2
	11/21/96		< 0.01	240			738			< 2
	09/25/97			90,000			160,000			< 2
	02/04/98		0.10	5,000			50,000			< 2
	02/24/98		0.20	13,000			17,000			< 2
	02/12/03			7,000			17,000			
	04/14/03			130,000			70,000			
	07/24/03			1,600,000			170,000			
	08/16/03			300,000			10,000			0
	08/13/04			> 1,600,000			170,000			
	08/16/04			> 1,600,000			900,000			
	Median	**< 1**	**< 0.10**	**52,000**	**30,000**	**50,000**	**75,000**	**160,000**	**90,000**	**< 2**
	Maximum	**< 1**	**0.20**	**1,600,000**	**1,600,000**	**500,000**	**900,000**	**500,000**	**170,000**	**13**
	Minimum	**< 1**	**< 0.01**	**240**	**500**	**2300**	**738**	**1,300**	**500**	**0**

Location	Date	VOC # of detects		Pesticides # of detects	SOC # of detects		Herbicides # of detects	
Flamingo Wash at Nellis	10/24/92							
	02/08/93							
	06/05/93							
	08/05/93							
	02/04/94							
	03/25/94							
	07/19/94							
	08/19/94							
	01/24/95							
	05/24/95							
	08/12/95							
	01/31/96			0			0	
	11/21/96			0			0	
	09/25/97			0			0	
	02/04/98			2			1	
	02/24/98			1			1	
	02/12/03	1	a	0	9	g,h,j,o,q,s,t,u,x	0	
	04/14/03	1	d		8	g,h,k,o,x,z,aa,bb	0	
	07/24/03	2		0	3		0	
	08/16/03	1		0	0		0	
	08/13/04	2	k,l	0	2	x,o	0	
	08/16/04	1	a	0	3	x,o,g	2	y,uu
	Median							
	Maximum							
	Minimum							

Location	**Date**	**Q** cfs	**Temp** Deg. C	**Oil & Grease** mg/L	**TSS** mg/L	**TDS** mg/L	**Specific Conductance** umho/cm	**Lab pH** units	**Surfactants (MBAS)** mg/L	**Ortho-Phosphate** mg/L	**Total Phosphorous** mg/L
C-1 Channel at Warm Springs	08/30/92	500	24.5	< 3	17,800	230		8.0	0.26	< 0.05	2.20
	02/08/93	181	11.1	< 3	3,670	140		8.3	< 0.05	1.50	3.90
	07/19/94		24.1	3	77	290	486	7.5	1.81	0.41	0.42
	09/19/94		22.7	3	120	930	888	7.6	2.60	1.20	2.70
	01/24/95	5	9.5	< 3	1,190	210	274	8.2	0.14	0.41	
	11/21/96	30	17.0	< 3	1,980	150	575	8.2	< 0.05	0.52	1.90
	08/10/97		17.5	< 3	4,800	260		8.5	0.60	0.37	1.48
	02/24/98		12.0	< 3	1,460	88		8.4	< 0.50	0.61	6.04
	02/16/00			< 3	610	62					2.15
	08/16/00	76		5	1,170	380					1.50
	02/25/03	9		< 3	187	100	139	7.7	0.19		
	09/04/03	29			3,850	440					6.80
	11/12/03	156			110	150				0.26	0.38
	11/07/04			< 5	810	80	93	8.4	0.05	1.40	1.50
	Median	**53**	**17.3**	**< 3**	**1,180**	**180**	**380**	**8.2**	**0.22**	**0.47**	**2.03**
	Maximum	**500**	**25**	**5**	**17,800**	**930**	**888**	**9**	**3**	**2**	**7**
	Minimum	**5**	**9.5**	**< 3**	**77**	**62**	**93**	**7.5**	**< 0.05**	**< 0.05**	**0.38**

Location	Date	NO3-N mg/L	NO-2 mg/L	NH3-N mg/L	TKN mg/L	Total Nitrogen mg/L	Copper mg/L	Dissolved Copper mg/L	Chromium mg/L	Lead mg/L
C-1 Channel at Warm Springs	08/30/92	1.60		0.07	8.3	9.9	0.27		0.1900	0.2200
	02/08/93	0.30		0.11	< 1.0	1.3	0.09		0.0630	0.0600
	07/19/94	0.80		0.97	2.8	3.6	0.02		< 0.0100	0.0100
	09/19/94	5.20		1.60	4.1	9.3	0.03		0.0140	0.0220
	01/24/95	0.80		0.06	< 1.0	1.8	0.04		0.0190	< 0.1000
	11/21/96	0.80		0.30	2.1	2.9	0.03			< 0.1000
	08/10/97	2.00		0.20	5.2	7.2	0.03			< 0.1000
	02/24/98	0.59		0.20	1.7	2.3	< 0.01			< 0.1000
	02/16/00	0.49		0.36	1.9	2.4	0.07	< 0.010		< 0.1000
	08/16/00	4.12		1.13	6.1	10.2	0.15	0.034		< 0.1000
	02/25/03	0.44	< 0.10		0.9	1.4	0.03	< 0.010	0.0089	0.0055
	09/04/03	1.70	< 0.10		10.0	11.5	< 0.20	< 0.010		0.0900
	11/12/03	0.61	< 0.10		2.4	3.0	0.02	0.038		0.0045
	11/07/04	0.20	< 0.10		1.4	1.6	0.04	< 0.010	0.0160	0.0170
	Median	**0.80**	**< 0.10**	**0.25**	**2.3**	**3.0**	**0.03**	**< 0.010**	**0.0160**	**< 0.1000**
	Maximum	**5**	**< 0.10**	**2**	**10**	**12**	**0.27**	**0.038**	**0.1900**	**0.2200**
	Minimum	**0.20**	**< 0.10**	**0.06**	**0.9**	**1.3**	**0.01**	**< 0.010**	**0.0089**	**0.0045**

Location	Date	Dissolved Lead mg/L	Mercury mg/L	Cadmium mg/L	Zinc mg/L	Dissolved Zinc mg/L	Silver mg/L	Nickel mg/L	Selenium mg/L	Arsenic mg/L
C-1 Channel at Warm Springs	08/30/92		0.0014	< 0.0050	0.89		< 0.0100	0.210		0.120
	02/08/93		< 0.0002	< 0.0050	0.37		< 0.0100	0.077	< 0.0250	0.021
	07/19/94		< 0.0002	< 0.0050	0.08		< 0.0100	0.017	< 0.0050	< 0.005
	09/19/94		< 0.0002	< 0.0050	0.20		< 0.0100	0.022	< 0.0050	0.008
	01/24/95		0.0002	< 0.0050	0.18		< 0.0100	0.068	< 0.0050	
	11/21/96				0.23					
	08/10/97				0.20					
	02/24/98				0.17					
	02/16/00	< 0.10			0.32	< 0.20				
	08/16/00	< 0.10			0.49	< 0.02				
	02/25/03	< 0.10	< 0.0002	< 0.0005	0.08	0.10	< 0.0005	0.007	< 0.0050	0.003
	09/04/03	< 0.10			0.45	< 0.02				
	11/12/03	< 0.02			0.08	0.08				
	11/07/04	< 0.02	< 0.0002	< 0.0005	0.15	< 0.02	< 0.0005	0.020	< 0.0100	0.006
	Median	**< 0.10**	**< 0.0002**	**< 0.0050**	**0.20**	**< 0.05**	**< 0.0100**	**0.022**	**< 0.005**	**0.007**
	Maximum	**< 0.10**	**0.0014**	**< 0.0050**	**0.89**	**< 0.20**	**< 0.0100**	**0.210**	**< 0.025**	**0.120**
	Minimum	**< 0.02**	**< 0.0002**	**< 0.0005**	**0.08**	**< 0.02**	**< 0.0005**	**0.007**	**< 0.005**	**0.003**

Location	Date	Boron mg/L	Cyanide mg/L	BOD mg/L	COD mg/L	Color ACU	Turbidity NTU	Phenol mg/L	Petroleum Hydrocarbons	TPH (diesel) MPN/100 mL
C-1 Channel at Warm Springs	08/30/92	0.27	0.015	13	88	30	8,500	0.02		
	02/08/93	0.09	< 0.005	< 6	81	30	1,900	0.10		
	07/19/94	0.10	0.006	27	190	200	26	0.08		
	09/19/94	0.23	0.009	105	560	400	18	0.02		
	01/24/95	0.06	0.007	7	60	25	380	0.10		< 1
	11/21/96	0.07	< 0.005	< 6	58	32	840	< 0.01	< 1	
	08/10/97	0.15	< 0.005	8	230	< 3	4,400	< 0.01		
	02/24/98	0.09	< 0.005	13	120	20	850	< 0.01	< 1	
	02/16/00									
	08/16/00	0.12								
	02/25/03	< 0.05								
	09/04/03	0.11								
	11/12/03	< 0.05								
	11/07/04	< 0.05								
	Median	**0.09**	**0.006**	**11**	**104**	**30**	**845**	**0.02**	**< 1**	**< 1**
	Maximum	**0.27**	**0.015**	**105**	**560**	**400**	**8,500**	**0.10**	**< 1**	**< 1**
	Minimum	**< 0.05**	**< 0.005**	**< 6**	**58**	**3**	**18**	**< 0.01**	**< 1**	**< 1**

Location	Date	TPH (gasoline) MPN/100 mL	Total Chlorine mg/L	Fecal Coliform MPN/100 mL	Fecal* Coliform MPN/100 mL	Fecal** Coliform MPN/100 mL	Fecal Strep. MPN/100 mL	Fecal* Strep. MPN/100 mL	Fecal** Strep. MPN/100 mL	Salmonella MPN/100 mL
C-1 Channel at Warm Springs	08/30/92		< 0.100	90,000			> 16			
	02/08/93		< 0.100	3,000			30,000			
	07/19/94		< 0.100		11,000	30,000		80,000	300,000	4.0
	09/19/94		< 0.010			30,000			90,000	8.0
	01/24/95	< 1	< 0.010			1,700			13,000	< 2.0
	11/21/96		< 0.010	240			1,230			< 2.2
	08/10/97		< 0.100	3,000			50,000			9.2
	02/24/98		0.100	5,000			24,000			< 2.2
	02/16/00			13,000			30,000			
	08/16/00			30,000			90,000			
	02/25/03			8,000			2,400			
	09/04/03			17,000			30,000			
	11/12/03			24,000			16,000			
	11/07/04			5,000			17,000			
	Median	**< 1**	**< 0.100**	**8,000**	**11,000**	**30,000**	**24,000**	**80,000**	**90,000**	**3.1**
	Maximum	**< 1**	**0.100**	**90,000**	**11,000**	**30,000**	**90,000**	**80,000**	**300,000**	**9.2**
	Minimum	**< 1**	**< 0.010**	**240**	**11,000**	**1,700**	**> 16**	**80,000**	**13,000**	**< 2.0**

Location	Date	VOC # of detects		Pesticides # of detects		SOC # of detects		Herbicides # of detects	
C-1 Channel at Warm Springs	08/30/92								
	02/08/93								
	07/19/94								
	09/19/94								
	01/24/95								
	11/21/96			0				1	hh
	08/10/97			0				1	
	02/24/98			0				2	
	02/16/00	1	d	0				0	
	08/16/00	1	a	1	ww			1	hh
	02/25/03	0		0		5	g,h,l,o,x	0	
	09/04/03	0		0		0		0	
	11/12/03	4		0		4		0	
	11/07/04	0		0		1	x	0	
	Median								
	Maximum								
	Minimum								

Location	Date	Q cfs	Temp Deg. C	Oil & Grease mg/L	TSS mg/L	TDS mg/L	Specific Conductance umho/cm	Lab pH units	Surfactants (MBAS) mg/L	Ortho-Phosphate mg/L	Total Phosphorous mg/L
Sloan Channel (Range Wash) at Charleston	10/24/92	32	17.8	< 3	280	100		7.9	0.21	0.41	0.4
	02/08/93	56	10.5	< 3	830	130		8.2	< 0.10	0.64	4.7
	07/19/94	24	23.4		6,540	430	611	7.3	0.61	0.09	2.1
	08/09/94	5	24.1	< 3	16,200	440	598	7.9	0.31	0.09	2.0
	08/19/94	2	23.1	< 3	4,010	390	626	8.0	< 0.05	< 0.05	0.8
	01/24/95		10.0	< 3	3,540	230	3	8.1	0.22	0.08	
	08/12/95	5	27.3	3	3,390	510	620	7.4	0.75	0.24	3.1
	11/21/96	63	16.9	< 3	5,230	240	413	8.0	< 0.05	0.51	1.7
	07/22/97		27.0	1,060	230	200	297	8.1		0.44	0.1
	08/08/97			4	1,500	240		7.9	1.53	0.08	0.5
	08/14/98	30		< 3	4,060	330					1.0
	02/16/00			< 3	1,970	200					1.7
	02/26/01			< 3	220	110					0.3
	02/12/03	99		< 3	79	110	172	7.2	0.31	0.18	0.3
	10/20/04			< 5	270	180	263	7.9	0.56	0.30	0.5
	Median	**30**	**23.1**	**< 3**	**1,970**	**230**	**413**	**7.9**	**< 0.31**	**0.21**	**0.9**
	Maximum	**99**	**27.3**	**1,060**	**16,200**	**510**	**626**	**8.2**	**1.53**	**0.64**	**4.7**
	Minimum	**2**	**10.0**	**< 3**	**79**	**100**	**3**	**7.2**	**< 0.05**	**< 0.05**	**0.1**

Location	Date	NO3-N mg/L	NO-2 mg/L	NH3-N mg/L	TKN mg/L	Total Nitrogen mg/L	Copper mg/L	Dissolved Copper mg/L	Chromium mg/L	Lead mg/L
Sloan Channel (Range Wash) at Charleston	10/24/92	0.50		0.20	1.1	1.6	0.028		0.019	0.020
	02/08/93	0.40		0.14	< 1.0	1.4	0.017		0.021	0.018
	07/19/94	2.30		1.20	1.7	4.0	0.068		0.057	0.063
	08/09/94	1.30		0.14	2.7	4.0	0.049		0.031	0.086
	08/19/94	2.00		0.37	3.1	5.1	0.040		0.035	0.037
	01/24/95	8.70		0.70	2.5	11.2	0.064		0.058	< 0.100
	08/12/95	< 0.20		0.40	8.0	8.2	0.056		0.035	0.029
	11/21/96	1.10		0.50	3.7	4.8	0.033			< 0.100
	07/22/97	0.90		1.00	2.5	3.4	0.029			< 0.100
	08/08/97	2.00		2.50	6.1	8.1	0.150			0.210
	08/14/98	2.50		0.66	5.8	8.3	0.110	0.011		< 0.100
	02/16/00	1.74		0.49	3.9	5.6	0.012	< 0.010		< 0.100
	02/26/01	0.64		0.28	1.3	1.9	0.029	< 0.010		0.011
	02/12/03	0.73	< 0.1		2.0	2.7	0.018	< 0.010	0.004	0.006
	10/20/04	0.90	< 0.1		2.6	3.5	0.028	0.013		0.010
	Median	**1.10**	**< 0.1**	**0.49**	**2.6**	**4.0**	**0.033**	**0.010**	**0.033**	**0.063**
	Maximum	**8.70**	**< 0.1**	**2.50**	**8.0**	**11.2**	**0.150**	**0.013**	**0.058**	**0.210**
	Minimum	**< 0.20**	**< 0.1**	**0.14**	**< 1.0**	**1.4**	**0.012**	**< 0.010**	**0.004**	**0.006**

Location	Date	Dissolved Lead mg/L	Mercury mg/L	Cadmium mg/L	Zinc mg/L	Dissolved Zinc mg/L	Silver mg/L	Nickel mg/L	Selenium mg/L	Arsenic mg/L
Sloan Channel (Range Wash) at Charleston	10/24/92		< 0.0002	< 0.005	0.17		< 0.010	< 0.040		< 0.025
	02/08/93		< 0.0002	< 0.005	0.11		< 0.010	< 0.040	< 0.005	0.010
	07/19/94		< 0.0002	< 0.005	0.31		< 0.010	0.046	< 0.010	0.049
	08/09/94		0.0002	< 0.005	0.17		< 0.010	0.028	< 0.005	0.061
	08/19/94		< 0.0002	< 0.005	0.15		< 0.010	0.026	0.027	0.027
	01/24/95		< 0.0002	< 0.005	0.29		< 0.010	0.044	< 0.005	
	08/12/95		< 0.0002	< 0.005	0.30		< 0.010	0.030	< 0.005	0.018
	11/21/96				0.20					
	07/22/97				0.26					
	08/08/97				0.62					
	08/14/98	< 0.1000			0.44	< 0.02				
	02/16/00	< 0.1000			0.05	< 0.02				
	02/26/01	< 0.0005			0.12	< 0.02				
	02/12/03	< 0.1000	< 0.0002	< 0.001	0.08	< 0.02	< 0.001	< 0.001	< 0.050	0.003
	10/20/04	< 0.0200	0.0002	< 0.005			< 0.001	0.009	< 0.010	0.005
	Median	**< 0.1000**	**< 0.0002**	**< 0.005**	**0.19**	**< 0.02**	**< 0.010**	**0.030**	**< 0.008**	**0.022**
	Maximum	**< 0.1000**	**0.0002**	**< 0.005**	**0.62**	**< 0.02**	**< 0.010**	**0.046**	**< 0.050**	**0.061**
	Minimum	**< 0.0005**	**< 0.0002**	**< 0.001**	**0.05**	**< 0.02**	**< 0.001**	**< 0.001**	**< 0.005**	**0.003**

Location	Date	Boron mg/L	Cyanide mg/L	BOD mg/L	COD mg/L	Color ACU	Turbidity NTU	Phenol mg/L	Petroleum Hydrocarbons	TPH (diesel) MPN/100 mL
Sloan Channel (Range Wash) at Charleston	10/24/92	0.08	0.005	12	74	10.0	0	< 0.01		
	02/08/93	0.08	< 0.005	< 6	46	15.0	600	0.20		
	07/19/94	0.24	0.007	28	135	100.0	3	0.04		
	08/09/94	0.93	< 0.005	15	295	75.0	1	< 0.01		
	08/19/94	0.24	< 0.005	10	115	150.0	1,350	< 0.01		
	01/24/95	0.11	0.010	14	97	15.0	1,100	0.10		< 1
	08/12/95	0.20	< 0.005	59	375	250.0	63	0.10		< 1
	11/21/96	0.15	< 0.005	17	140	37.0	1,600	< 0.01	< 1	
	07/22/97	0.12	< 0.005	26	130	200.0	240	< 0.01	< 1	
	08/08/97	0.18	0.330	41	310	150.0	600	0.01		
	08/14/98	0.24								
	02/16/00	0.10								
	02/26/01									
	02/12/03	< 0.05								
	10/20/04	0.10								
	Median	**0.14**	**< 0.005**	**16**	**133**	**87.5**	**420**	**< 0.01**	**< 1**	**< 1**
	Maximum	**0.93**	**0.330**	**59**	**375**	**250.0**	**1,600**	**0.20**	**< 1**	**< 1**
	Minimum	**< 0.05**	**< 0.005**	**< 6**	**46**	**10.0**	**0.170**	**< 0.01**	**< 1**	**< 1**

Location	**Date**	**TPH (gasoline)** MPN/100 mL	**Total Chlorine** mg/L	**Fecal Coliform** MPN/100 mL	**Fecal* Coliform** MPN/100 mL	**Fecal** Coliform** MPN/100 mL	**Fecal Strep.** MPN/100 mL	**Fecal* Strep.** MPN/100 mL	**Fecal** Strep.** MPN/100 mL	**Salmonella** MPN/100 mL
Sloan Channel (Range Wash) at Charleston	10/24/92		< 0.10	5,000			130,000			
	02/08/93		< 0.10	1,300		1,400	24,000		50,000	
	07/19/94		< 0.10	28,000	23,000	23,000	22,000	30,000	30,000	12.0
	08/09/94		< 0.10		170,000	30,000		70,000	23,000	< 2.0
	08/19/94		< 0.10	30,000	80,000	130,000	23,000	35,000	9,000	170.0
	01/24/95	< 1	< 0.01			3,000			17,000	4.0
	08/12/95	< 1	< 0.01			> 160,000			> 1,600	< 14.0
	11/21/96		< 0.01	240			9,300			< 2.2
	07/22/97		< 0.10	90,000			90,000			< 2.2
	08/08/97			5,000			160,000			< 2.2
	08/14/98			3,000			160,000			< 2.2
	02/16/00			11,000			30,000			
	02/26/01			5,000			50,000			
	02/12/03			5,000			80,000			
	10/20/04			17,000			30,000			
	Median	**< 1**	**< 0.10**	**5,000**	**80,000**	**26,500**	**40,000**	**35,000**	**20,000**	**< 2.2**
	Maximum	**< 1**	**< 0.10**	**90,000**	**170,000**	**160,000**	**160,000**	**70,000**	**50,000**	**170.0**
	Minimum	**< 1**	**< 0.01**	**240**	**23,000**	**1,400**	**9,300**	**30,000**	**> 1,600**	**< 2.0**

Location	Date	VOC # of detects		Pesticides # of detects		SOC # of detects		Herbicides # of detects	
Sloan Channel (Range Wash) at Charleston	10/24/92								
	02/08/93								
	07/19/94								
	08/09/94								
	08/19/94								
	01/24/95								
	08/12/95								
	11/21/96			1	c,m,ii,jj,kk,ll			1	hh
	07/22/97			0				1	
	08/08/97			0				0	
	08/14/98	1	a	0				1	hh
	02/16/00	1	a	0				0	
	02/26/01	1	a	0				0	
	02/12/03	1	a	0		9	g,h,i,j,k,l,u,v,x		
	10/20/04	1	a	0		4	x,h,g,k	1	uu
	Median								
	Maximum								
	Minimum								

Appendix A-2

A-2: Storm and Wet Weather Reports (2023-2024)

APPENDIX A-2

NPDES Storm Write Up and Wet Weather Sample Collection Form

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT | LAS VEGAS VALLEY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PROJECT

Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	Friday, September 1, 2023		
Samplers' Name:	Bany Umanzor, Sean Weir		
Sample Collection Information			
Time of 1st Sample Collected:	8:49 AM		
Time of Grab Sample Collected:	9:11 AM		
Time of 24th Sample Collected:	9:37 AM		
Sample Intervals:	2 minutes		
Air Temperature (°F):	76	**Water Temperature (°F):**	-
Relative Humidity (%RH):	66	**Conductivity (mS/cm):**	-
5-minute Precipitation (inches):	-	**Discharge (cfs):**	-
Turbidity (NTU):	-	**Photos:**	Attached
Sampling Notes:	All 24 bottled samples were combined into one composite sample. The sample time on the Chain of Custody (COC) form was 8:49 AM and the sample identification name was FW-100-CS.		

Weather Conditions

(Temperature, storm location, etc.)

On Friday, September 1, 2023, thunderstorms covered the Las Vegas Valley. Rain depths increased through the morning. Rain gages reported between 0.04 – 0.75 inches before sampling. Throughout the Las Vegas Valley, temperatures were between 73°F and 79°F. Wind speeds ranged from 2 mph to 7 mph (Southwest). Relative humidity ranged between 62% and 66%.

Site Status

(Any maintenance required? Any equipment missing or damaged?)

No new updates.

Additional Information

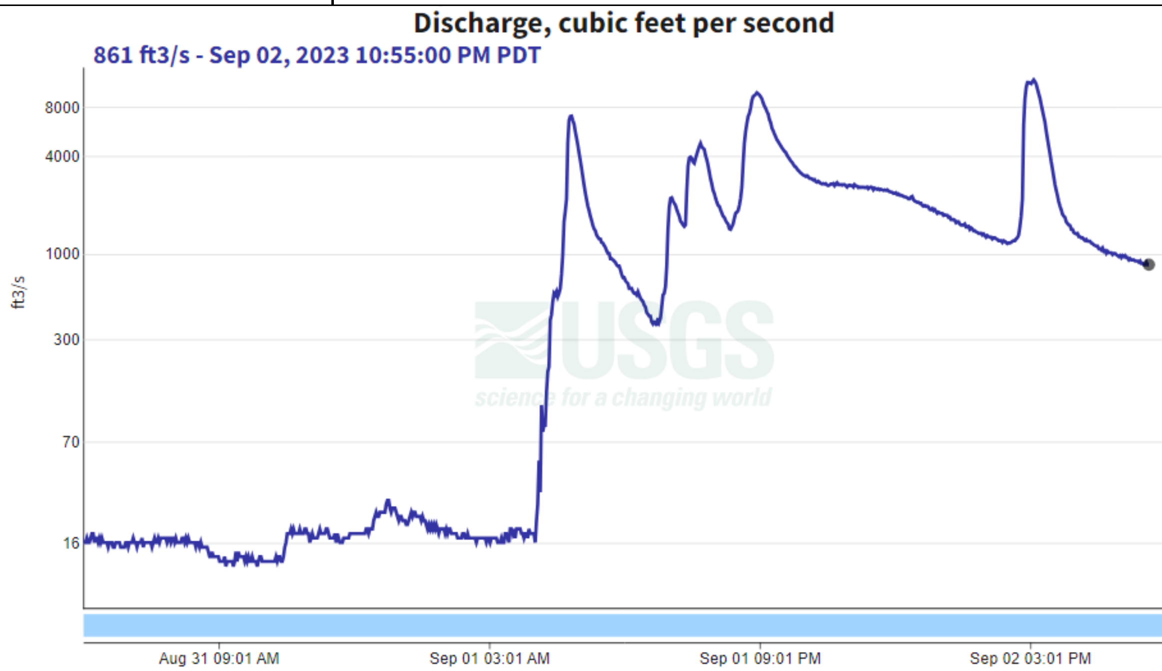
No additional information at this time.

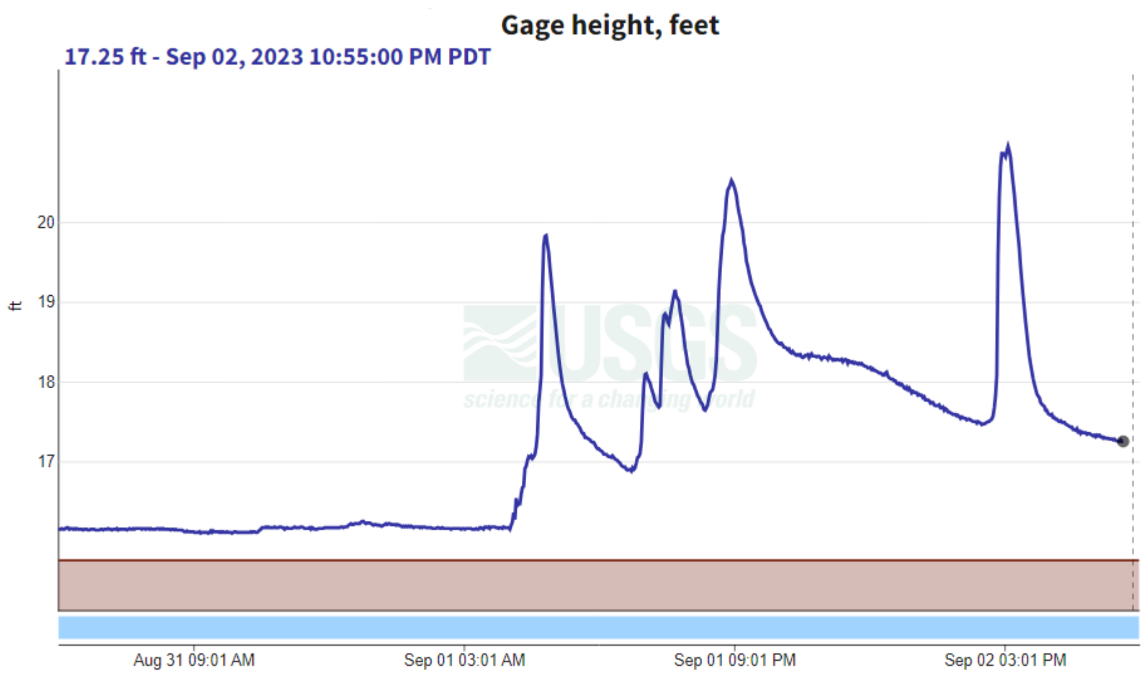
Photos (09/01/2023, 8:49 AM)	
	
	

NPDES Storm Write Up and Wet Weather Sample Summary

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT| LAS VEGAS VALLEY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PROJECT

Sample Location:	Las Vegas Wash at The Club at Sunrise
Date:	Friday, September 1, 2023
Samplers' Name:	Bany Umanzor, Sean Weir

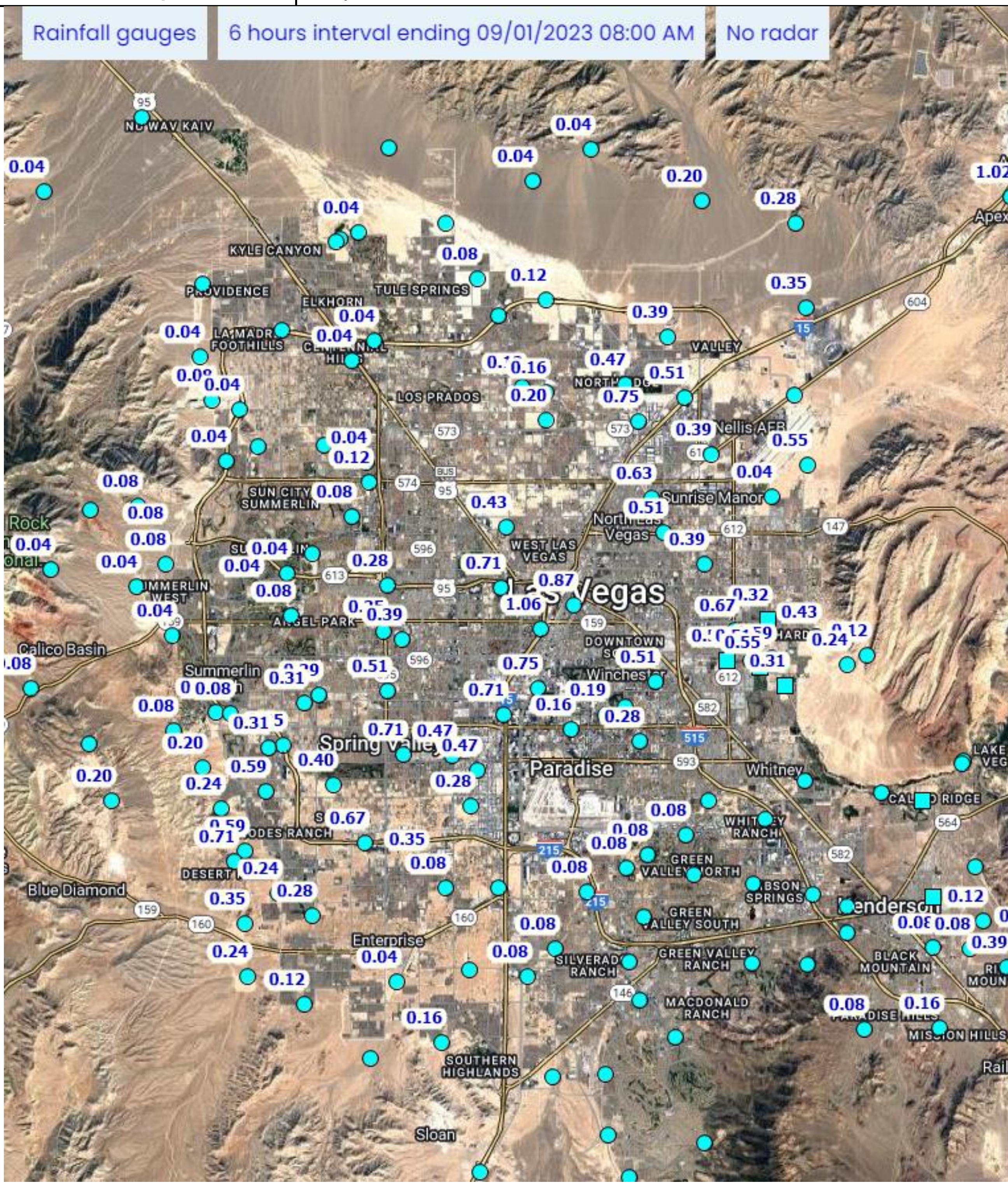




NPDES Storm Write Up and Wet Weather Sample Summary

Clark County Regional Flood Control district| Las Vegas Valley Municipal Separate Storm Sewer System (MS4) Project

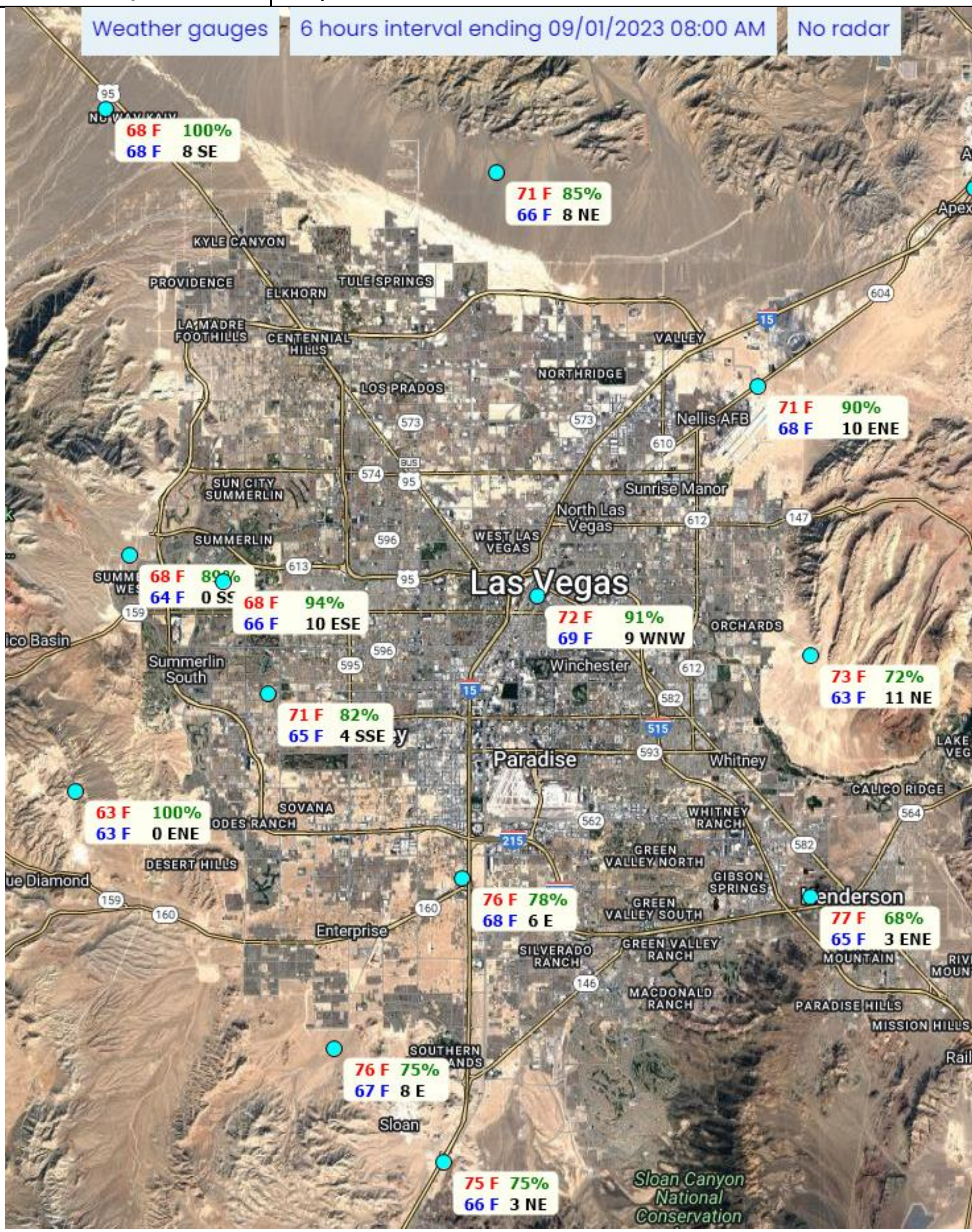
Sample Location:	Las Vegas Wash at The Club at Sunrise
Date:	Friday, September 1, 2023
Samplers' Name:	Bany Umanzor, Sean Weir



NPDES Storm Write Up and Wet Weather Sample Summary

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT| LAS VEGAS VALLEY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PROJECT

Sample Location:	Las Vegas Wash at The Club at Sunrise
Date:	Friday, September 1, 2023
Samplers' Name:	Bany Umanzor, Sean Weir



NPDES Storm Write Up and Wet Weather Sample Collection Form

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT | LAS VEGAS VALLEY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PROJECT

Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	Friday, September 1, 2023		
Samplers' Name:	Bany Umanzor, Sean Weir		
Sample Collection Information			
Time of 1st Sample Collected:	12:27 PM		
Time of Grab Sample Collected:	12:49 PM		
Time of 24th Sample Collected:	1:10 PM		
Sample Intervals:	2 minutes		
Air Temperature (°F):	73	**Water Temperature (°F):**	-
Relative Humidity (%RH):	82	**Conductivity (mS/cm):**	-
5-minute Precipitation (inches):	-	**Discharge (cfs):**	-
Turbidity (NTU):	-	**Photos:**	Attached
Sampling Notes:	All 24 bottled samples were combined into one composite sample. The sample time on the Chain of Custody (COC) form was 12:27 PM and the sample identification name was FW-100-RG.		

Weather Conditions

(Temperature, storm location, etc.)

On Friday, September 1, 2023, thunderstorms covered the Las Vegas Valley. Rain depths increased through the morning. Rain gages reported between 0.04 – 1.06 inches before sampling. Throughout the Las Vegas Valley, temperatures were between 73°F and 77°F. Wind speeds ranged from 4 mph to 5 mph (Northwest). Relative humidity ranged between 66% and 83%.

Site Status

(Any maintenance required? Any equipment missing or damaged?)

No new updates.

Additional Information

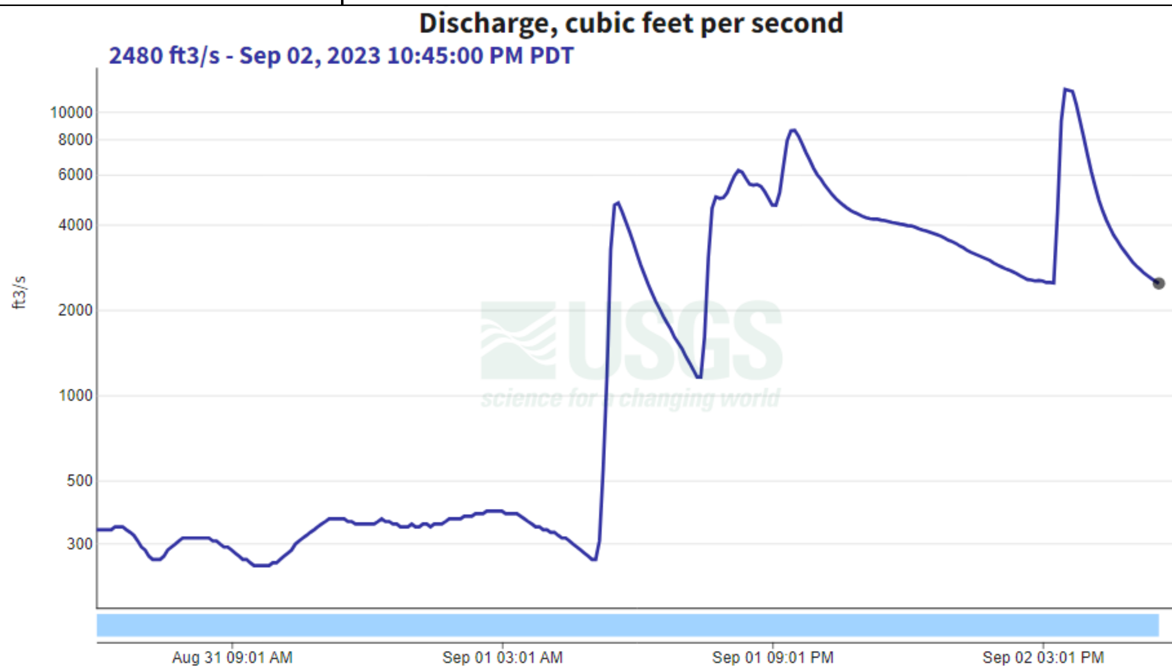
No additional information at this time.

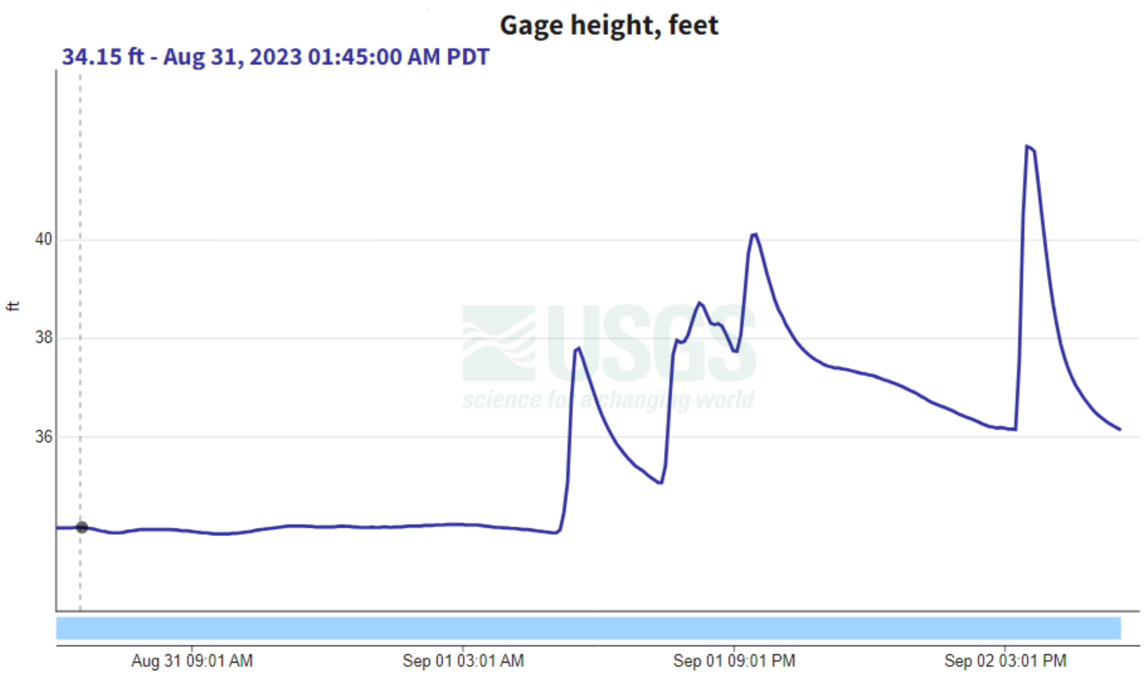
Photos (09/01/2023, 12:27 PM)	
	
	

NPDES Storm Write Up and Wet Weather Sample Summary

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT| LAS VEGAS VALLEY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PROJECT

Sample Location:	Las Vegas Wash at Rainbow Gardens
Date:	Friday, September 1, 2023
Samplers' Name:	Bany Umanzor, Sean Weir

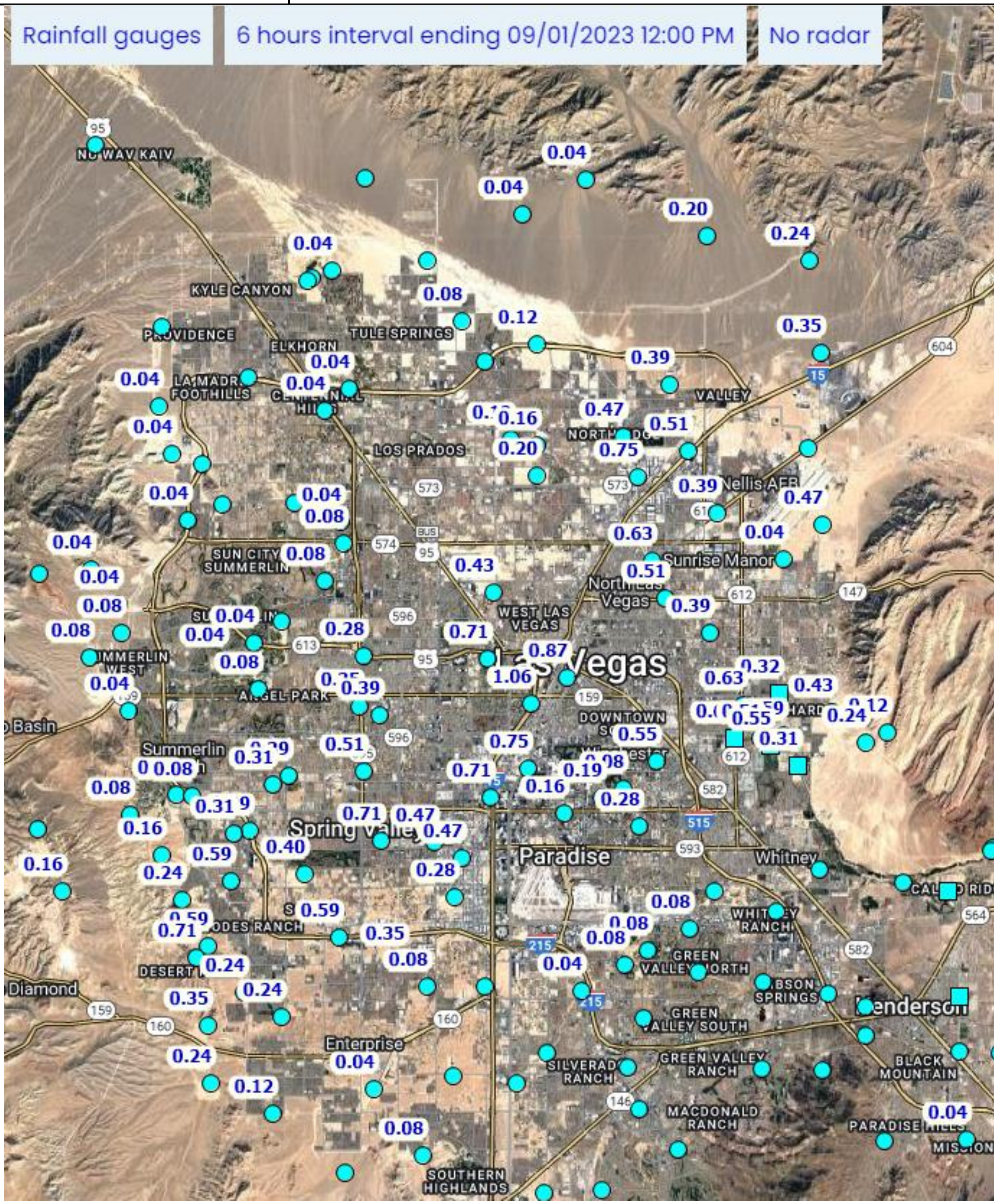




NPDES Storm Write Up and Wet Weather Sample Summary

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT| LAS VEGAS VALLEY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PROJECT

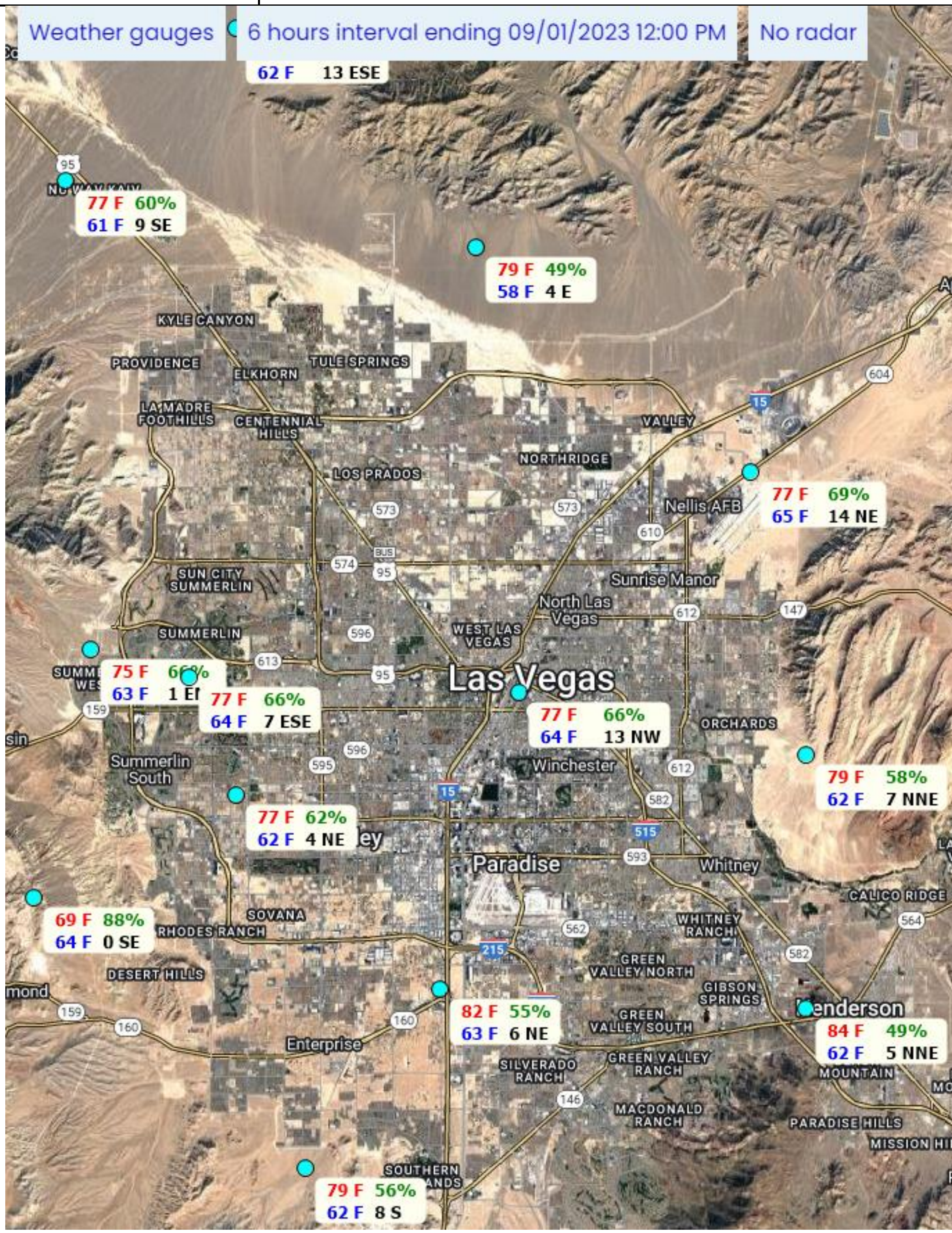
Sample Location:	Las Vegas Wash at Rainbow Gardens
Date:	Friday, September 1, 2023
Samplers' Name:	Bany Umanzor, Sean Weir



NPDES Storm Write Up and Wet Weather Sample Summary

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT| LAS VEGAS VALLEY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PROJECT

Sample Location:	Las Vegas Wash at Rainbow Gardens
Date:	Friday, September 1, 2023
Samplers' Name:	Bany Umanzor, Sean Weir



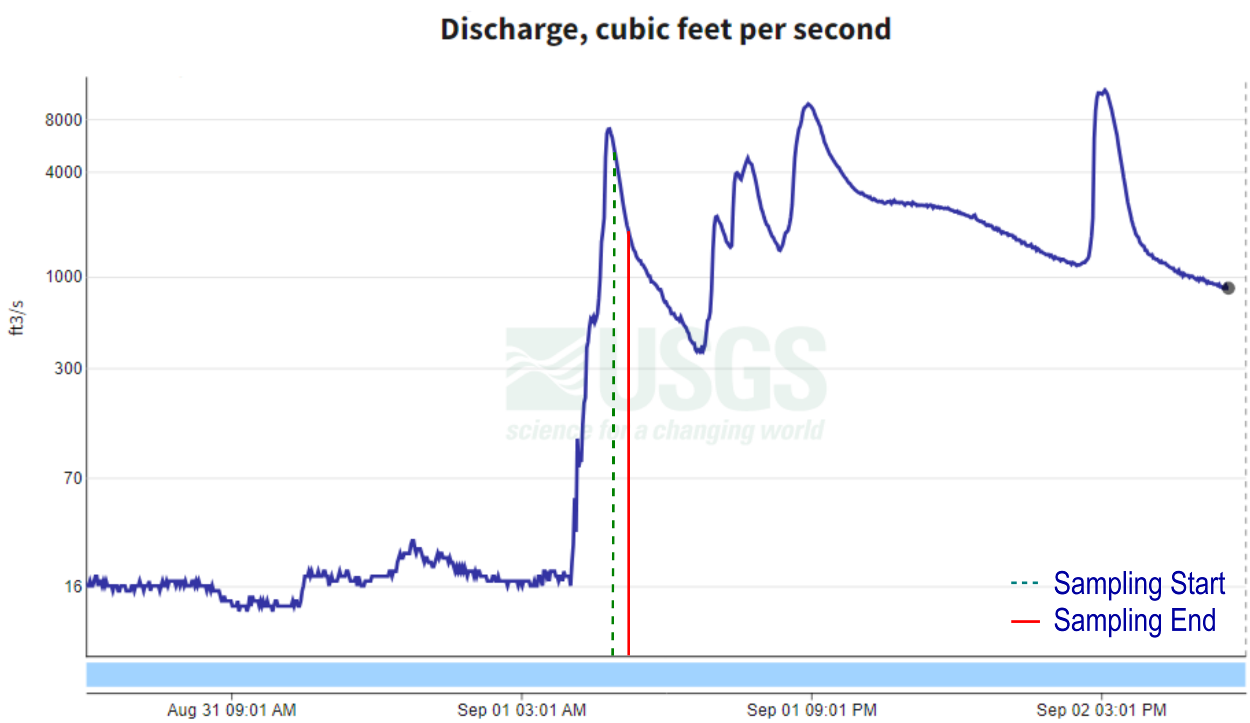
Appendix B

B: Hydrographs

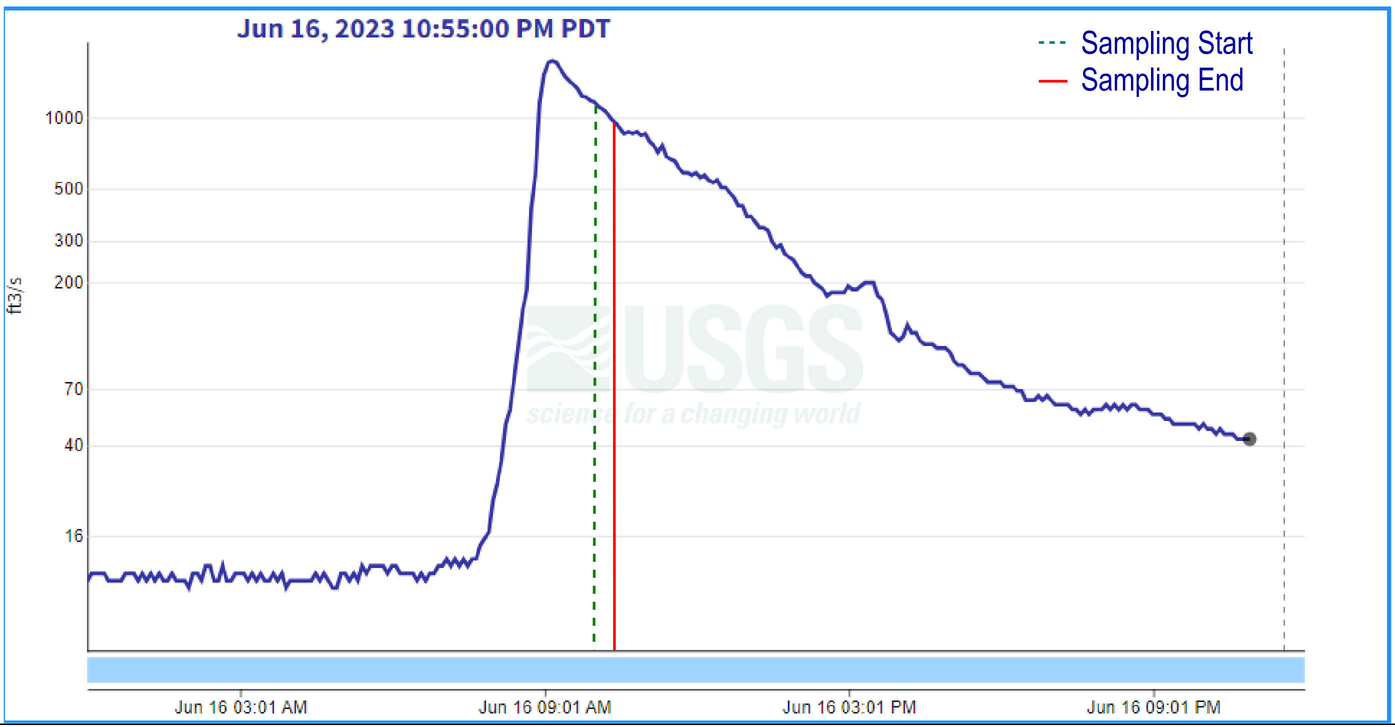
APPENDIX B

Club at Sunrise Hydrographs

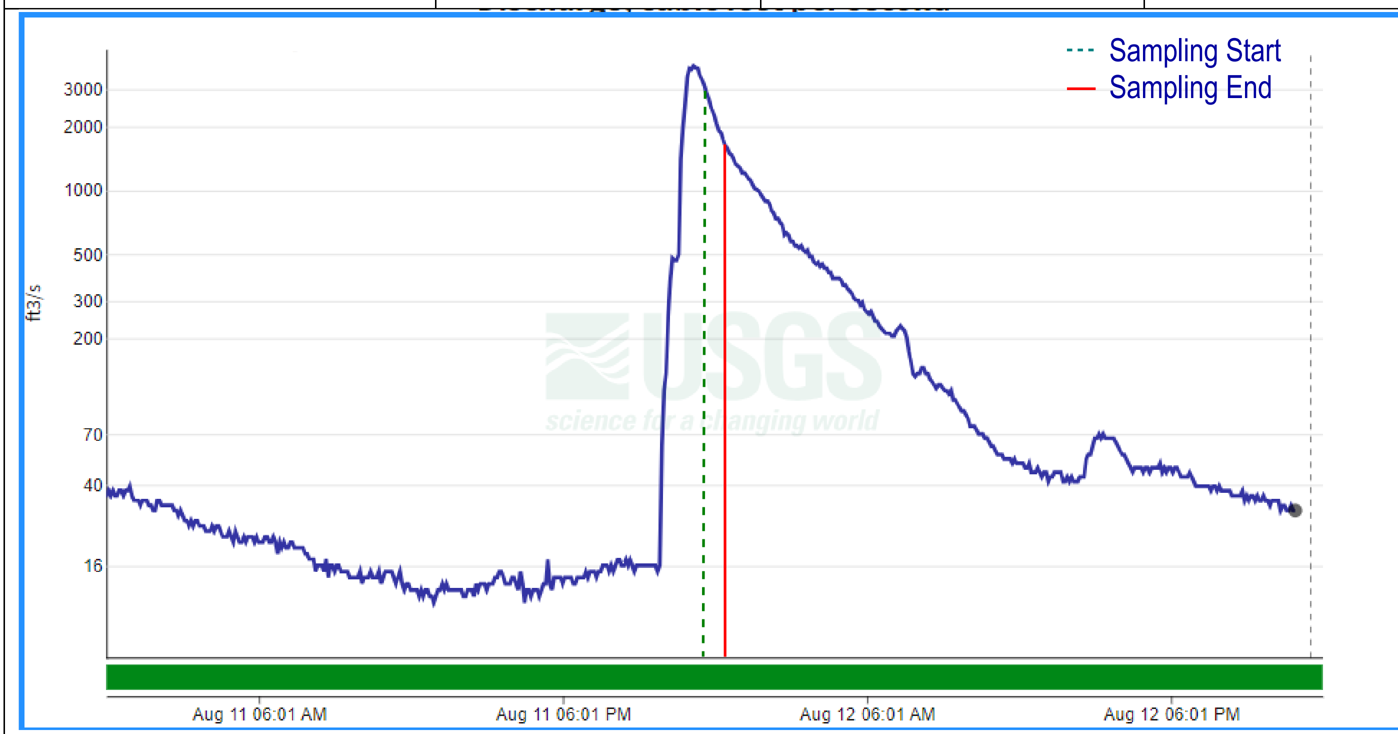
Year:	2023		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	9/1/2023		
Sample Collection Information			
Time of 1st Sample Collected:	8:49 AM		
Time of 24th Sample Collected:	9:37 AM		
Sample Intervals:	2 minutes		
Flow rate at time of sample (CFS):	5,140	**Flow rate at time of end of Sampling (CFS):**	1,970
Average flow rate during sampling (CFS):	3,323	**Max flow rate for the event (CFS):**	7,010
Peak occurs during the sampling time?	No		
TSS (mg/L):	867	**Turbidity (NTU):**	731



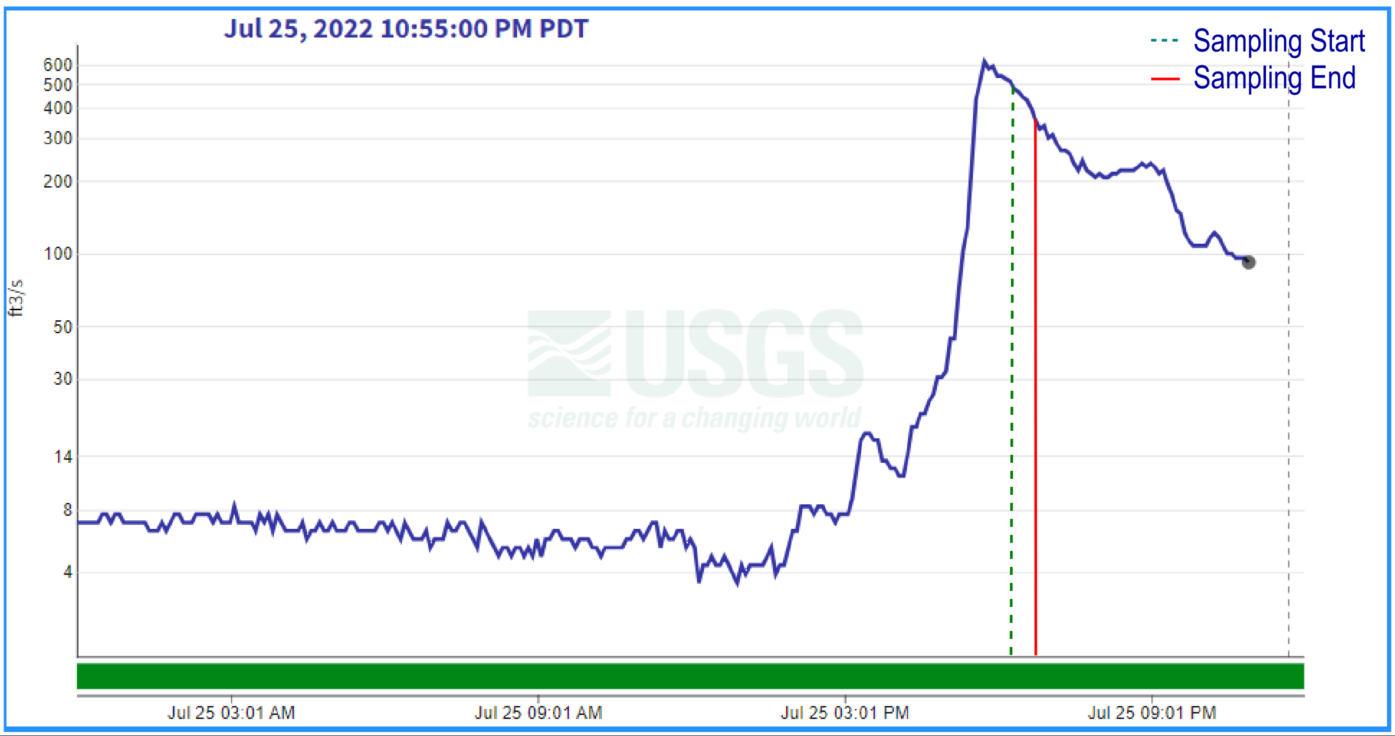
Year:	2023		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	6/16/2023		
Sample Collection Information			
Time of 1st Sample Collected:	10:00 AM		
Time of 24th Sample Collected:	10:25 AM		
Sample Intervals:	1 minute		
Flow rate at time of sample (CFS):	1,160	**Flow rate at time of end of Sampling (CFS):**	945
Average flow rate (CFS):	1,054	**Max flow rate for the event (CFS):**	1,740
Peak occurs during the sampling time?	No		
TSS (mg/L):	560	**Turbidity (NTU):**	353



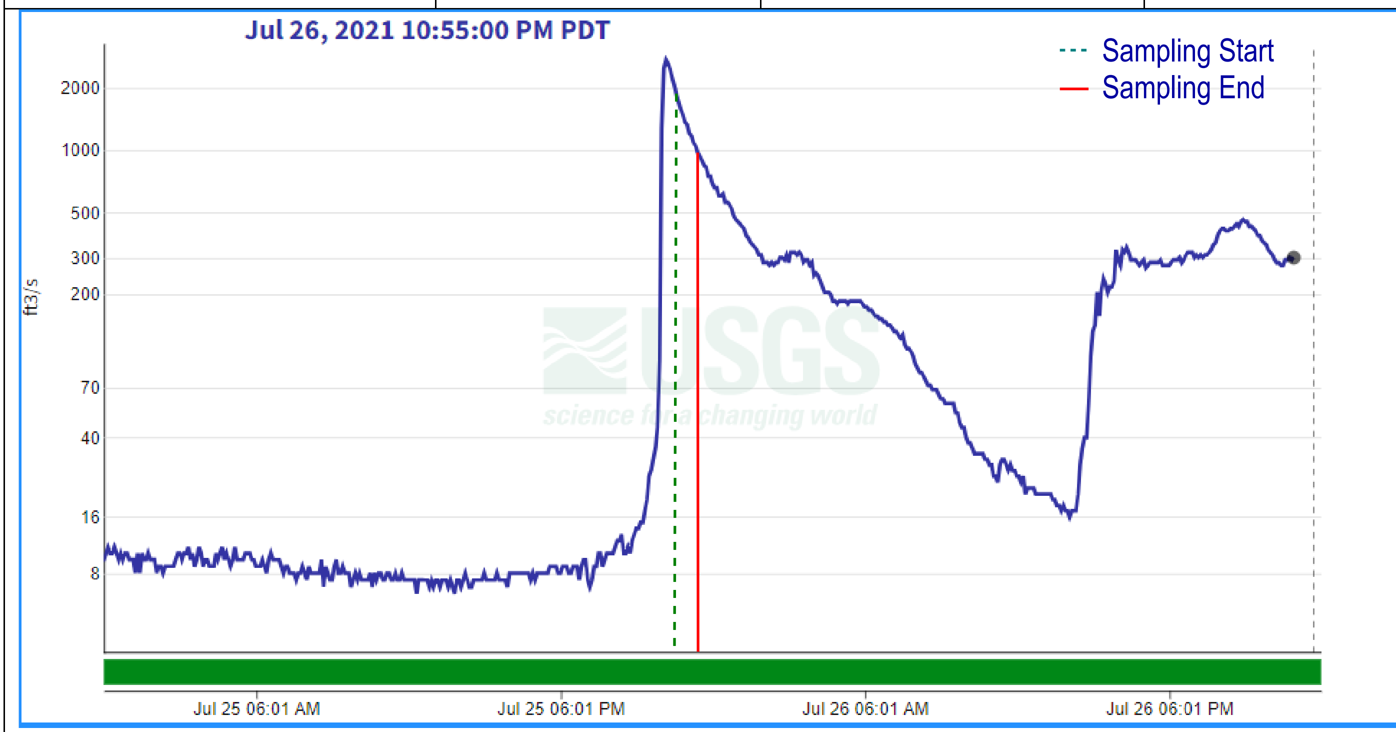
Year:	2022		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	8/11/2022		
Sample Collection Information			
Time of 1st Sample Collected:	11:41 PM		
Time of 24th Sample Collected:	12:29 AM		
Sample Intervals:	2 minutes		
Flow rate at time of sample (CFS):	2,910	**Flow rate at time of end of Sampling (CFS):**	1,580
Average flow rate (CFS):	2,142	**Max flow rate for the event (CFS):**	3,860
Peak occurs during the sampling time?	No		
TSS (mg/L):	860	**Turbidity (NTU):**	666



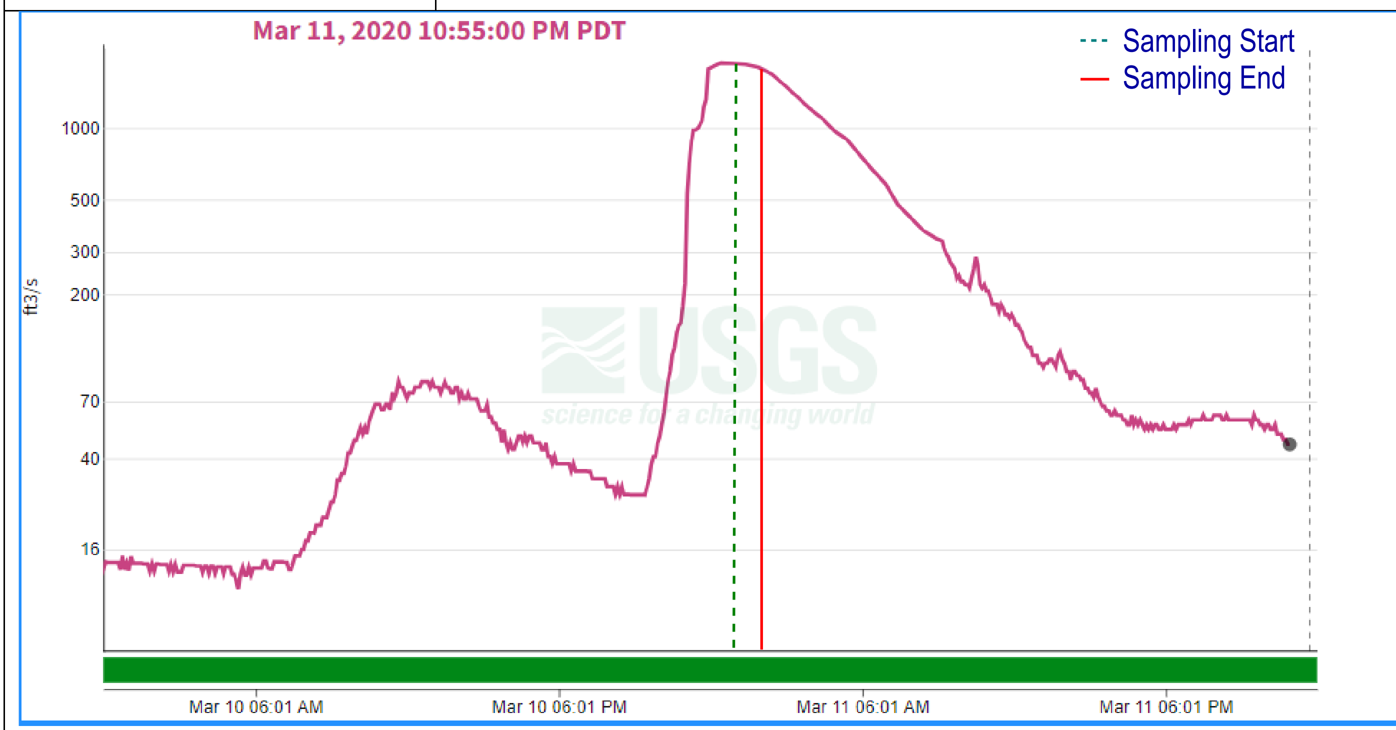
Year:	2022		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	7/25/2022		
Sample Collection Information			
Time of 1st Sample Collected:	6:22 PM		
Time of 24th Sample Collected:	6:46 PM		
Sample Intervals:	1 minute		
Flow rate at time of sample (CFS):	477	**Flow rate at time of end of Sampling (CFS):**	356
Average flow rate (CFS):	428	**Max flow rate for the event (CFS):**	619
Peak occurs during the sampling time?	No		
TSS (mg/L):	825	**Turbidity (NTU):**	526



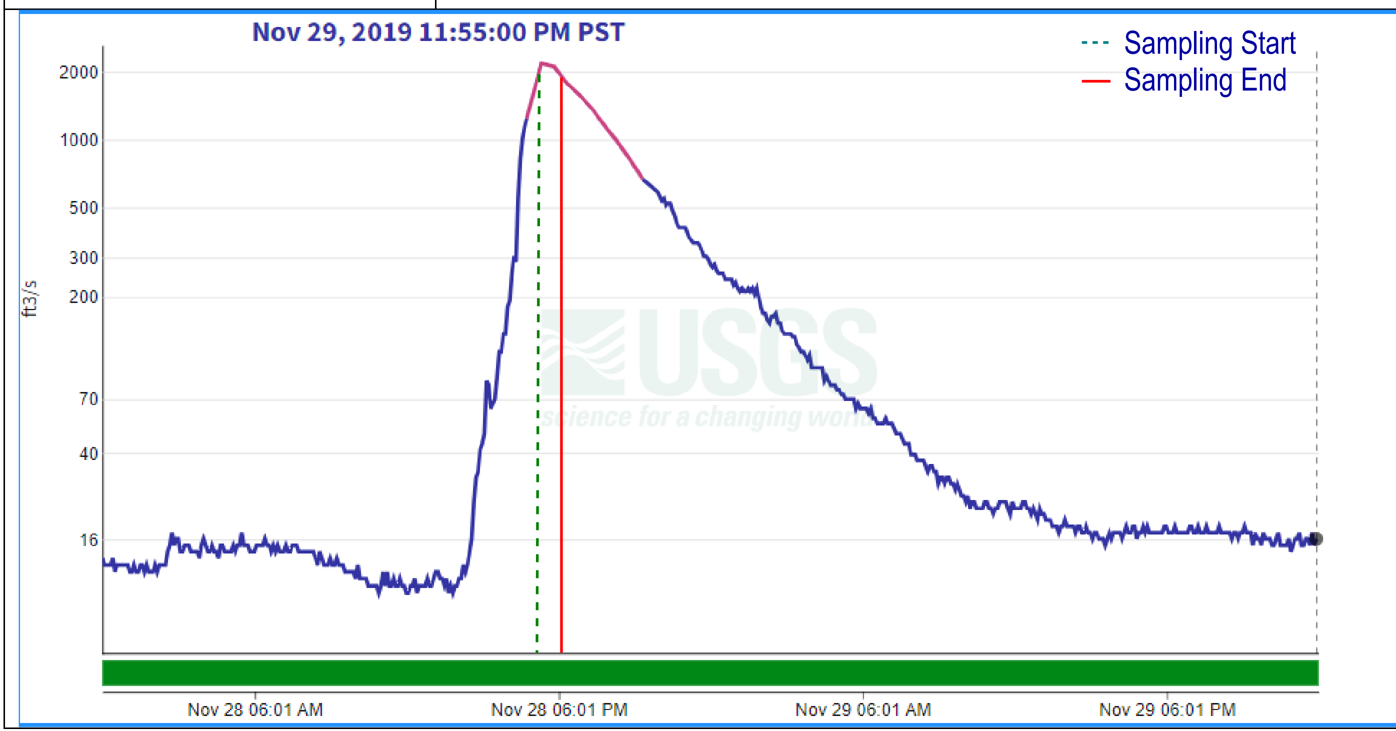
Year:	2021		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	7/25/2021		
Sample Collection Information			
Time of 1st Sample Collected:	10:37 PM		
Time of 24th Sample Collected:	11:23 PM		
Sample Intervals:	2 minutes		
Flow rate at time of sample (CFS):	1,850	**Flow rate at time of end of Sampling (CFS):**	977
Average flow rate (CFS):	1,344	**Max flow rate for the event (CFS):**	2,730
Peak occurs during the sampling time?	No		
TSS (mg/L):	2,800	**Turbidity (NTU):**	1,060



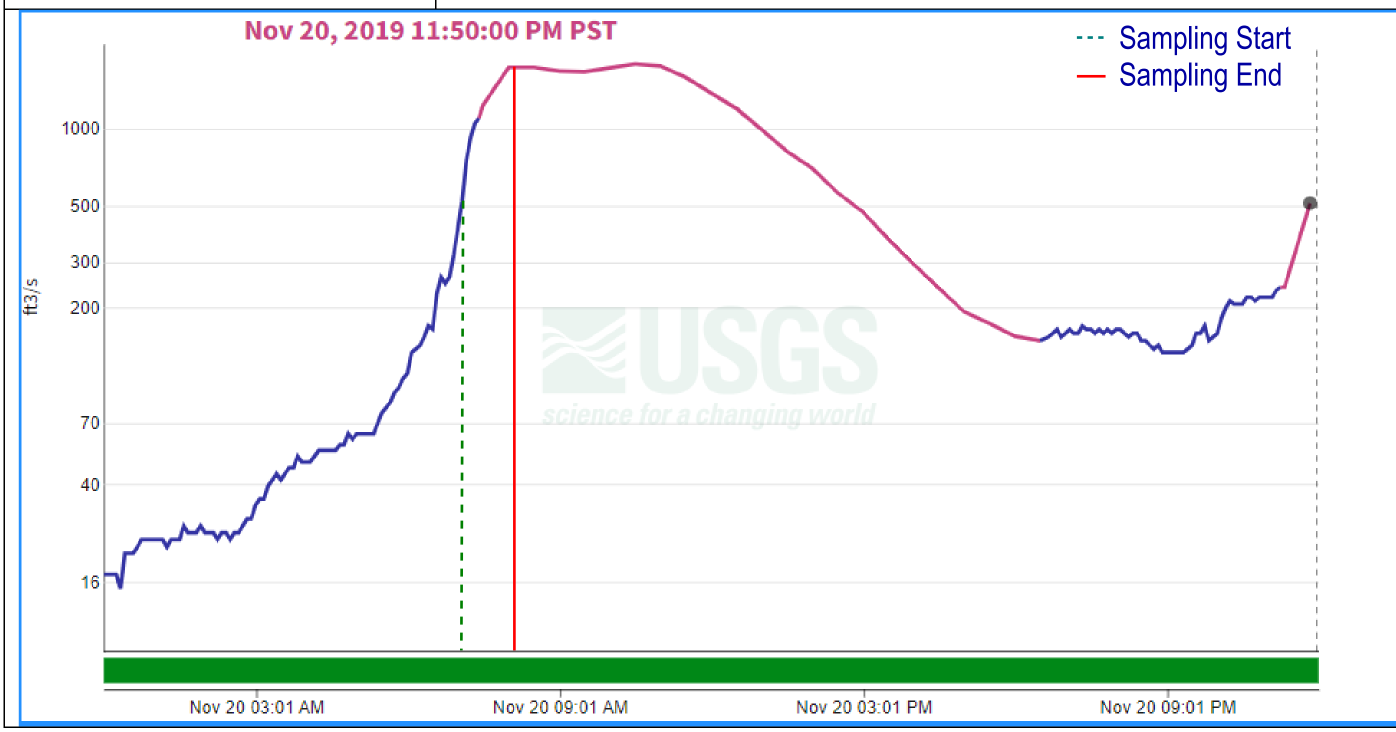
Year:	2020		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	3/11/2020		
Sample Collection Information			
Time of 1st Sample Collected:	12:33 AM		
Time of 24th Sample Collected:	1:46 AM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	1,880	**Flow rate at time of end of Sampling (CFS):**	1,810
Average flow rate during sampling (CFS):	1,850	**Max flow rate for the event (CFS):**	1,880
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	204	**Turbidity (NTU):**	169
Notes:	Only 4 data available		



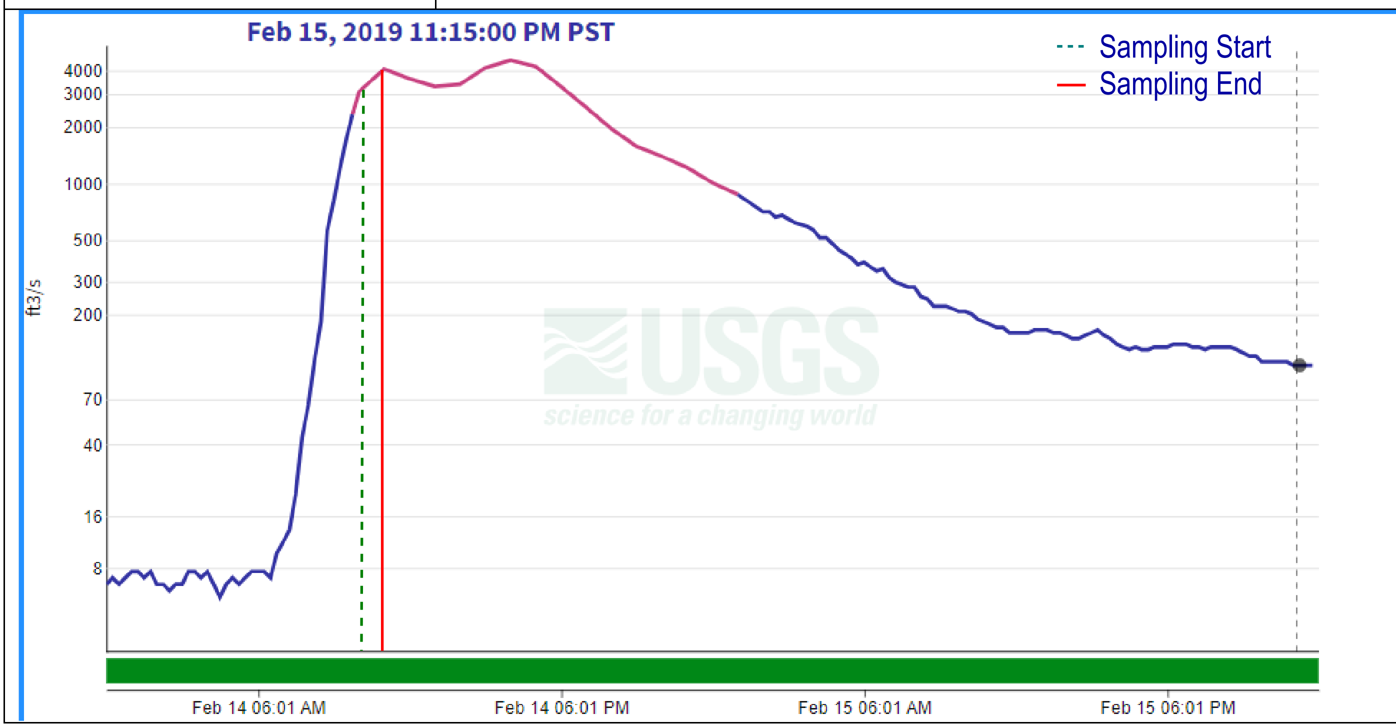
Year:	2019		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	11/28/2019		
Sample Collection Information			
Time of 1st Sample Collected:	5:01 PM		
Time of 24th Sample Collected:	6:10 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	2,000	**Flow rate at time of end of Sampling (CFS):**	1,810
Average flow rate (CFS):	1,973	**Max flow rate for the event (CFS):**	2,180
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	410	**Turbidity (NTU):**	62.9
Notes:	Only 3 data available		



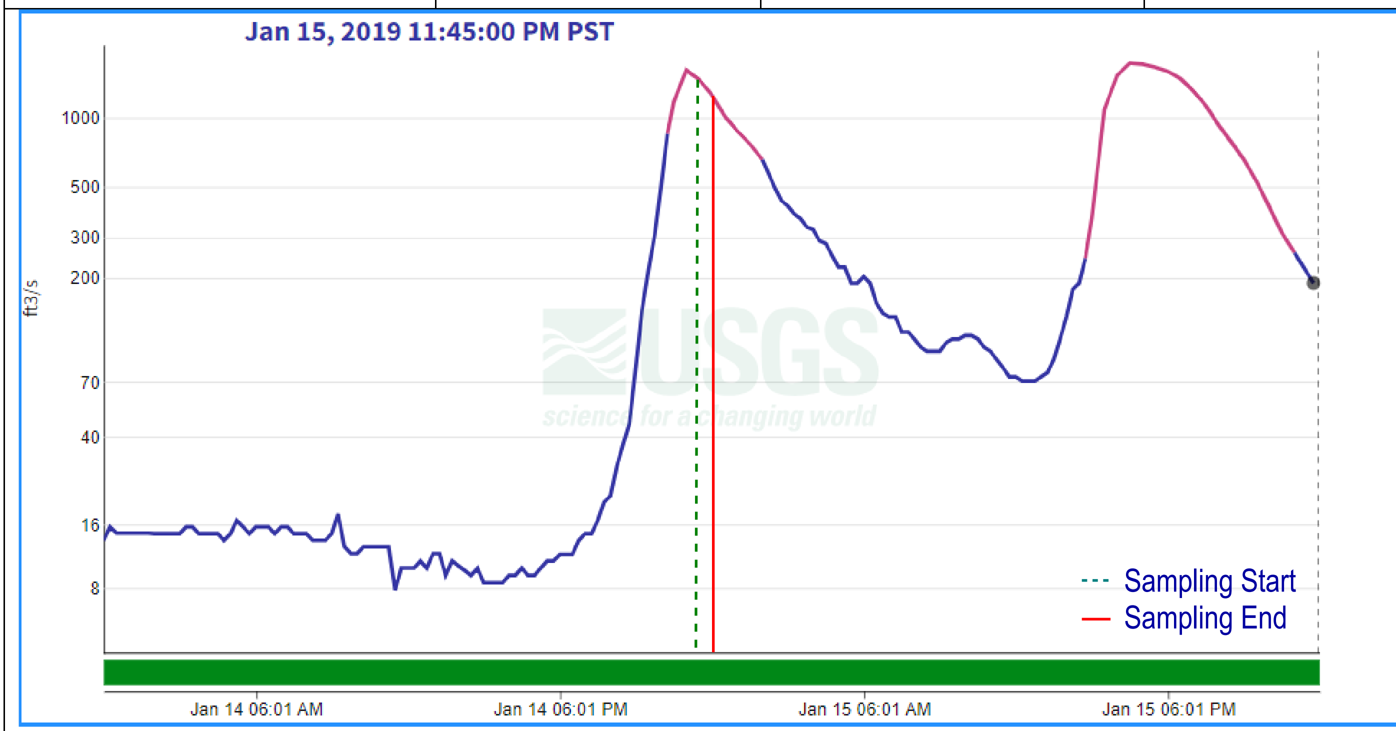
Year:	2019		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	11/20/2019		
Sample Collection Information			
Time of 1st Sample Collected:	7:04 AM		
Time of 24th Sample Collected:	8:20 AM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	523	**Flow rate at time of end of Sampling (CFS):**	1,740
Average flow rate (CFS):	1,133	**Max flow rate for the event (CFS):**	1,740
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	120	**Turbidity (NTU):**	495
Notes:	Missing data		



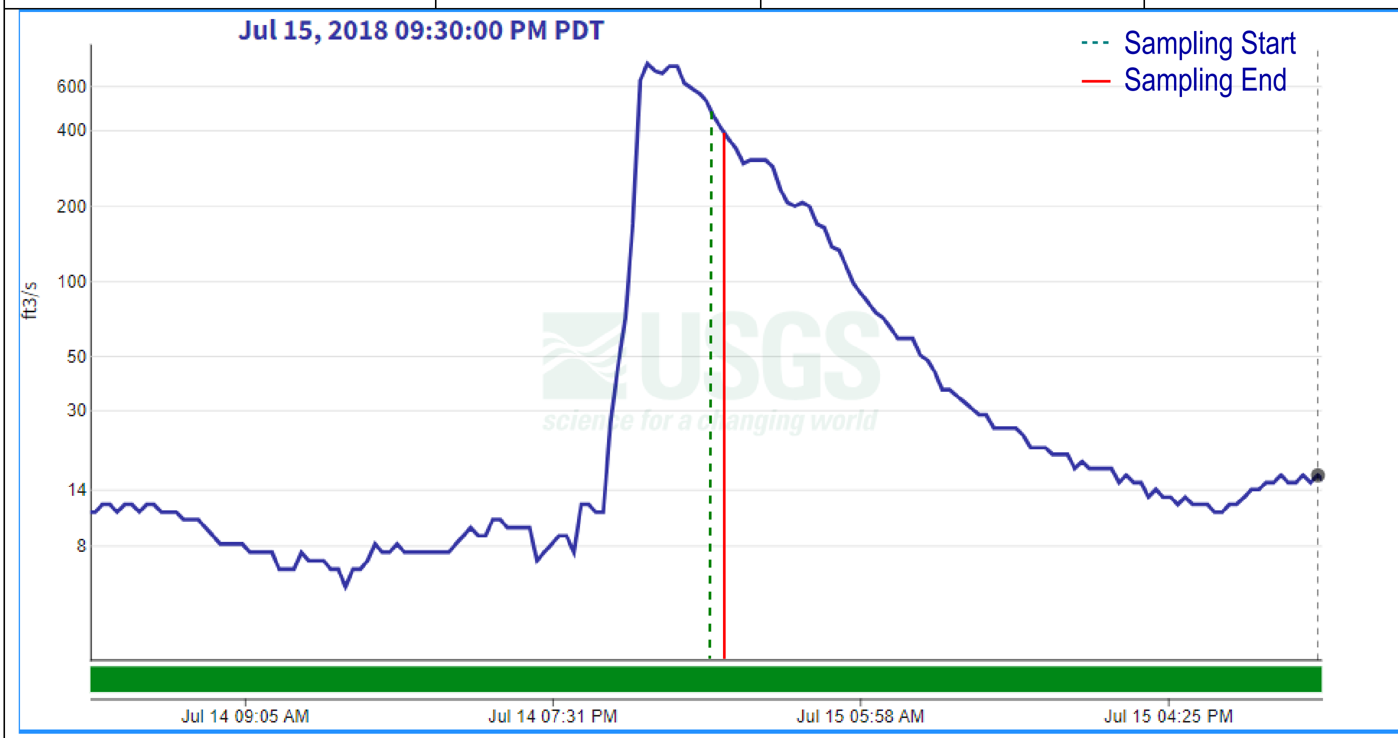
Year:	2019		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	2/14/2019		
Sample Collection Information			
Time of 1st Sample Collected:	9:56 AM		
Time of 24th Sample Collected:	10:22 AM		
Sample Intervals:	1 minute		
Flow rate at time of sample (CFS):	3,070	**Flow rate at time of end of Sampling (CFS):**	4,050
Average flow rate (CFS):	3,580	**Max flow rate for the event (CFS):**	4,090
Peak occurs during the sampling time?	No		
TSS (mg/L):	440	**Turbidity (NTU):**	278
Notes:	Missing data		



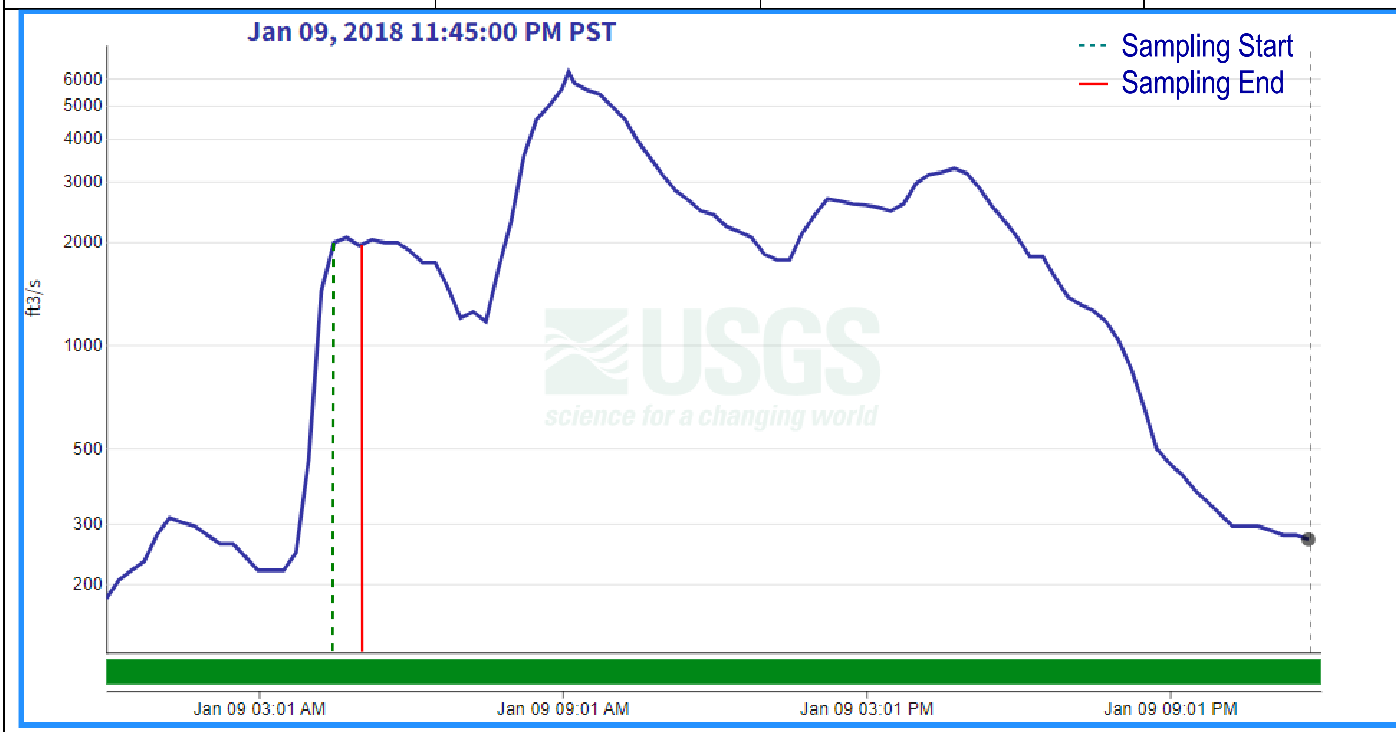
Year:	2019		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	1/14/2019		
Sample Collection Information			
Time of 1st Sample Collected:	11:26 PM		
Time of 24th Sample Collected:	11:53 PM		
Sample Intervals:	1 minute		
Flow rate at time of sample (CFS):	1,480	**Flow rate at time of end of Sampling (CFS):**	1,390
Average flow rate (CFS):	1,435	**Max flow rate for the event (CFS):**	1,610
Peak occurs during the sampling time?	No		
TSS (mg/L):	455	**Turbidity (NTU):**	328



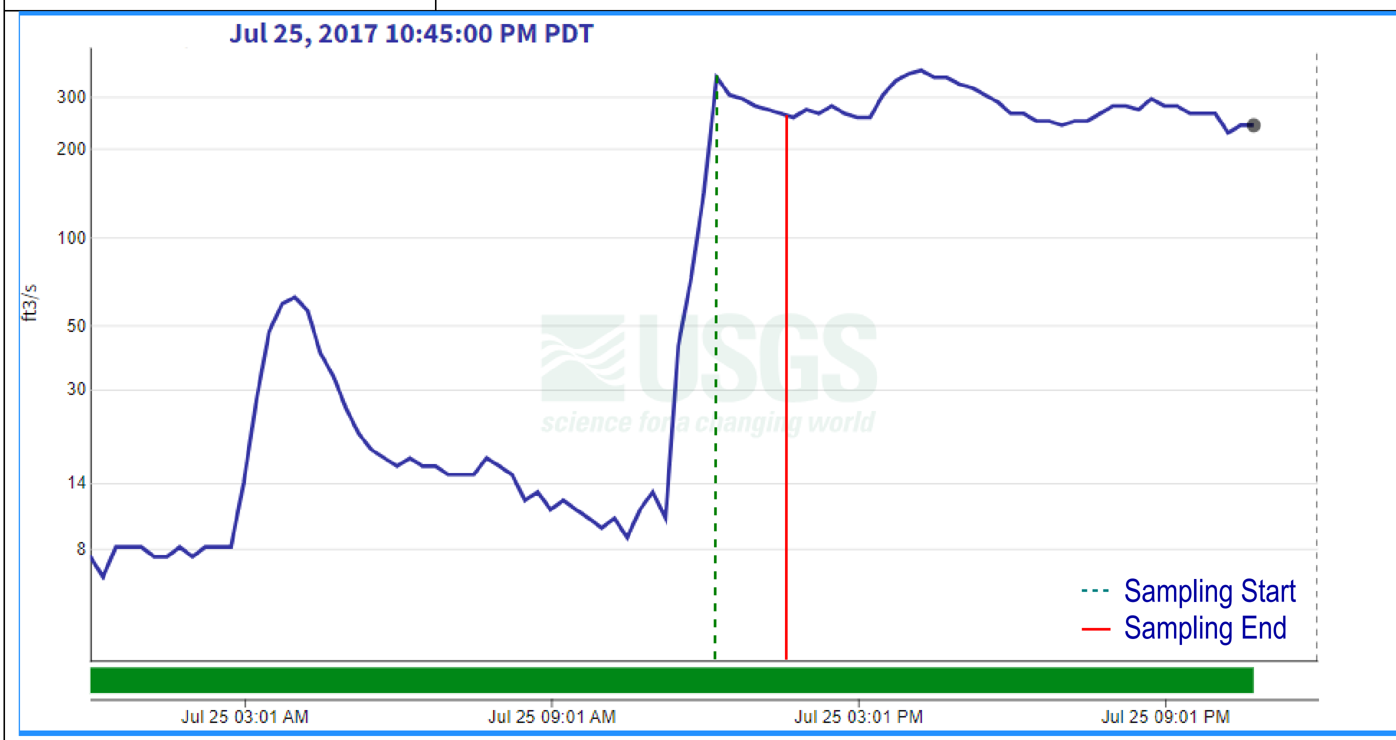
Year:	2018		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	7/15/2018		
Sample Collection Information			
Time of 1st Sample Collected:	12:51 AM		
Time of 24th Sample Collected:	1:20 AM		
Sample Intervals:	1 minute		
Flow rate at time of sample (CFS):	519	**Flow rate at time of end of Sampling (CFS):**	393
Average flow rate (CFS):	457	**Max flow rate for the event (CFS):**	735
Peak occurs during the sampling time?	No		
TSS (mg/L):	185	**Turbidity (NTU):**	160



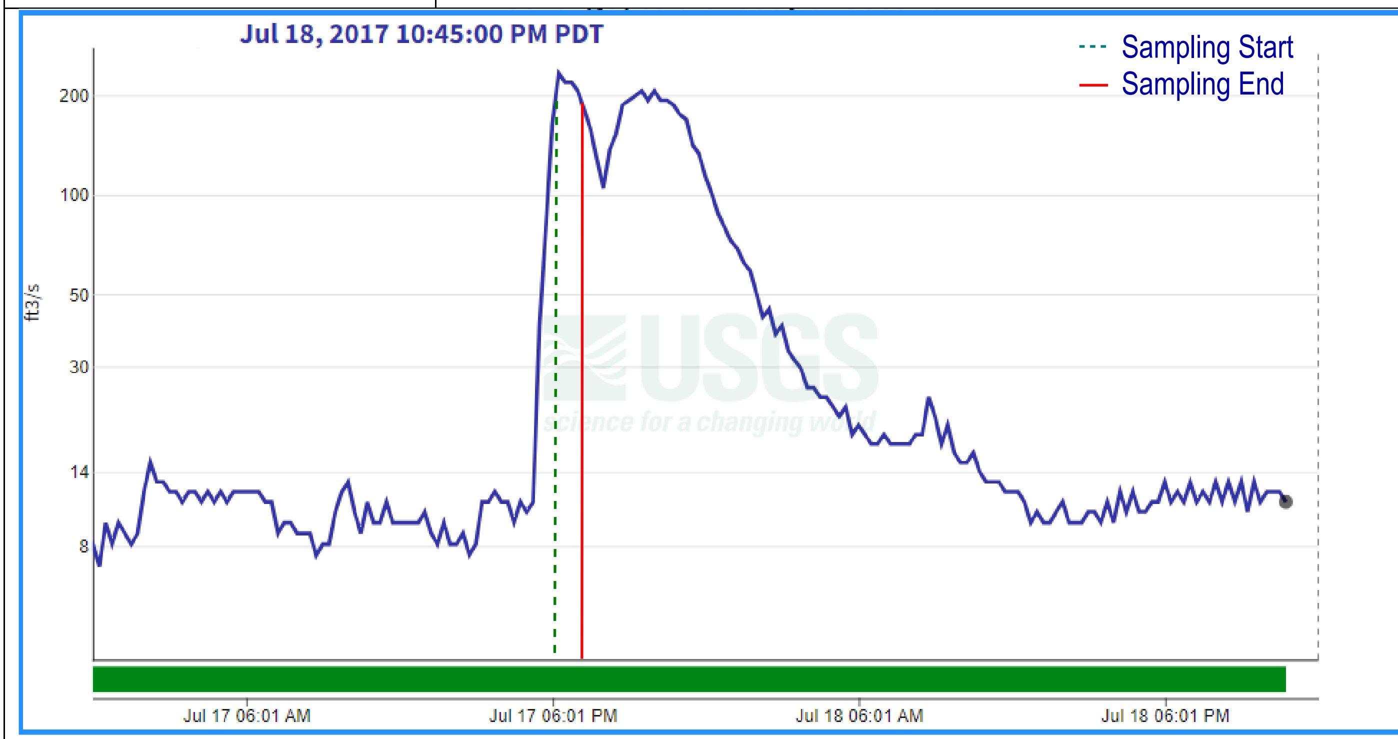
Year:	2018		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	1/9/2018		
Sample Collection Information			
Time of 1st Sample Collected:	4:35 AM		
Time of 24th Sample Collected:	5:06 AM		
Sample Intervals:	1 minute		
Flow rate at time of sample (CFS):	1,998	**Flow rate at time of end of Sampling (CFS):**	1,990
Average flow rate (CFS):	2,005	**Max flow rate for the event (CFS):**	2,060
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	665	**Turbidity (NTU):**	326



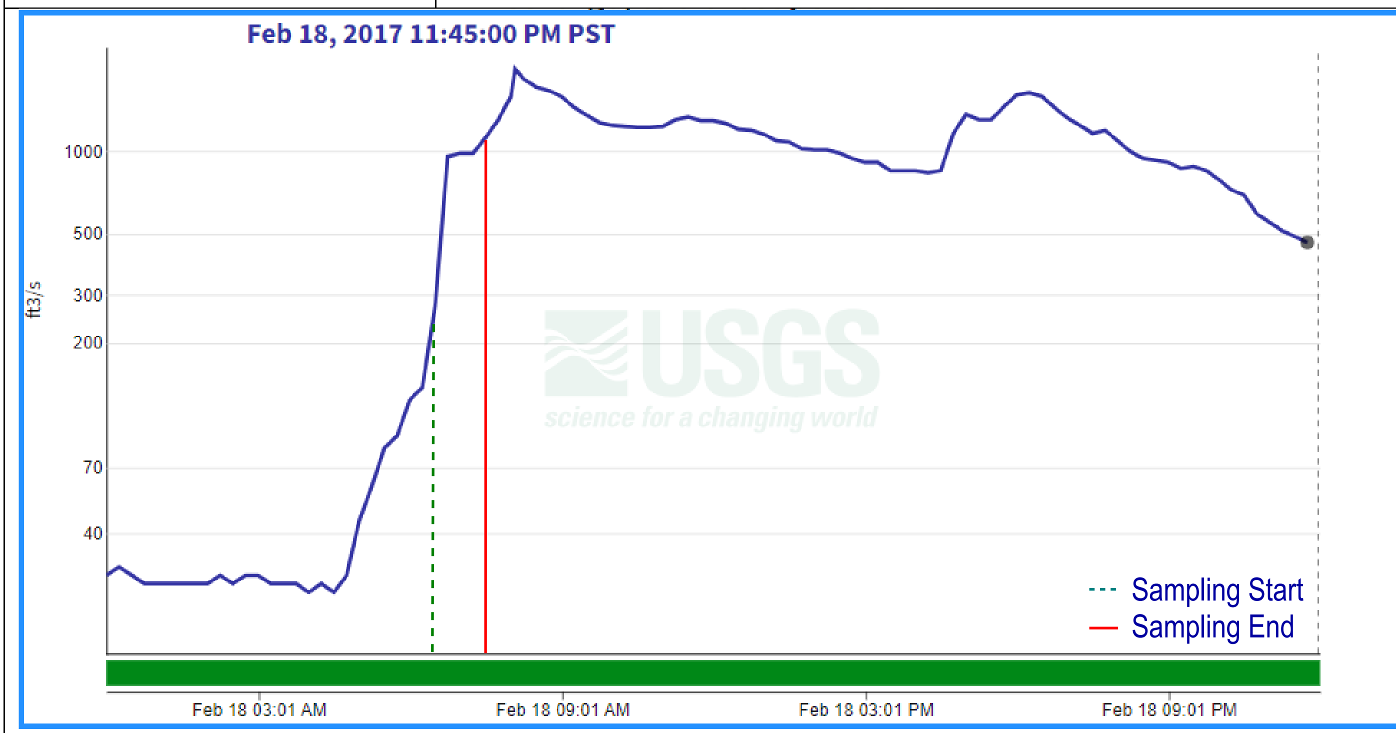
Year:	2017		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	7/25/2017		
Sample Collection Information			
Time of 1st Sample Collected:	12:14 PM		
Time of 24th Sample Collected:	1:23 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	348	**Flow rate at time of end of Sampling (CFS):**	266
Average flow rate during sampling (CFS):	294	**Max flow rate for the event (CFS):**	348
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	2,740	**Turbidity (NTU):**	2,190
Notes:			



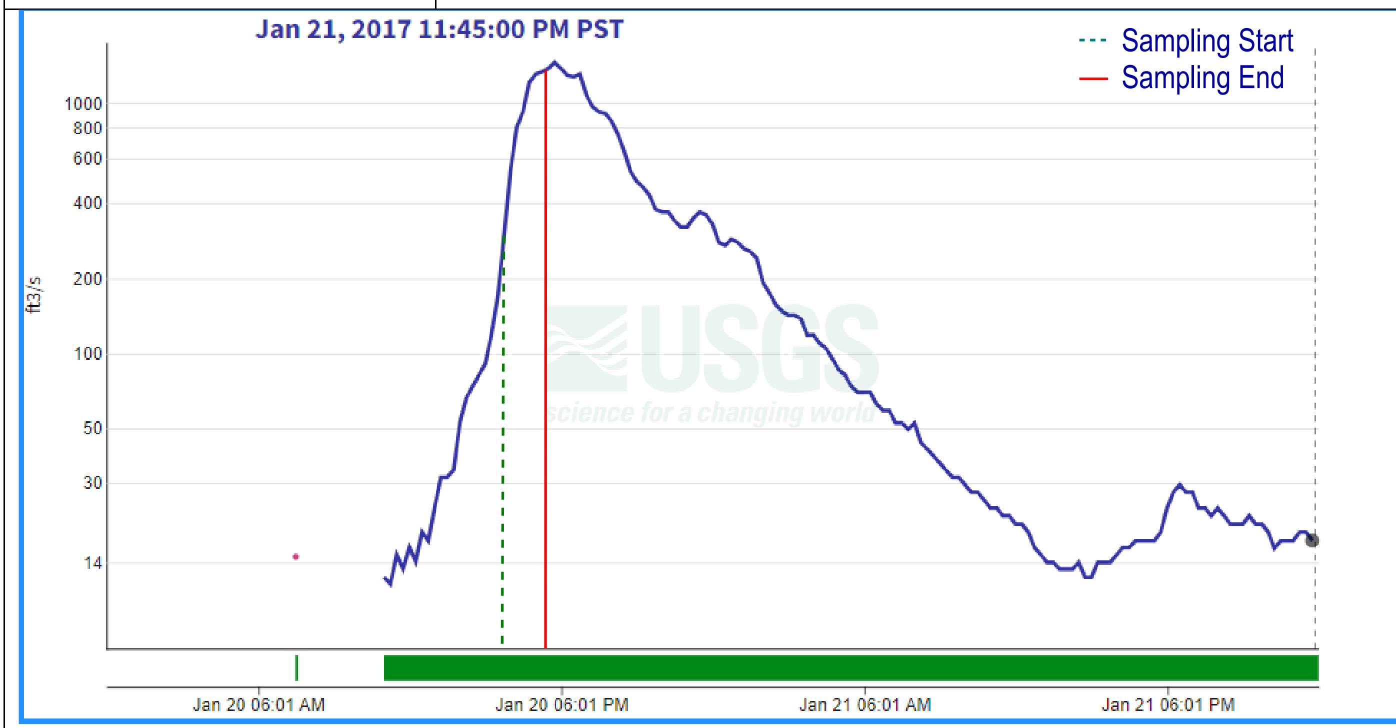
Year:	2017		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	7/17/2017		
Sample Collection Information			
Time of 1st Sample Collected:	6:05 PM		
Time of 24th Sample Collected:	7:14 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	170	**Flow rate at time of end of Sampling (CFS):**	181
Average flow rate during sampling (CFS):	205	**Max flow rate for the event (CFS):**	233
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	444	**Turbidity (NTU):**	355
Notes:			



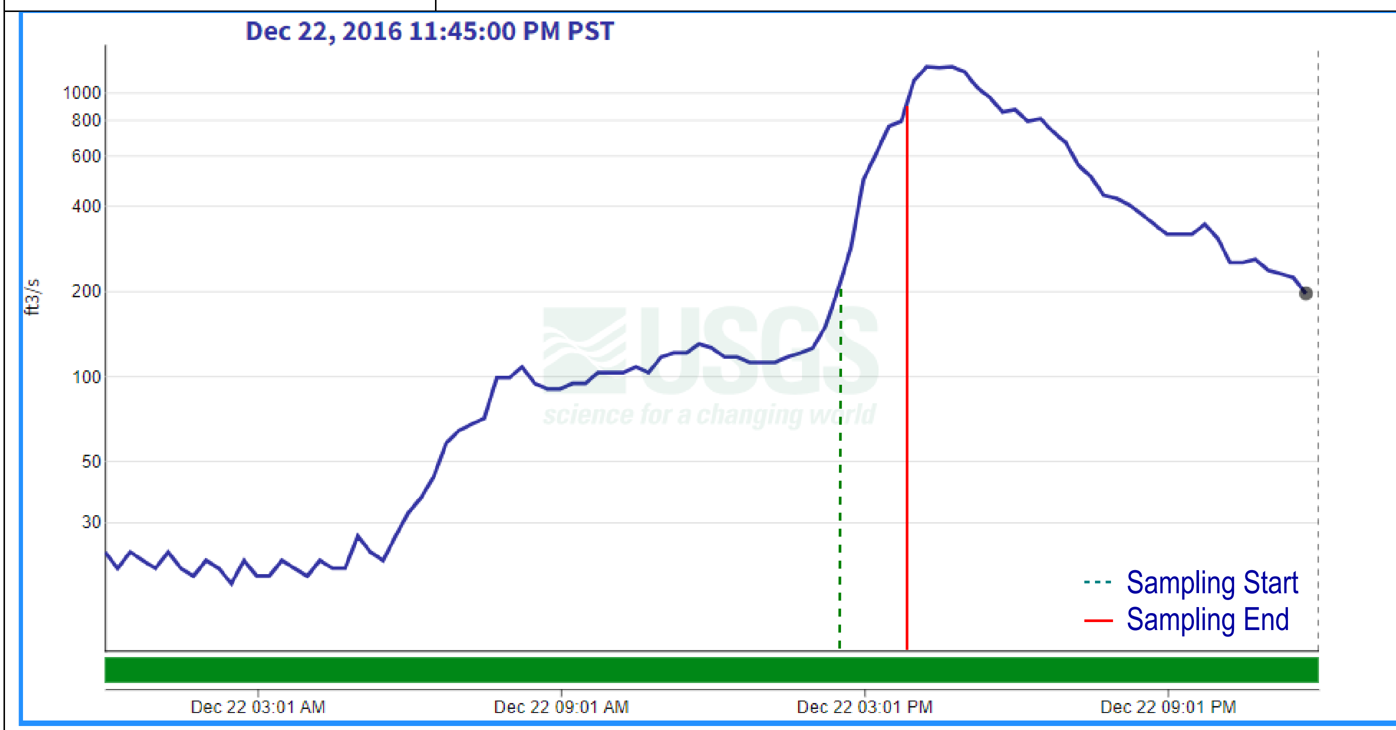
Year:	2017		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	2/18/2017		
Sample Collection Information			
Time of 1st Sample Collected:	6:20 AM		
Time of 24th Sample Collected:	7:32 AM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	250	**Flow rate at time of end of Sampling (CFS):**	1,120
Average flow rate during sampling (CFS):	760	**Max flow rate for the event (CFS):**	1,990
Peak occurs during the sampling time?	No		
TSS (mg/L):	248	**Turbidity (NTU):**	271
Notes:			



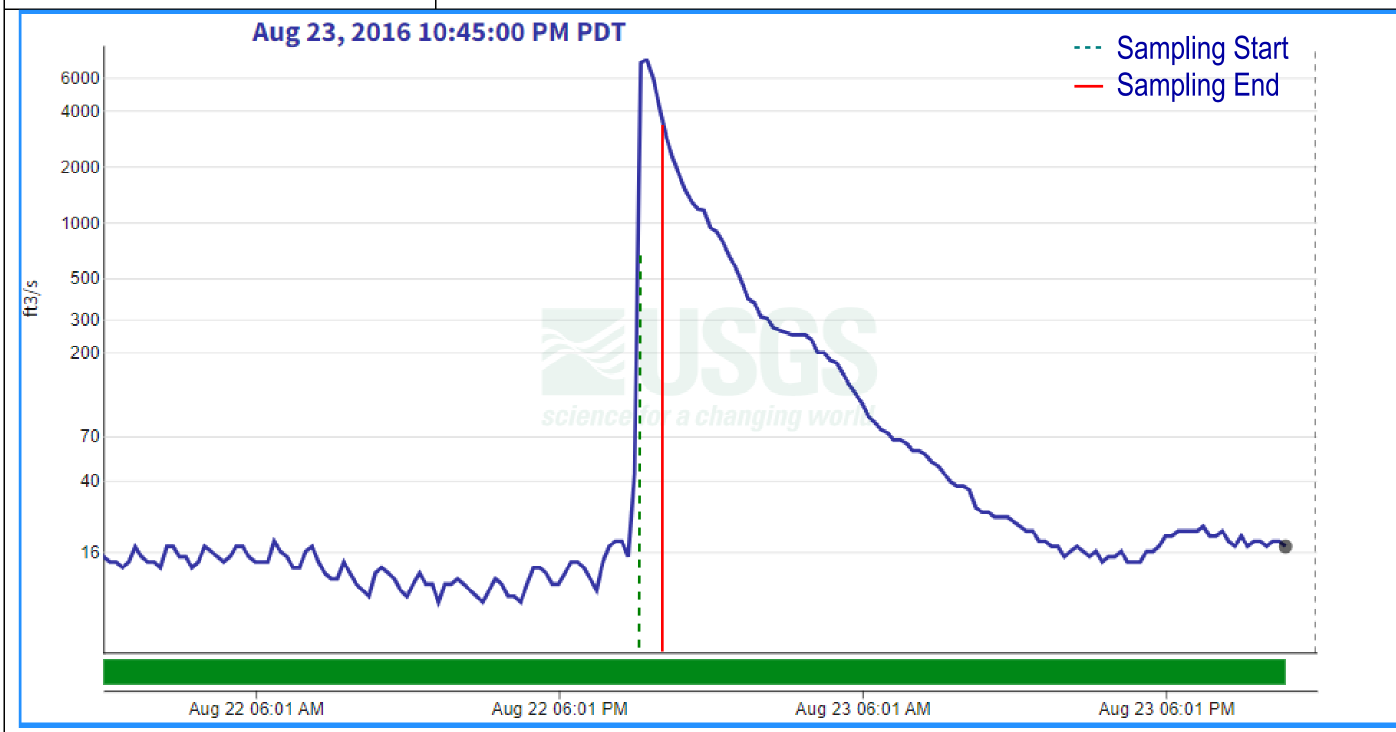
Year:	2017		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	1/20/2017		
Sample Collection Information			
Time of 1st Sample Collected:	3:43 PM		
Time of 24th Sample Collected:	4:52 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	296	**Flow rate at time of end of Sampling (CFS):**	1,230
Average flow rate during sampling (CFS):	835	**Max flow rate for the event (CFS):**	1,450
Peak occurs during the sampling time?	No		
TSS (mg/L):	522	**Turbidity (NTU):**	164
Notes:			



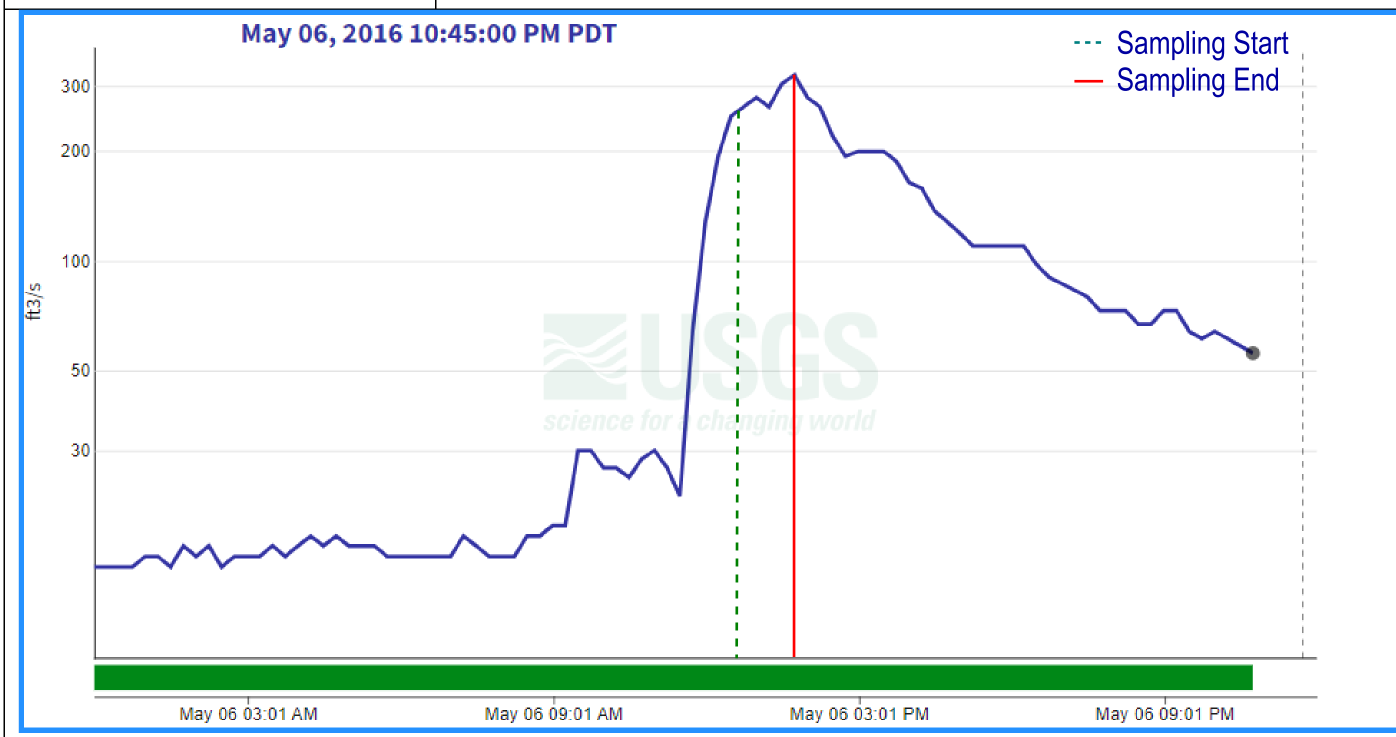
Year:	2016		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	12/22/2016		
Sample Collection Information			
Time of 1st Sample Collected:	2:26 PM		
Time of 24th Sample Collected:	3:55 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	203	**Flow rate at time of end of Sampling (CFS):**	880
Average flow rate during sampling (CFS):	538	**Max flow rate for the event (CFS):**	1,230
Peak occurs during the sampling time?	No		
TSS (mg/L):	310	**Turbidity (NTU):**	292
Notes:			



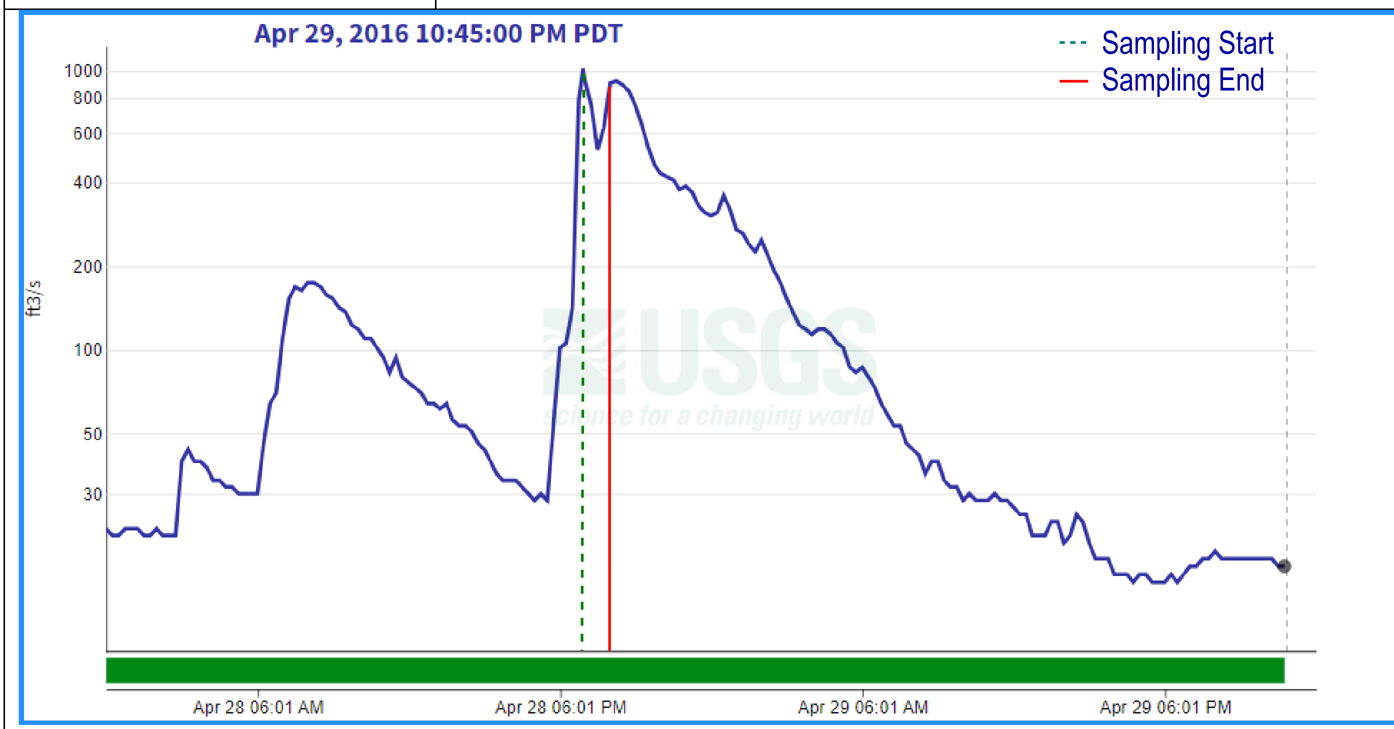
Year:	2016		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	8/22/2016		
Sample Collection Information			
Time of 1st Sample Collected:	9:07 PM		
Time of 24th Sample Collected:	10:17 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	720	**Flow rate at time of end of Sampling (CFS):**	2,910
Average flow rate during sampling (CFS):	5,106	**Max flow rate for the event (CFS):**	7,450
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	4,340	**Turbidity (NTU):**	401
Notes:			



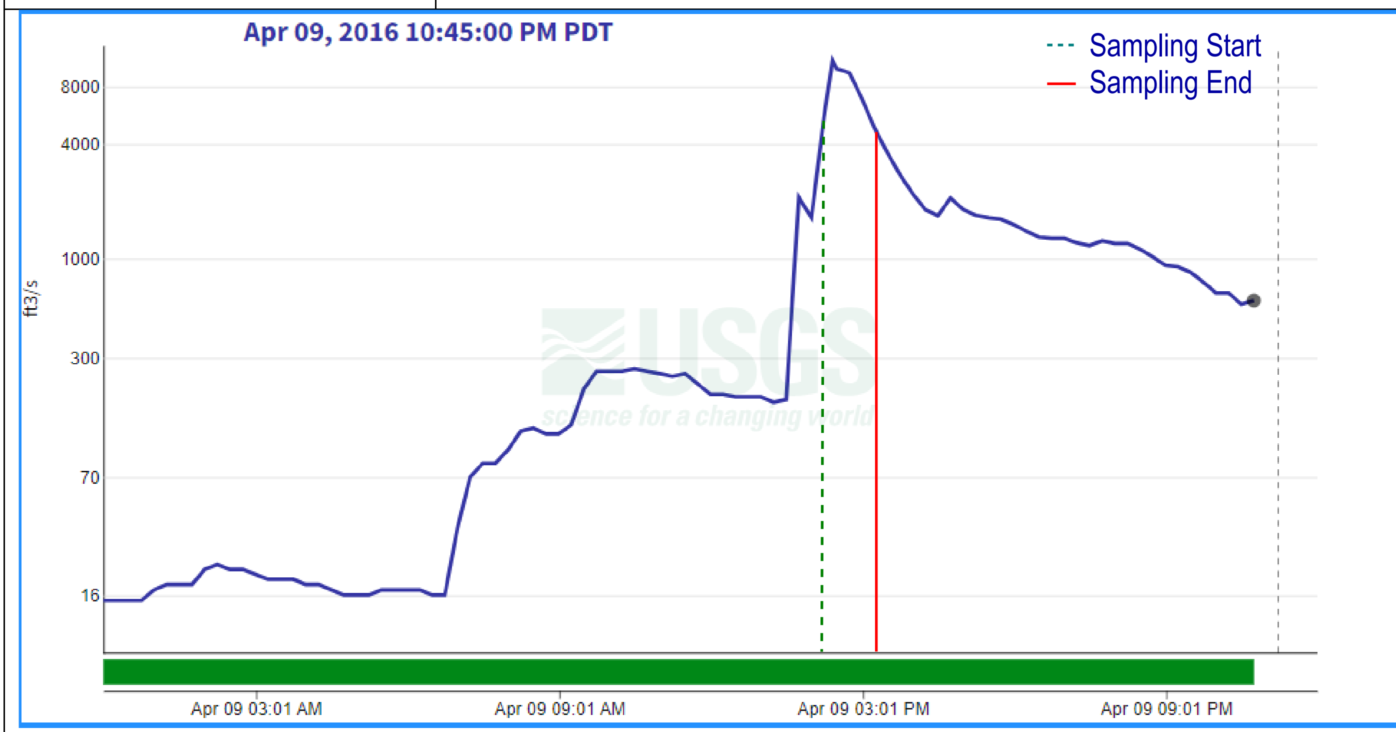
Year:	2016		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	5/6/2016		
Sample Collection Information			
Time of 1st Sample Collected:	12:35 PM		
Time of 24th Sample Collected:	1:45 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	253	**Flow rate at time of end of Sampling (CFS):**	321
Average flow rate during sampling (CFS):	281	**Max flow rate for the event (CFS):**	321
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	410	**Turbidity (NTU):**	628
Notes:			



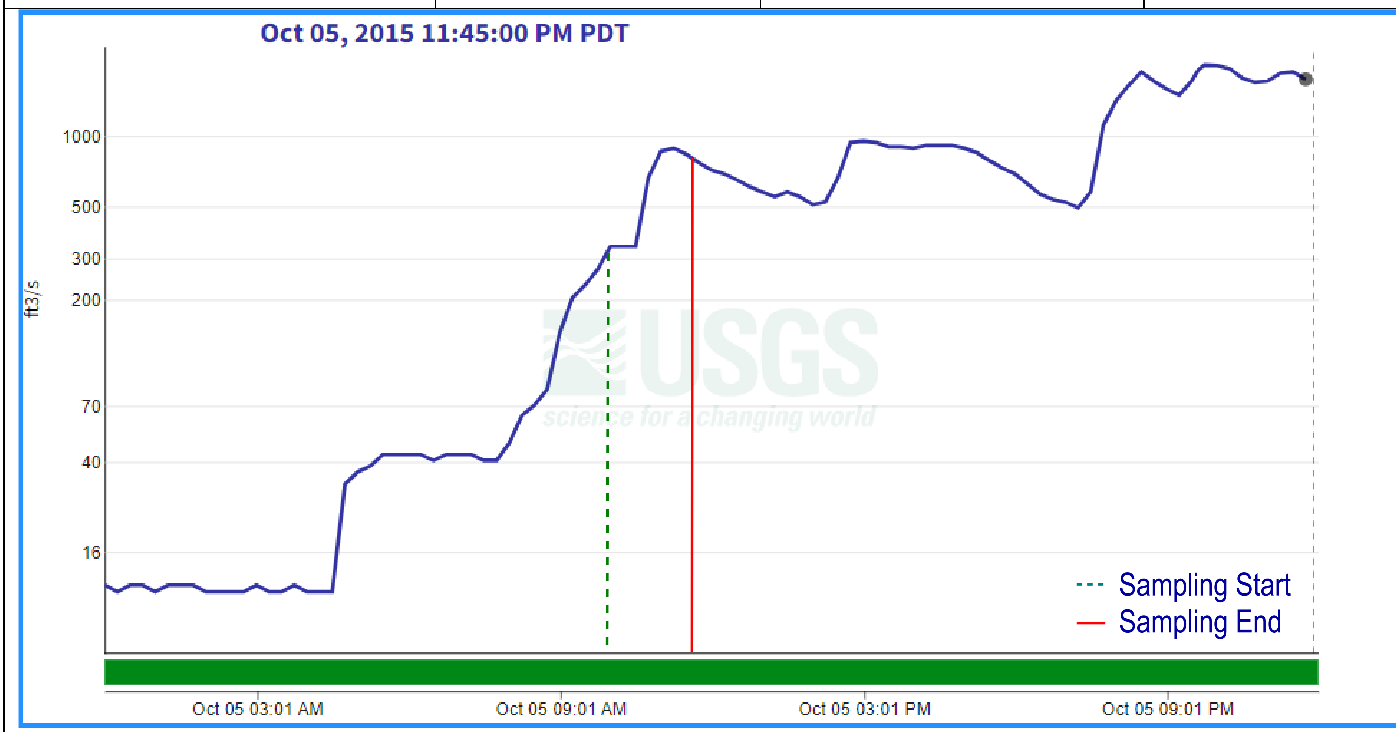
Year:	2016		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	4/28/2016		
Sample Collection Information			
Time of 1st Sample Collected:	6:58 PM		
Time of 24th Sample Collected:	7:56 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	1,020	**Flow rate at time of end of Sampling (CFS):**	907
Average flow rate during sampling (CFS):	792	**Max flow rate for the event (CFS):**	1,020
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	1,360	**Turbidity (NTU):**	939
Notes:			



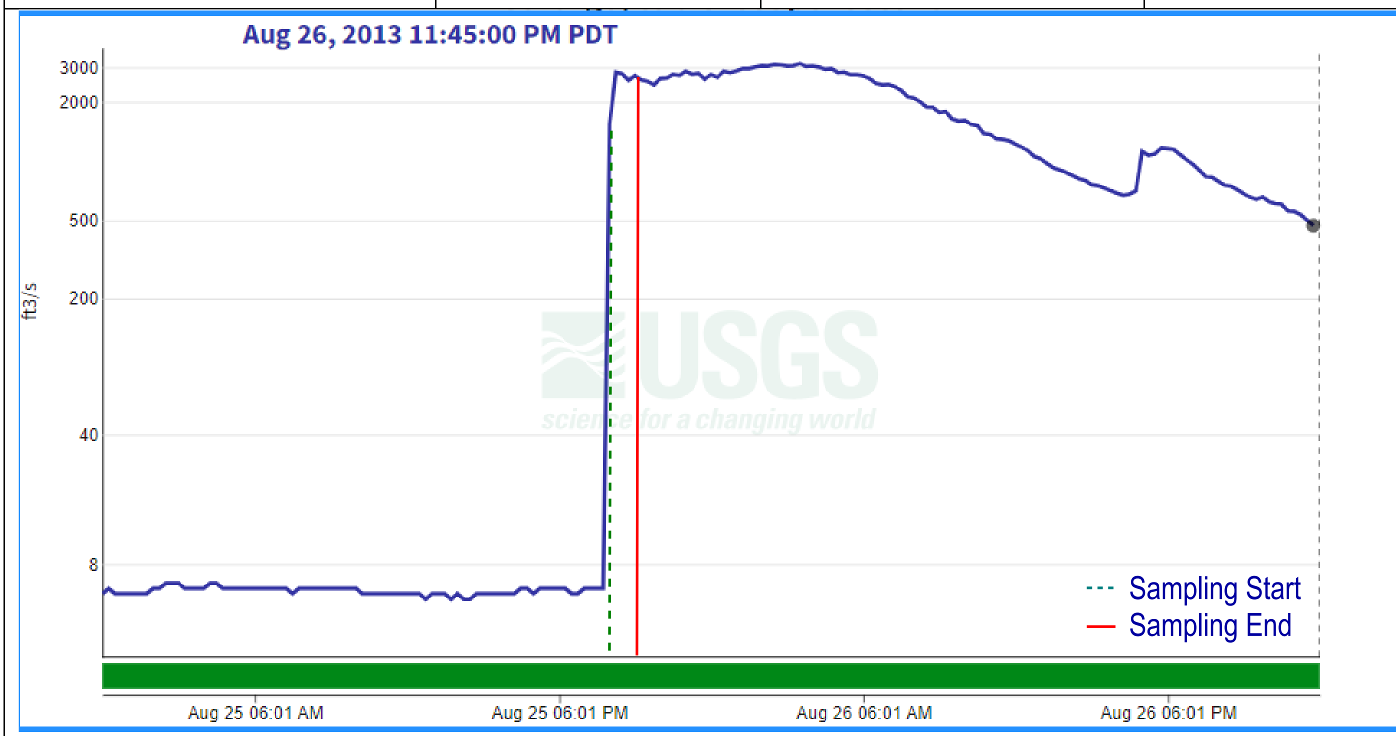
Year:	2016		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	4/9/2016		
Sample Collection Information			
Time of 1st Sample Collected:	2:12 PM		
Time of 24th Sample Collected:	3:22 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	5,580	**Flow rate at time of end of Sampling (CFS):**	4,220
Average flow rate during sampling (CFS):	7,862	**Max flow rate for the event (CFS):**	11,000
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	850	**Turbidity (NTU):**	1,152
Notes:			



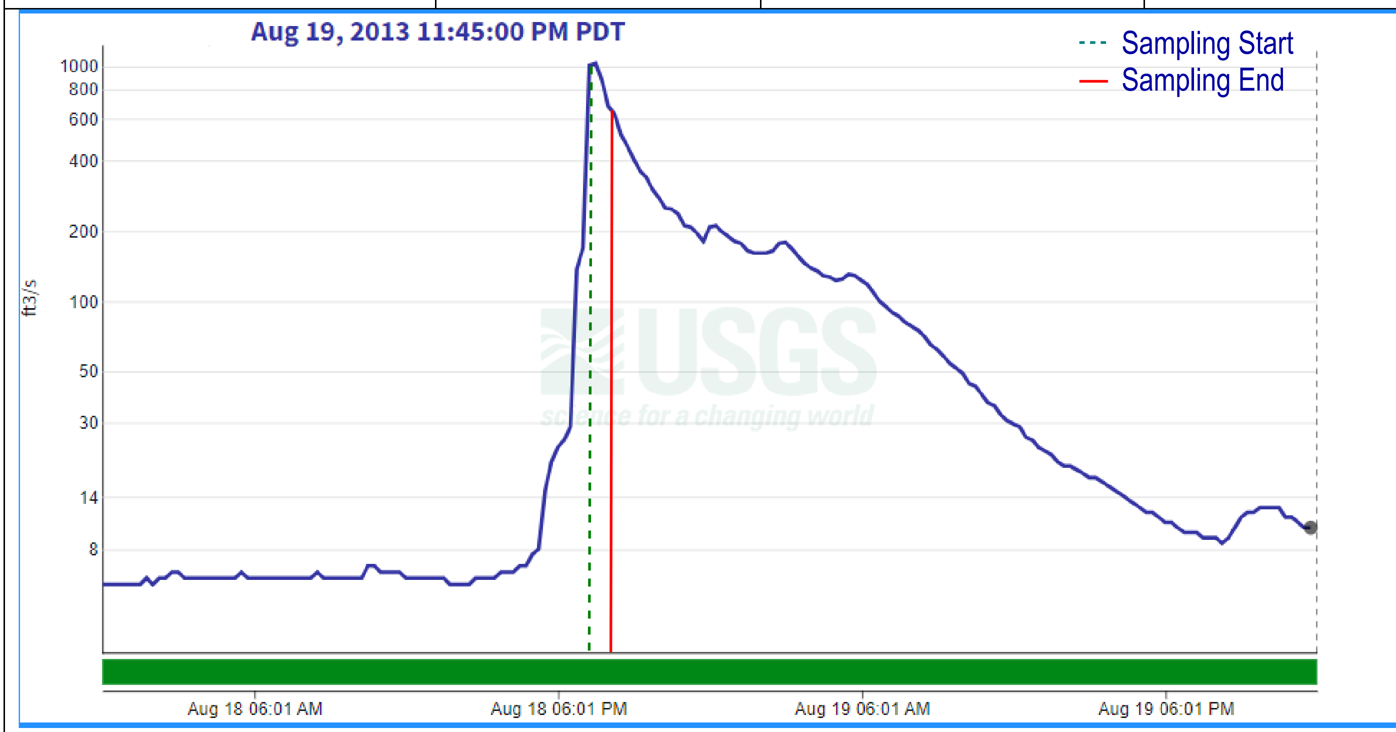
Year:	2015		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	10/05/15		
Sample Collection Information			
Time of 1st Sample Collected:	9:53 AM		
Time of 24th Sample Collected:	11:46 AM		
Sample Intervals:	3 Minutes		
Flow rate at time of sample (CFS):	320	**Flow rate at time of end of Sampling (CFS):**	770
Average flow rate during sampling (CFS):	595	**Max flow rate for the event (CFS):**	885
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	7,450	**Turbidity (NTU):**	485



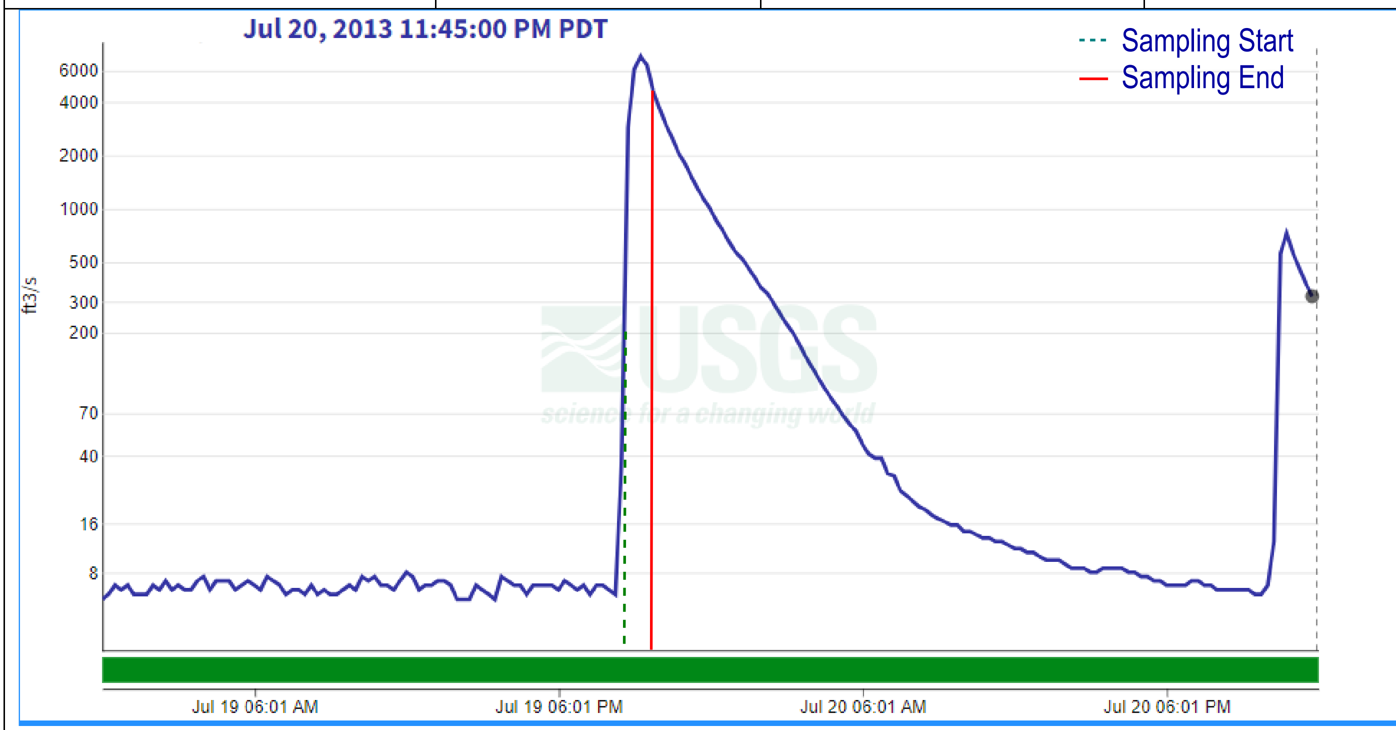
Year:	2013		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	8/25/2013		
Sample Collection Information			
Time of 1st Sample Collected:	8:03 PM		
Time of 24th Sample Collected:	9:12 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	1,550	**Flow rate at time of end of Sampling (CFS):**	2,590
Average flow rate during sampling (CFS):	2,510	**Max flow rate for the event (CFS):**	2,830
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	4,090	**Turbidity (NTU):**	368



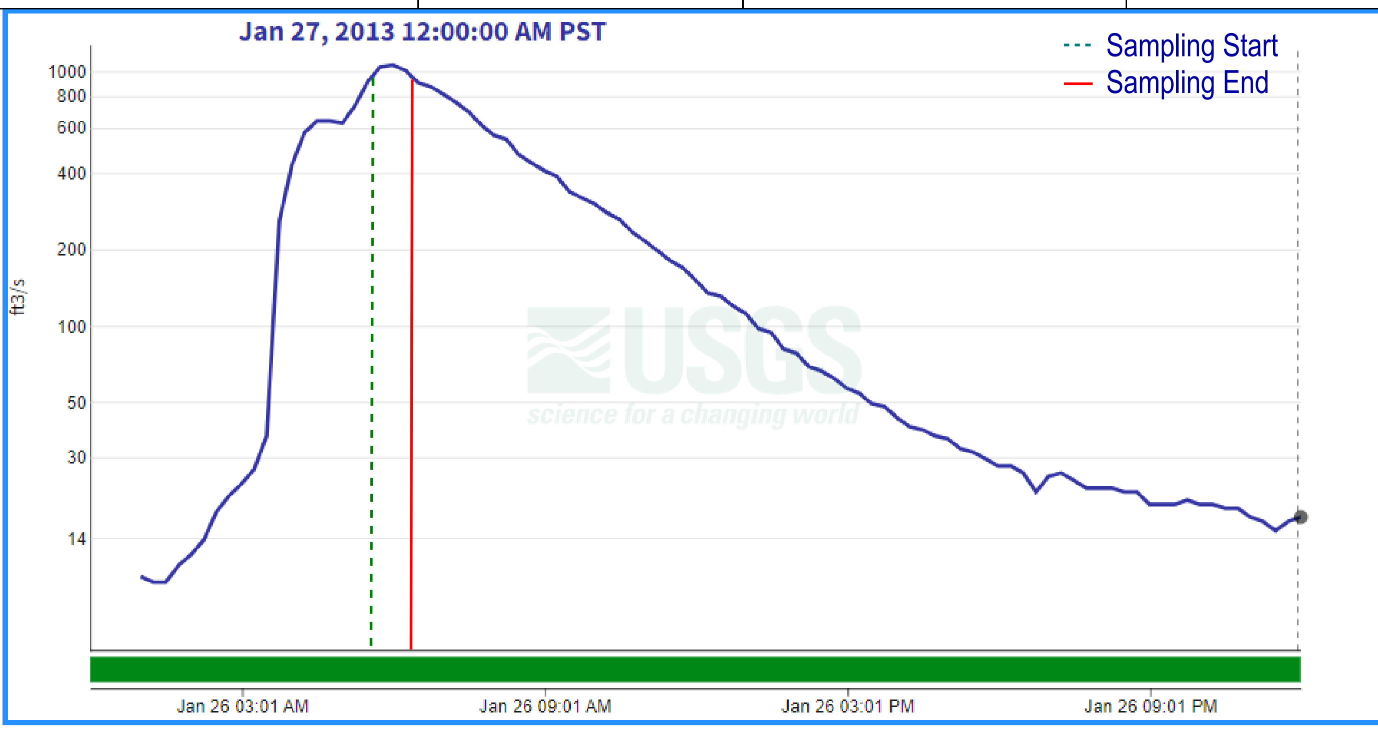
Year:	2013		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	8/18/2013		
Sample Collection Information			
Time of 1st Sample Collected:	7:15 PM		
Time of 24th Sample Collected:	8:15 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	1,010	**Flow rate at time of end of Sampling (CFS):**	627
Average flow rate during sampling (CFS):	845	**Max flow rate for the event (CFS):**	1,030
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	1,840	**Turbidity (NTU):**	790



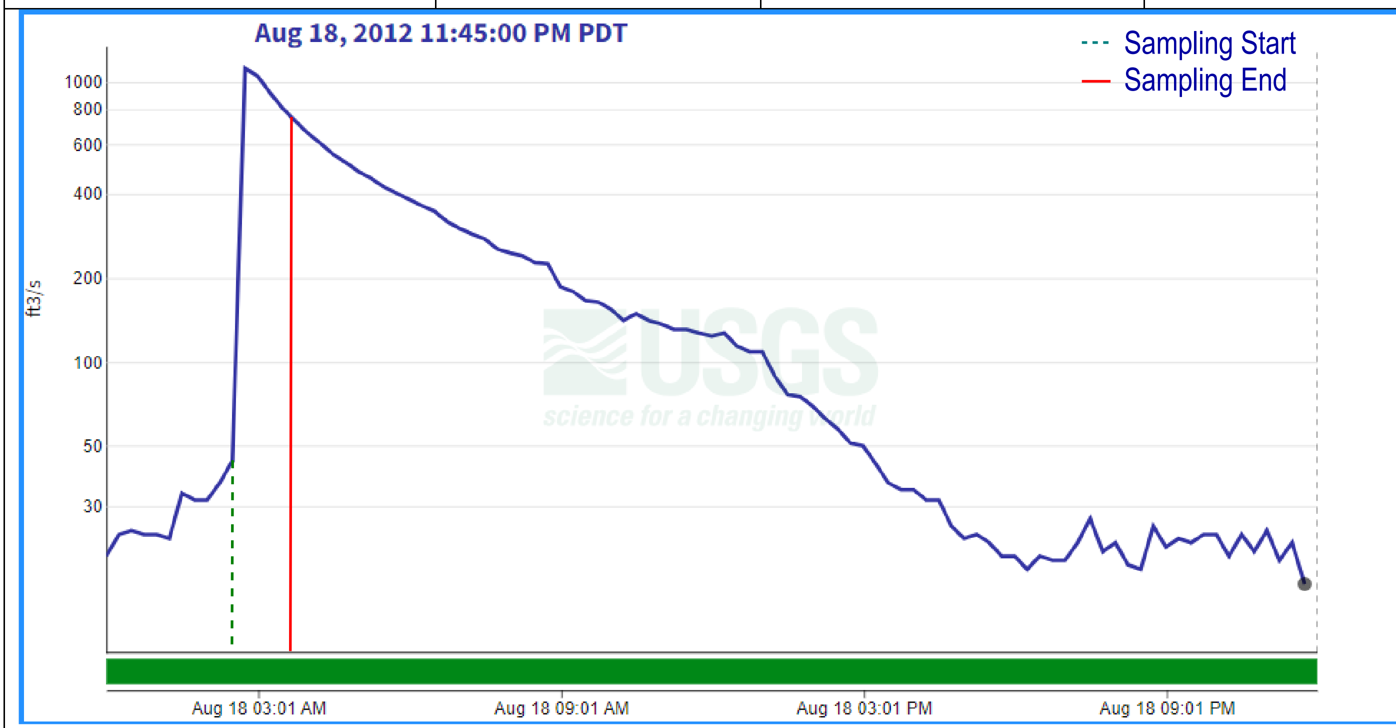
Year:	2013		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	7/19/2013		
Sample Collection Information			
Time of 1st Sample Collected:	8:36 PM		
Time of 24th Sample Collected:	9:46 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	200	**Flow rate at time of end of Sampling (CFS):**	4,600
Average flow rate during sampling (CFS):	4,580	**Max flow rate for the event (CFS):**	7,240
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	8,350	**Turbidity (NTU):**	193



Year:	2013		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	1/26/2013		
Sample Collection Information			
Time of 1st Sample Collected:	5:40 AM		
Time of 24th Sample Collected:	6:25 AM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	970	**Flow rate at time of end of Sampling (CFS):**	950
Average flow rate during sampling (CFS):	1,005	**Max flow rate for the event (CFS):**	1,060
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	1,900	**Turbidity (NTU):**	860

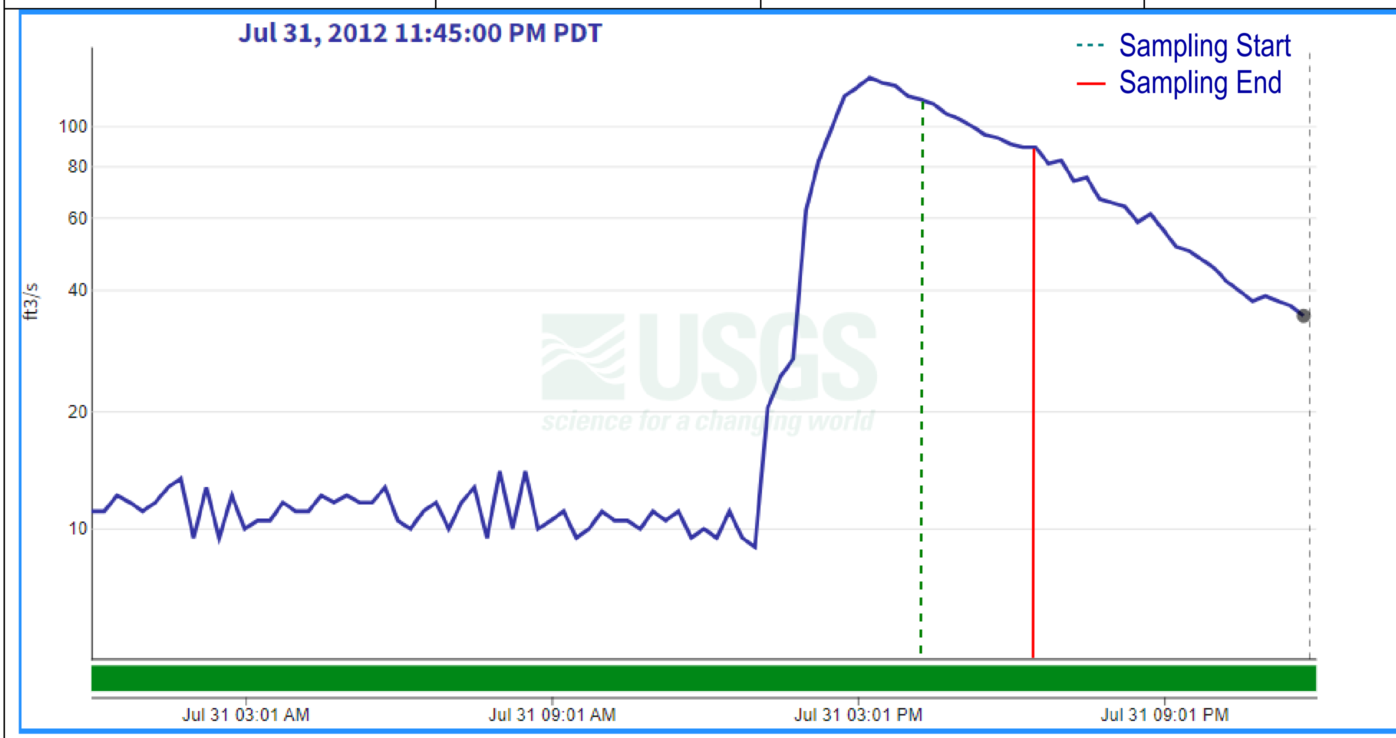


Year:	2012		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	8/18/2012		
Sample Collection Information			
Time of 1st Sample Collected:	2:29 AM		
Time of 24th Sample Collected:	3:48 AM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	44	**Flow rate at time of end of Sampling (CFS):**	700
Average flow rate during sampling (CFS):	770	**Max flow rate for the event (CFS):**	1,120
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	4,500	**Turbidity (NTU):**	2,300

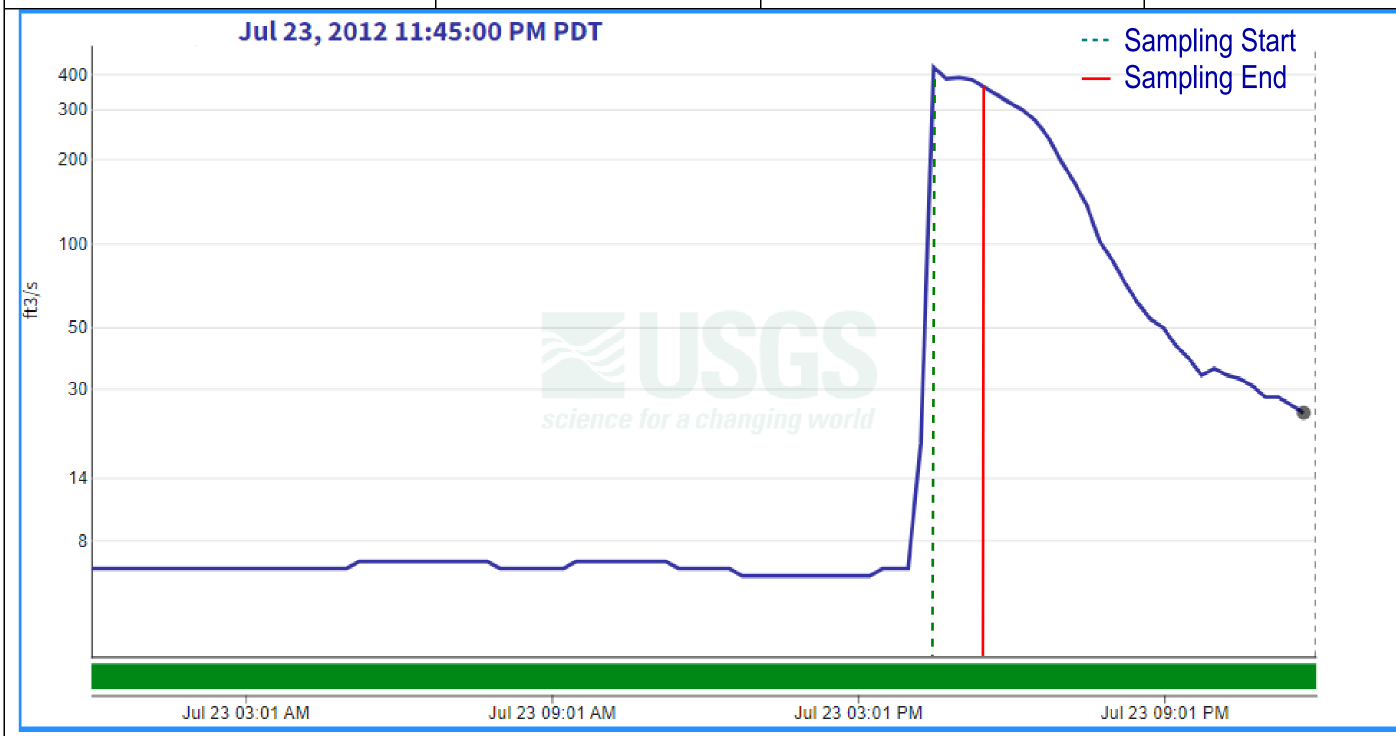


Year:	2012		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	8/12/2012		
Sample Collection Information			
Time of 1st Sample Collected:	1 AM		
Time of 24th Sample Collected:	2 AM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	114	**Flow rate at time of end of Sampling (CFS):**	147
Average flow rate during sampling (CFS):	125	**Max flow rate for the event (CFS):**	189
Peak occurs during the sampling time?	No		
Notes:			
TSS (mg/L):	110	**Turbidity (NTU):**	43

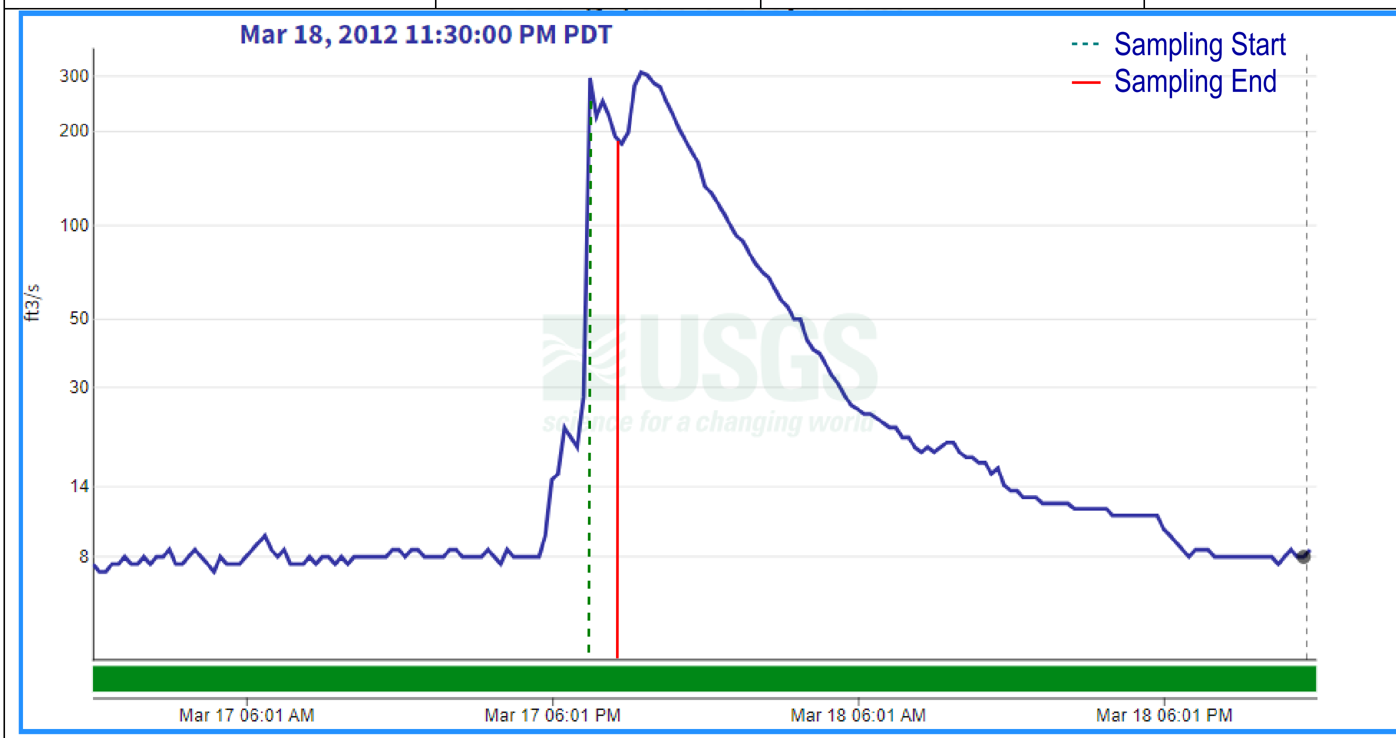
Year:	2012		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	7/31/2012		
Sample Collection Information			
Time of 1st Sample Collected:	3:56 PM		
Time of 24th Sample Collected:	4:52 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	118	**Flow rate at time of end of Sampling (CFS):**	108
Average flow rate during sampling (CFS):	112	**Max flow rate for the event (CFS):**	131
Peak occurs during the sampling time?	No		
TSS (mg/L):	1,400	**Turbidity (NTU):**	780



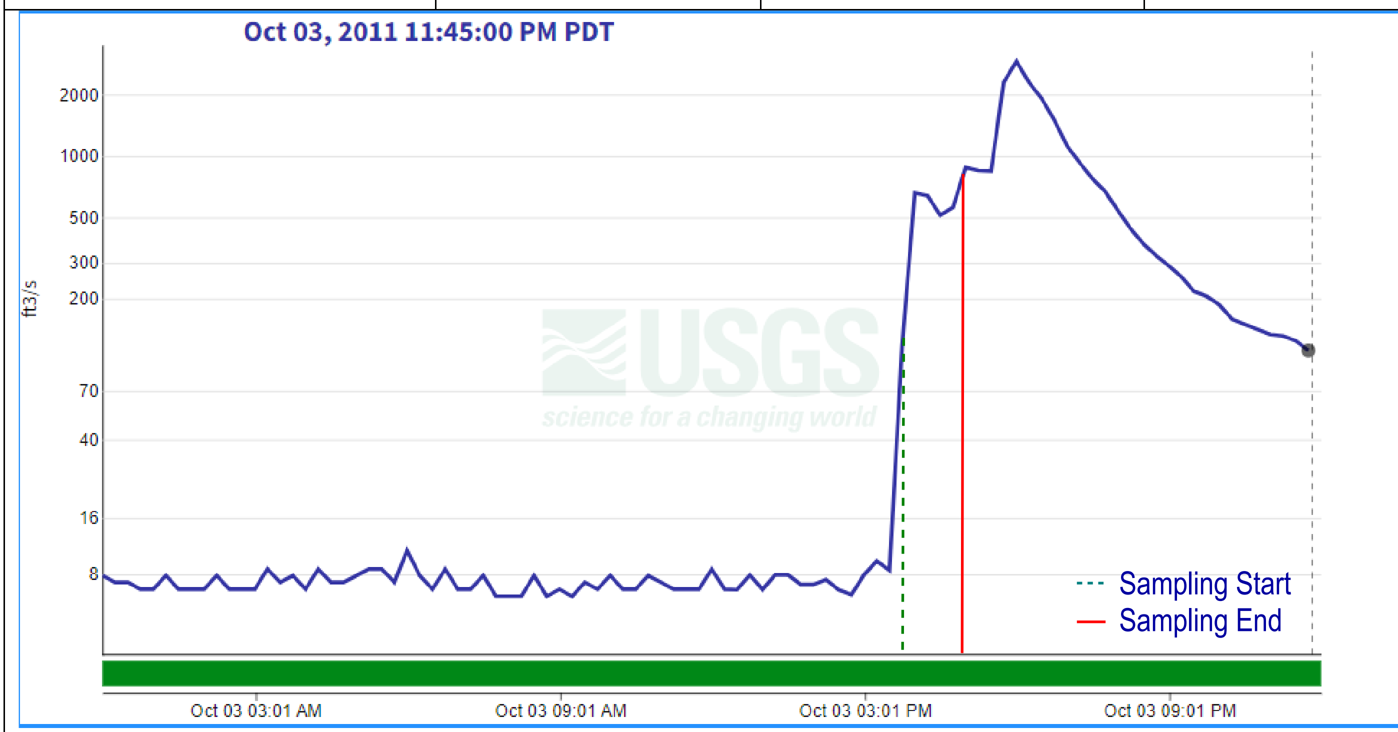
Year:	2012		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	7/23/2012		
Sample Collection Information			
Time of 1st Sample Collected:	4:26 PM		
Time of 24th Sample Collected:	5:30 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	385	**Flow rate at time of end of Sampling (CFS):**	359
Average flow rate during sampling (CFS):	388	**Max flow rate for the event (CFS):**	423
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	970	**Turbidity (NTU):**	700



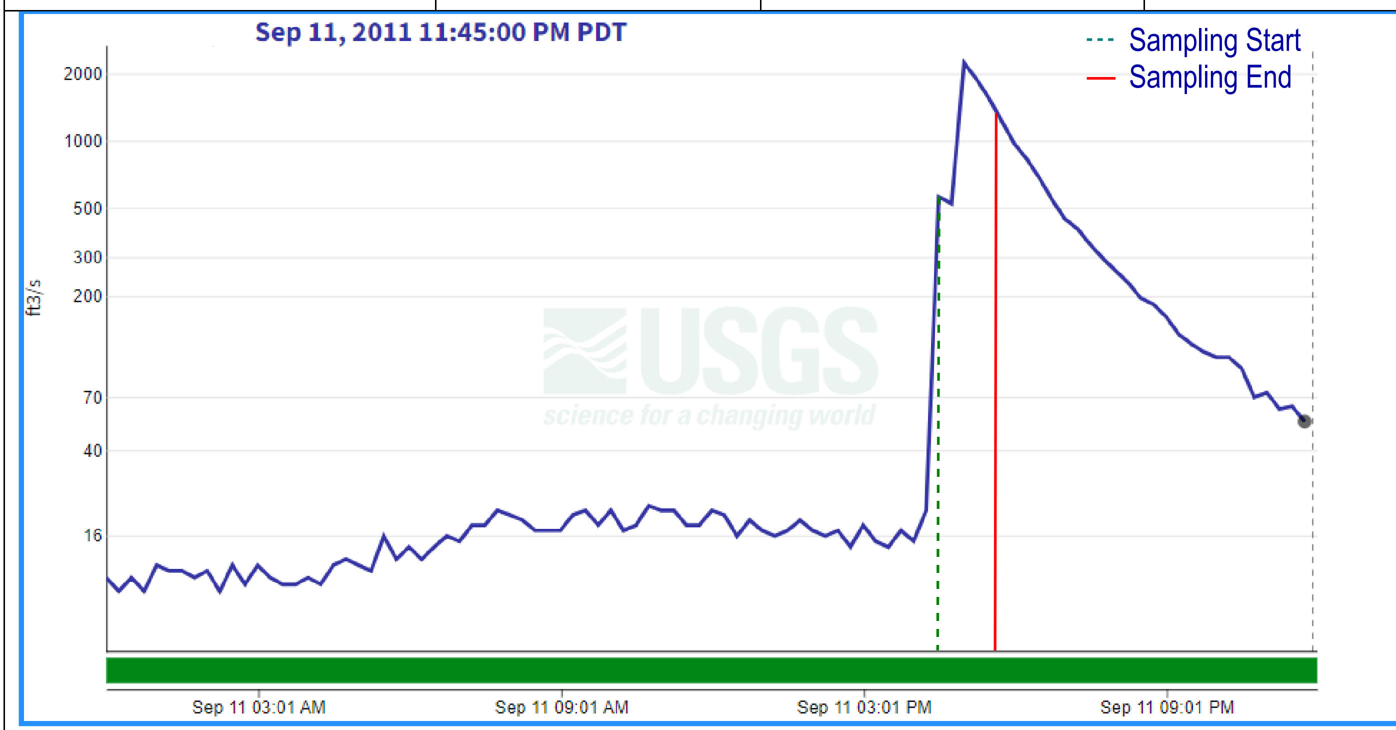
Year:	2012		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	3/17/2012		
Sample Collection Information			
Time of 1st Sample Collected:	7:22 PM		
Time of 24th Sample Collected:	8:32 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	280	**Flow rate at time of end of Sampling (CFS):**	191
Average flow rate during sampling (CFS):	230	**Max flow rate for the event (CFS):**	307
Peak occurs during the sampling time?	No		
TSS (mg/L):	1,600	**Turbidity (NTU):**	560



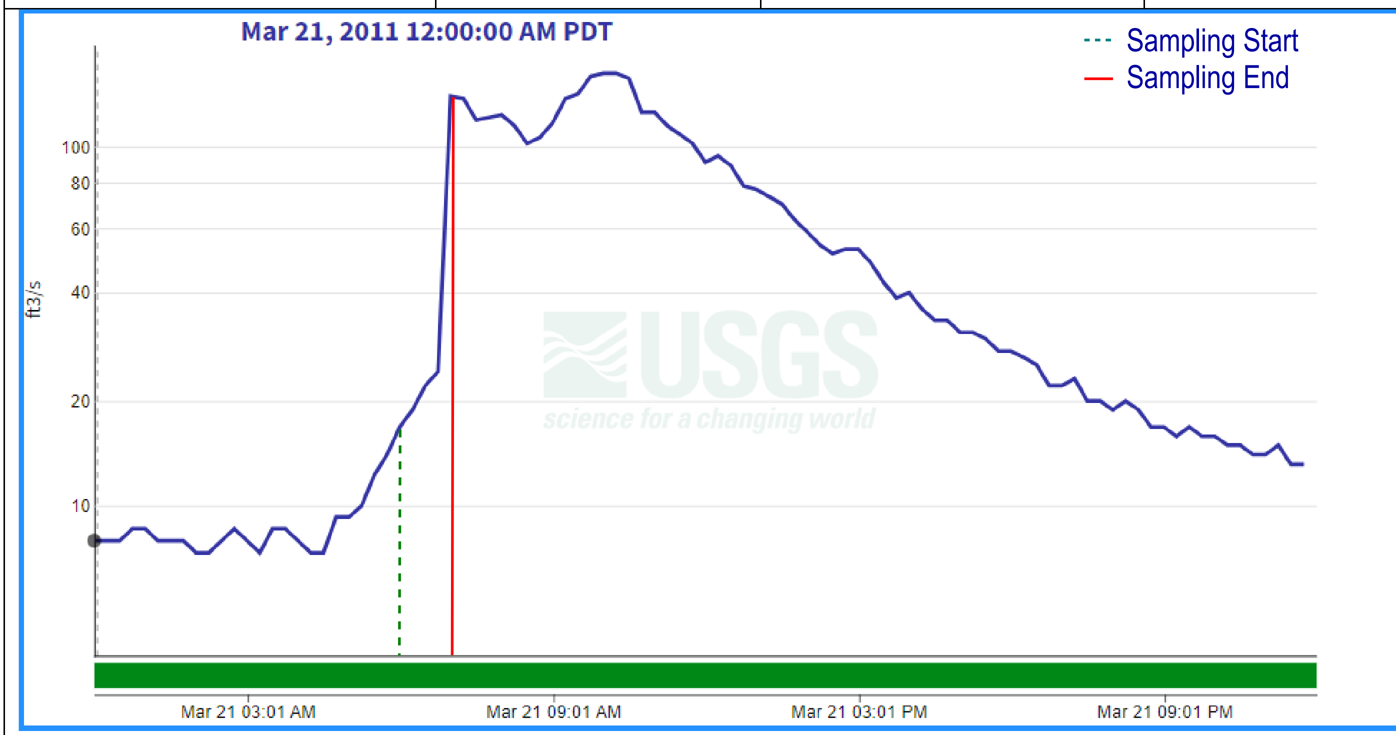
Year:	2011		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	10/3/2011		
Sample Collection Information			
Time of 1st Sample Collected:	3:45 PM		
Time of 24th Sample Collected:	4:55 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	118	**Flow rate at time of end of Sampling (CFS):**	870
Average flow rate during sampling (CFS):	560	**Max flow rate for the event (CFS):**	2,910
Peak occurs during the sampling time?	No		
TSS (mg/L):	4,700	**Turbidity (NTU):**	1,100



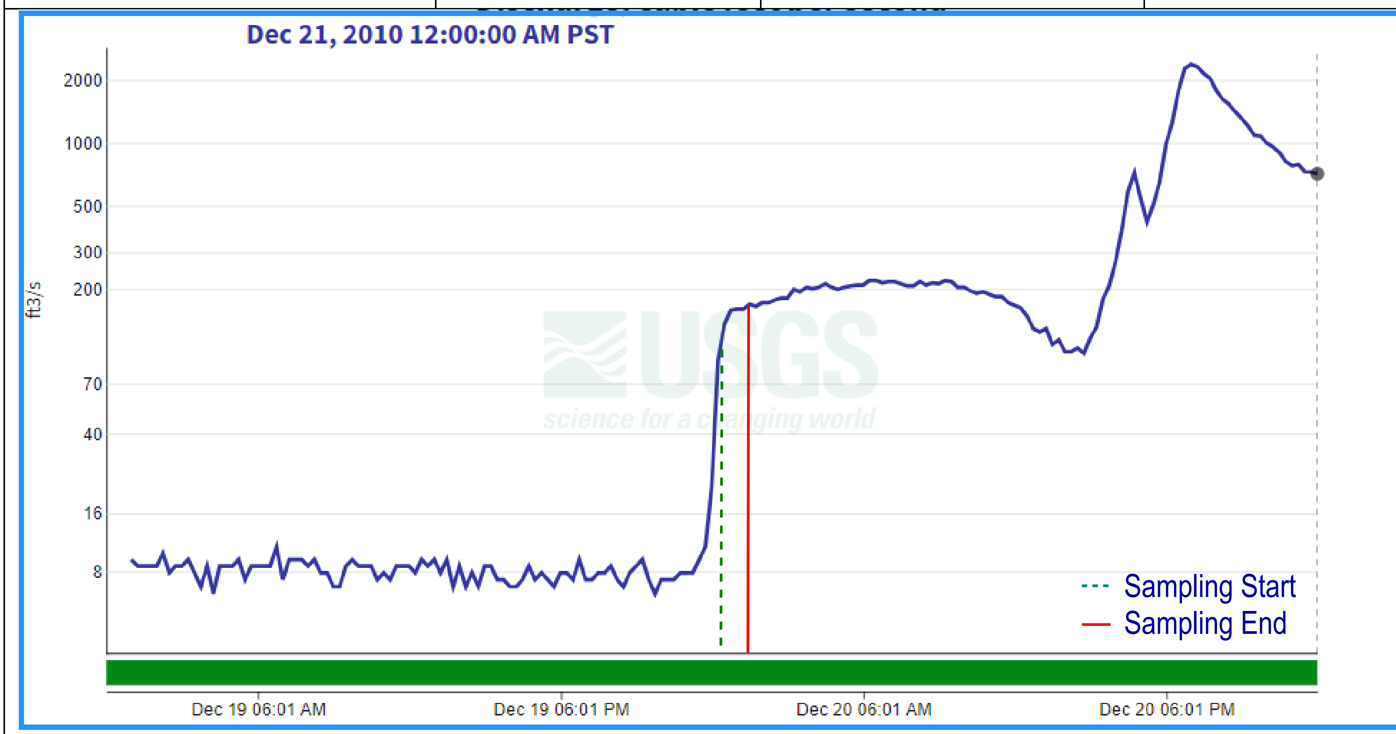
Year:	2011		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	9/11/2011		
Sample Collection Information			
Time of 1st Sample Collected:	4:29 PM		
Time of 24th Sample Collected:	5:39 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	560	**Flow rate at time of end of Sampling (CFS):**	1,280
Average flow rate during sampling (CFS):	1,335	**Max flow rate for the event (CFS):**	2,230
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	7,600	**Turbidity (NTU):**	5,200



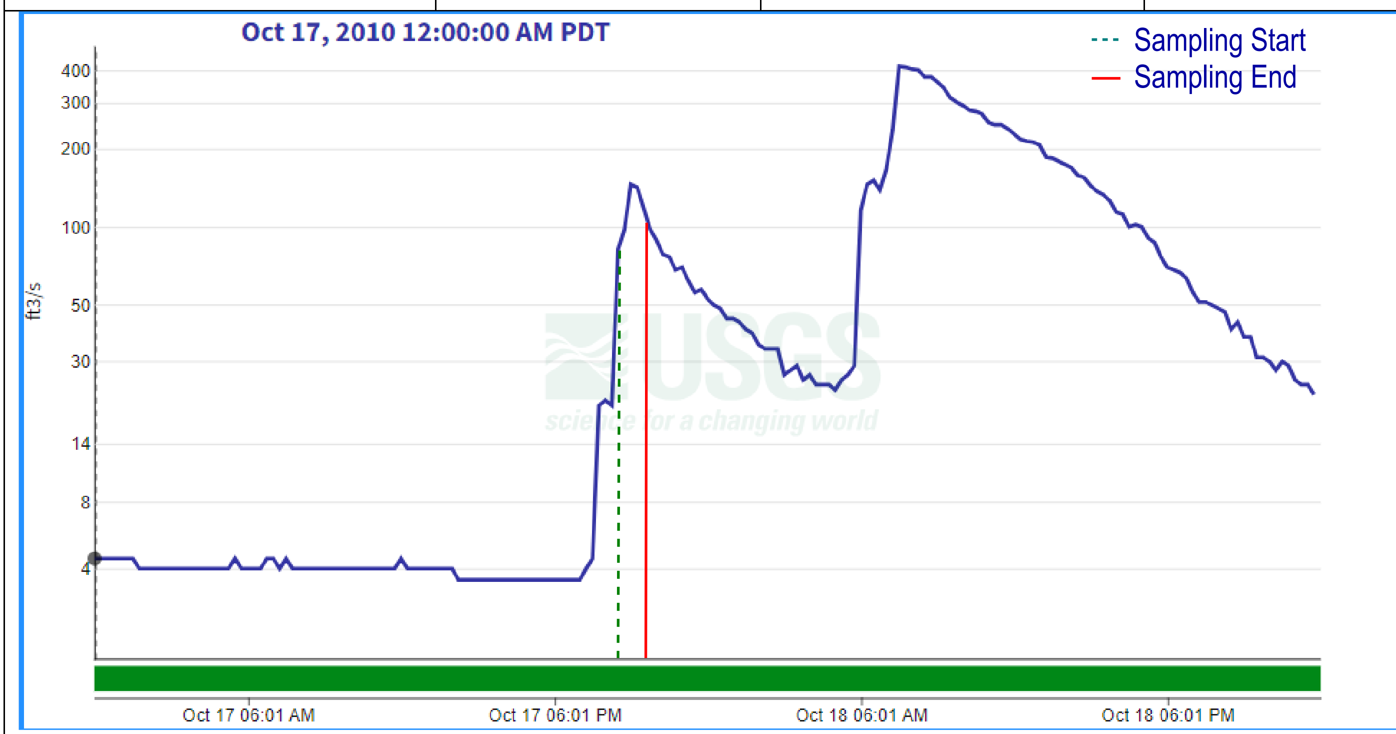
Year:	2011		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	3/21/2011		
Sample Collection Information			
Time of 1st Sample Collected:	5:54 AM		
Time of 24th Sample Collected:	7:06 AM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	16	**Flow rate at time of end of Sampling (CFS):**	135
Average flow rate during sampling (CFS):	39	**Max flow rate for the event (CFS):**	158
Peak occurs during the sampling time?	No		
TSS (mg/L):	750	**Turbidity (NTU):**	210



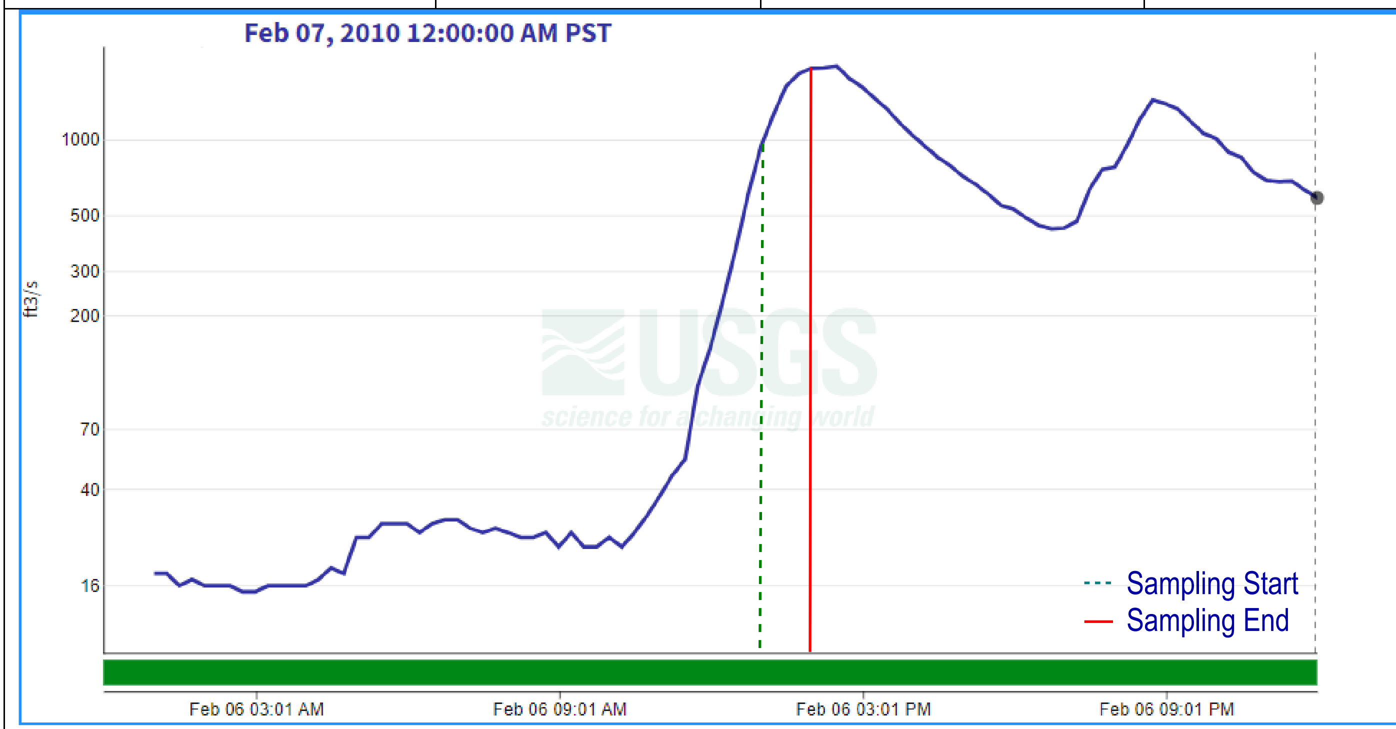
Year:	2010		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	12/20/2010		
Sample Collection Information			
Time of 1st Sample Collected:	12:19 AM		
Time of 24th Sample Collected:	1:38 AM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	98	**Flow rate at time of end of Sampling (CFS):**	165
Average flow rate during sampling (CFS):	150	**Max flow rate for the event (CFS):**	220
Peak occurs during the sampling time?	No		
TSS (mg/L):	1,700	**Turbidity (NTU):**	1,200



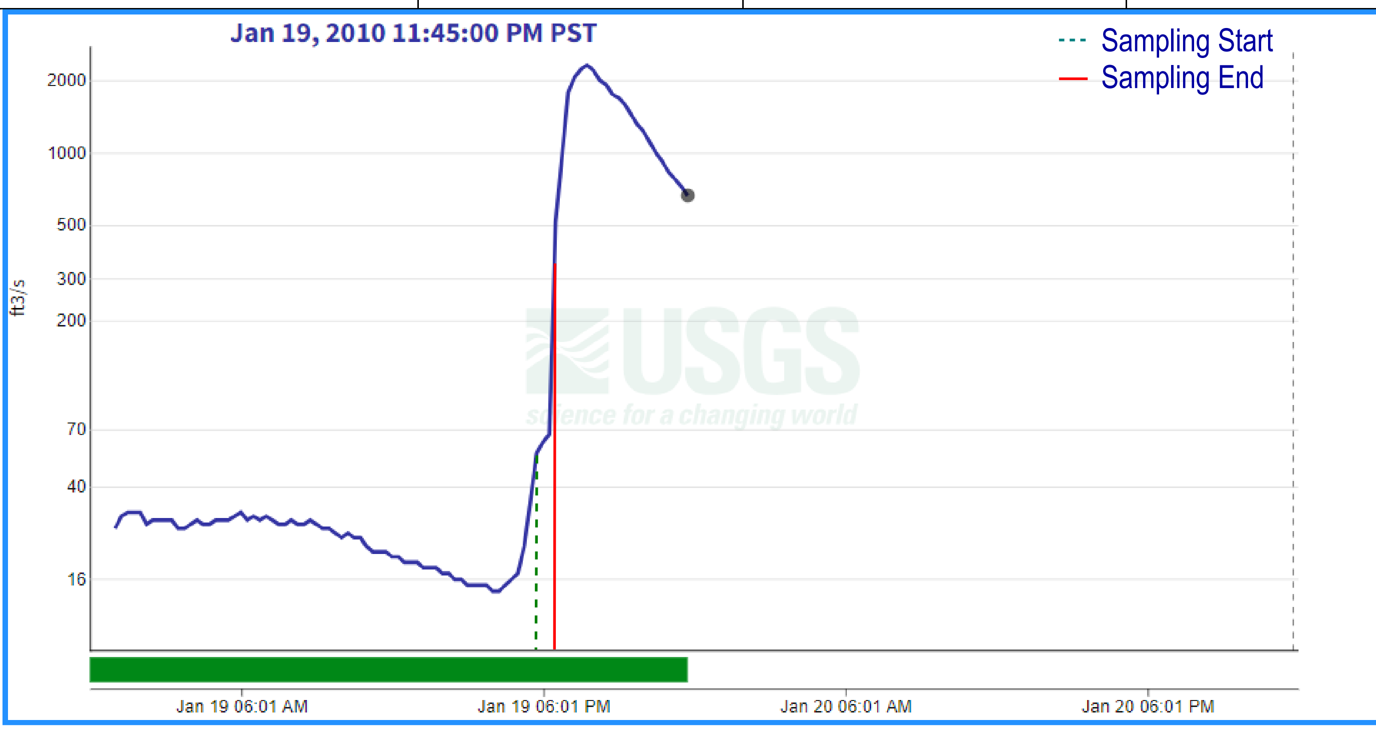
Year:	2010		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	10/17/2010		
Sample Collection Information			
Time of 1st Sample Collected:	8:32 PM		
Time of 24th Sample Collected:	9:41 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	81.8	**Flow rate at time of end of Sampling (CFS):**	105
Average flow rate during sampling (CFS):	115	**Max flow rate for the event (CFS):**	146
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	230	**Turbidity (NTU):**	28



Year:	2010		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	2/6/2010		
Sample Collection Information			
Time of 1st Sample Collected:	1 PM		
Time of 24th Sample Collected:	2 PM		
Sample Intervals:	Missing record on sampling interval		
Flow rate at time of sample (CFS):	938	**Flow rate at time of end of Sampling (CFS):**	1,920
Average flow rate during sampling (CFS):	1,515	**Max flow rate for the event (CFS):**	1,960
Peak occurs during the sampling time?	No		
TSS (mg/L):	620	**Turbidity (NTU):**	N/A

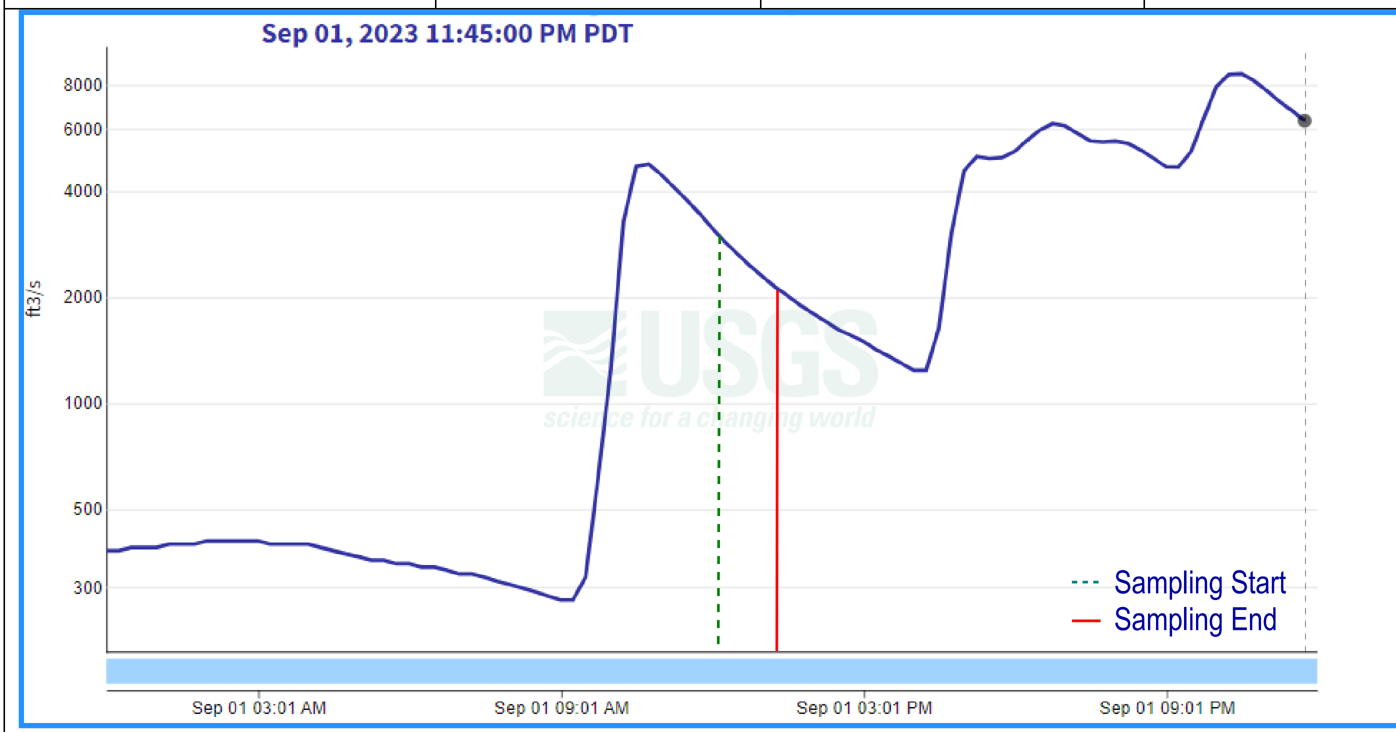


Year:	2010		
Sample Location:	Las Vegas Wash at The Club at Sunrise		
Date:	1/19/2010		
Sample Collection Information			
Time of 1st Sample Collected:	5:40 PM		
Time of 24th Sample Collected:	6:20 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	55	**Flow rate at time of end of Sampling (CFS):**	310
Average flow rate during sampling (CFS):	123	**Max flow rate for the event (CFS):**	2,310
Peak occurs during the sampling time?	No		
TSS (mg/L):	3,400	**Turbidity (NTU):**	N/A

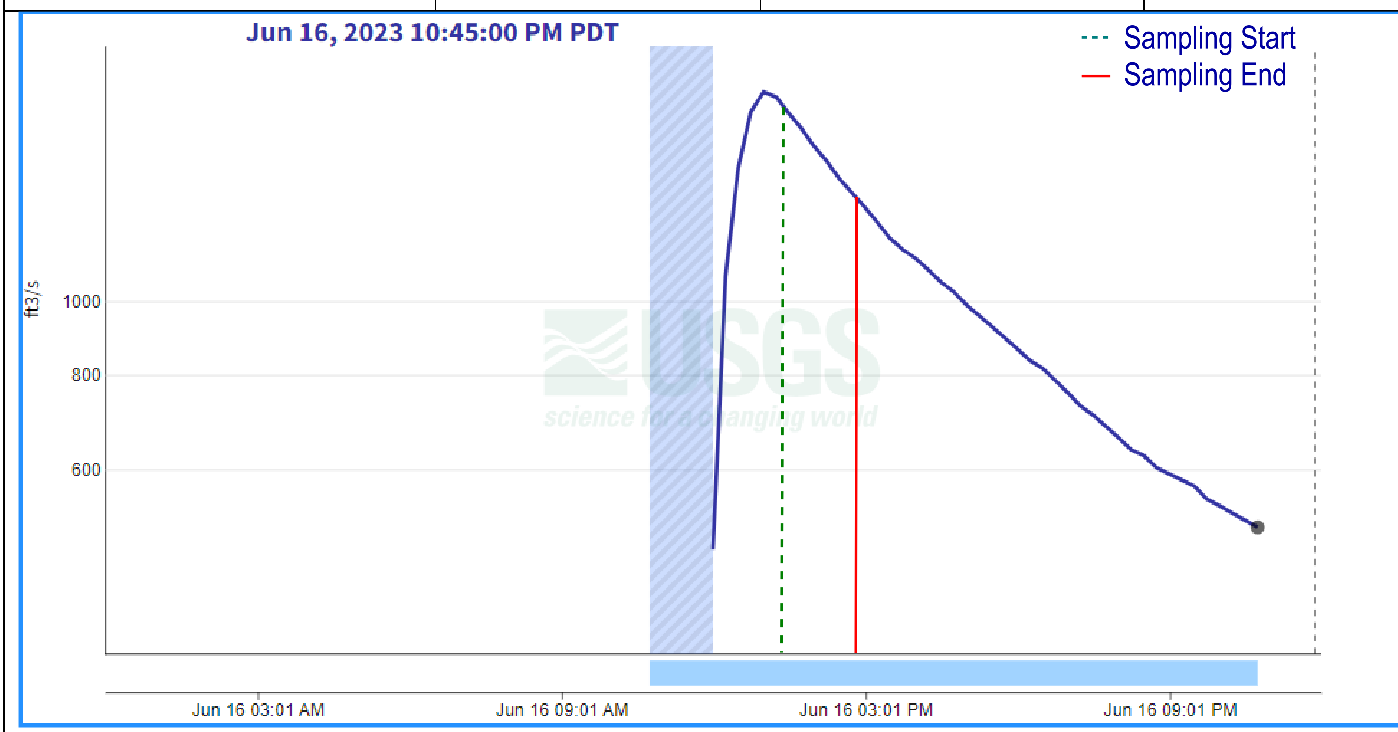


Rainbow Gardens Hydrographs

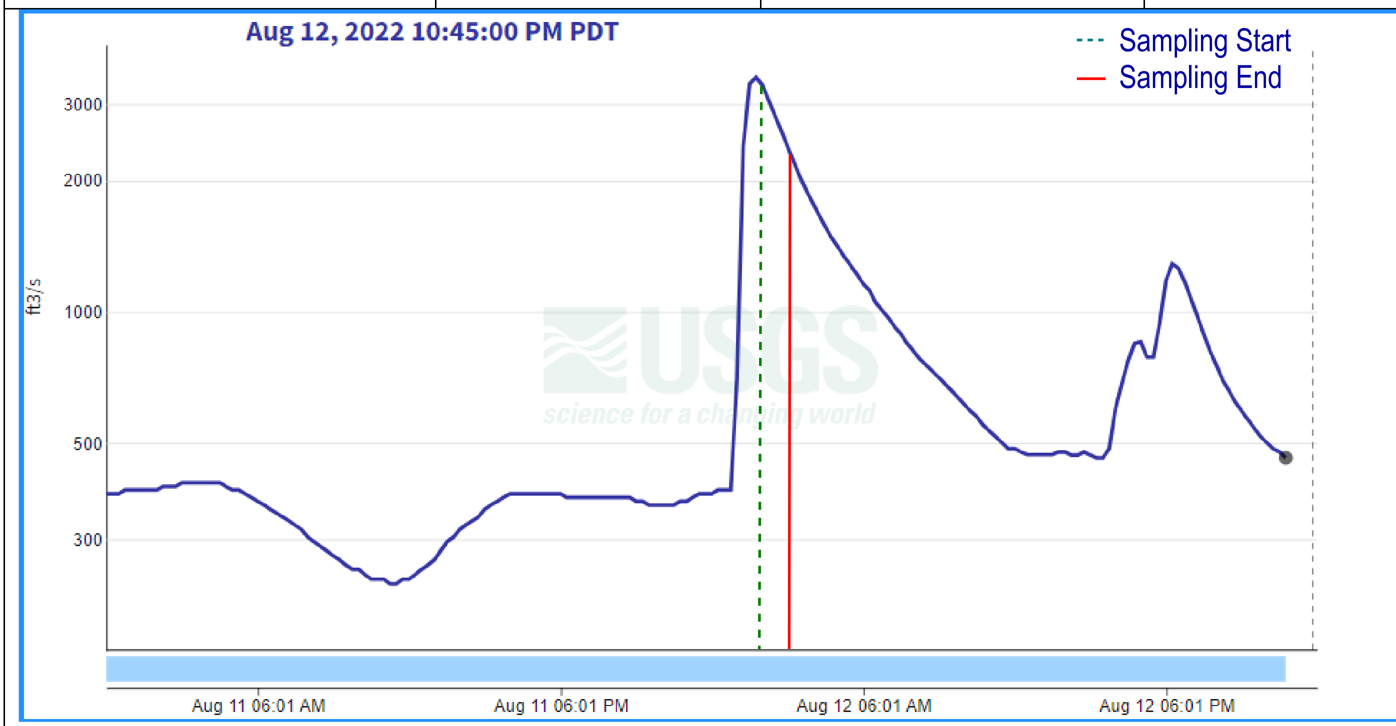
Year:	2023		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	9/1/2023		
Sample Collection Information			
Time of 1st Sample Collected:	12:27 PM		
Time of 24th Sample Collected:	1:10 PM		
Sample Intervals:	2 minutes		
Flow rate at time of sample (CFS):	2,660	**Flow rate at time of end of Sampling (CFS):**	2,120
Average flow rate during sampling (CFS):	2,380	**Max flow rate for the event (CFS):**	4,770
Peak occurs during the sampling time?	No		
TSS (mg/L):	680	**Turbidity (NTU):**	581



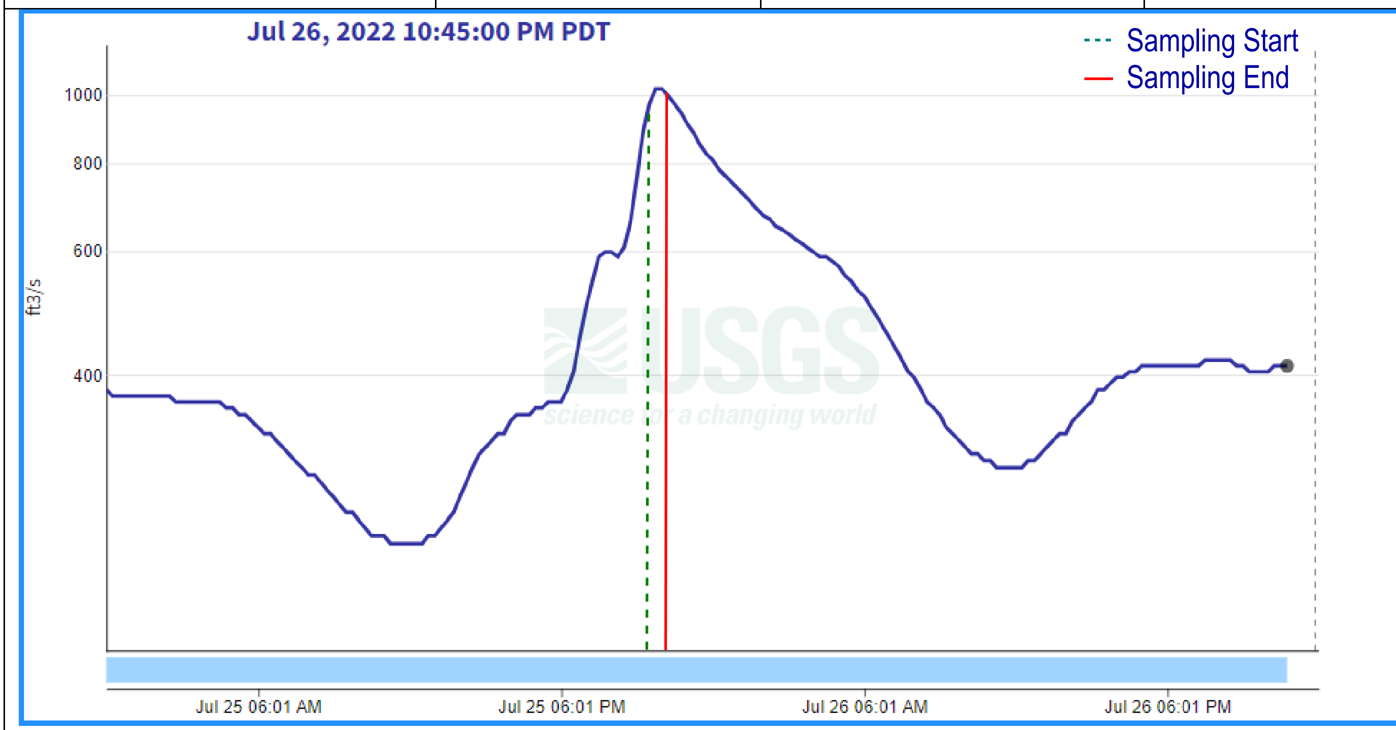
Year:	2023		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	6/16/2023		
Sample Collection Information			
Time of 1st Sample Collected:	1:28 PM		
Time of 24th Sample Collected:	2:43 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	1,770	**Flow rate at time of end of Sampling (CFS):**	1,390
Average flow rate (CFS):	1,572	**Max flow rate for the event (CFS):**	1,890
Peak occurs during the sampling time?	No		
TSS (mg/L):	268	**Turbidity (NTU):**	202



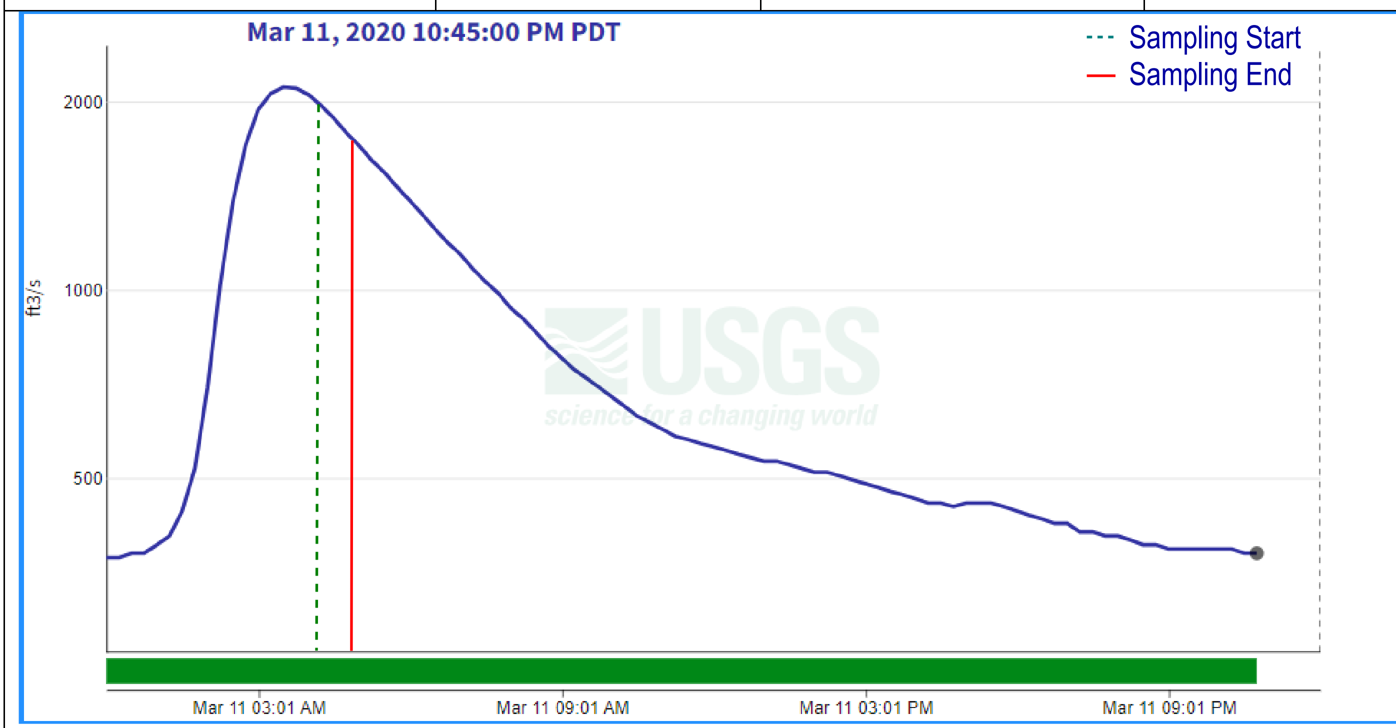
Year:	2022		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	8/12/2022		
Sample Collection Information			
Time of 1st Sample Collected:	2:03 AM		
Time of 24th Sample Collected:	3:12 AM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	3,310	**Flow rate at time of end of Sampling (CFS):**	2,200
Average flow rate (CFS):	2,740	**Max flow rate for the event (CFS):**	3,460
Peak occurs during the sampling time?	No		
TSS (mg/L):	786	**Turbidity (NTU):**	564



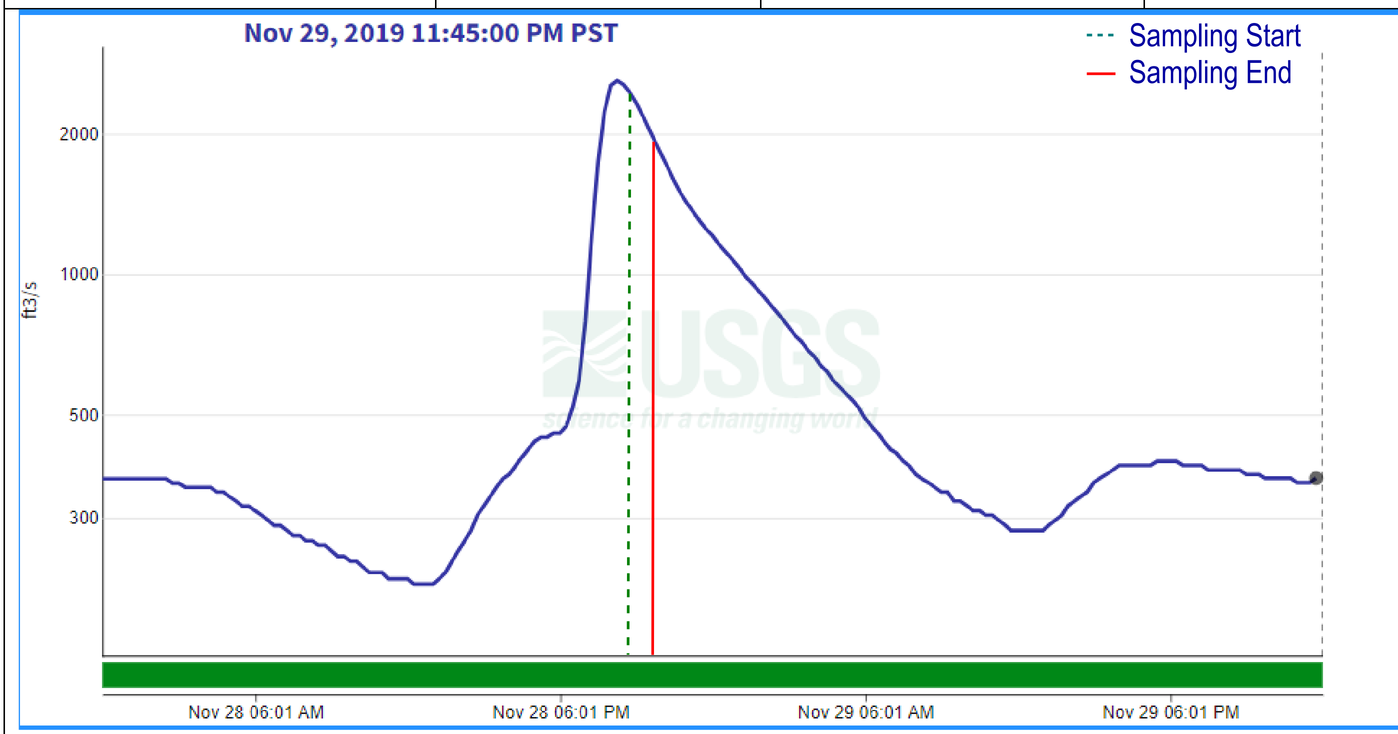
Year:	2022		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	7/25/2022		
Sample Collection Information			
Time of 1st Sample Collected:	9:19 PM		
Time of 24th Sample Collected:	10:05 PM		
Sample Intervals:	2 minutes		
Flow rate at time of sample (CFS):	910	**Flow rate at time of end of Sampling (CFS):**	1,015
Average flow rate (CFS):	990	**Max flow rate for the event (CFS):**	1,020
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	125	**Turbidity (NTU):**	45



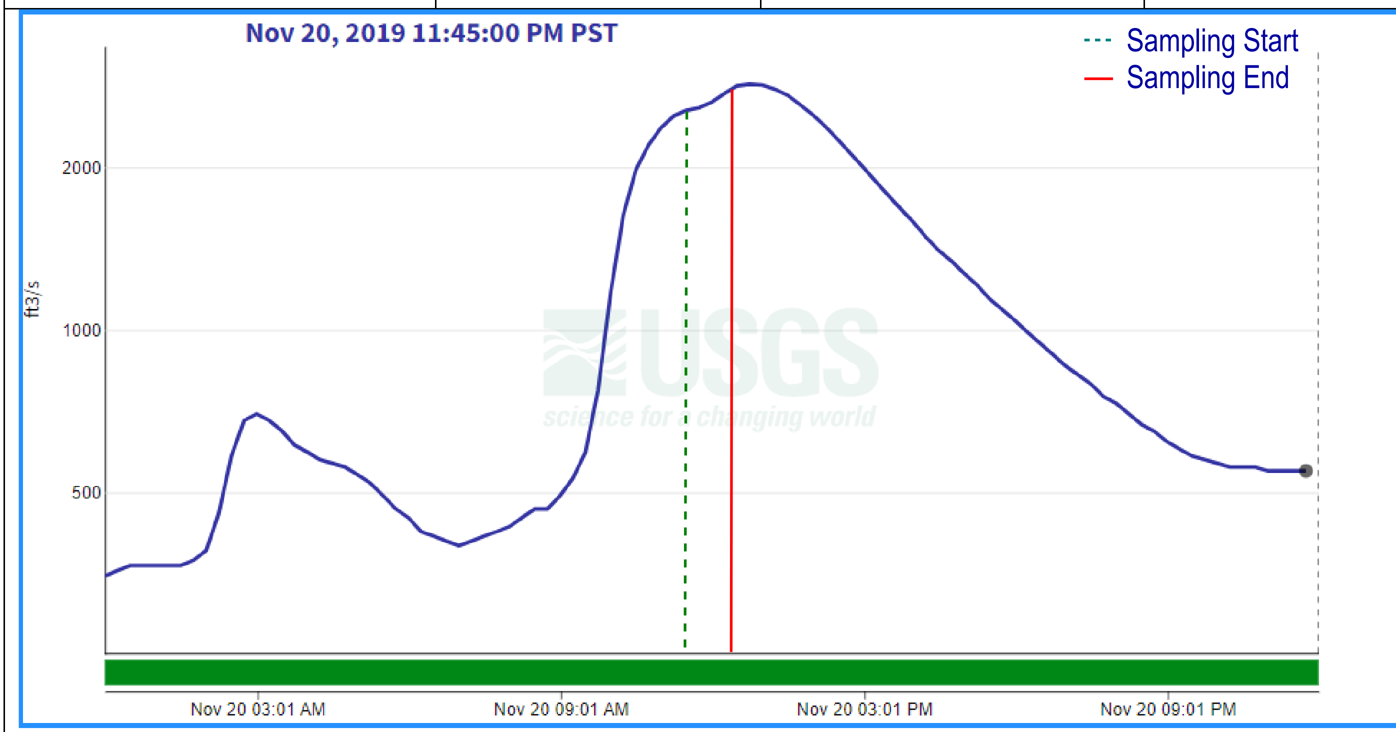
Year:	2020		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	3/11/2020		
Sample Collection Information			
Time of 1st Sample Collected:	4:19 AM		
Time of 24th Sample Collected:	5:04 AM		
Sample Intervals:	2 Minutes		
Flow rate at time of sample (CFS):	1,950	**Flow rate at time of end of Sampling (CFS):**	1,690
Average flow rate (CFS):	1,825	**Max flow rate for the event (CFS):**	2,110
Peak occurs during the sampling time?	No		
TSS (mg/L):	92	**Turbidity (NTU):**	52



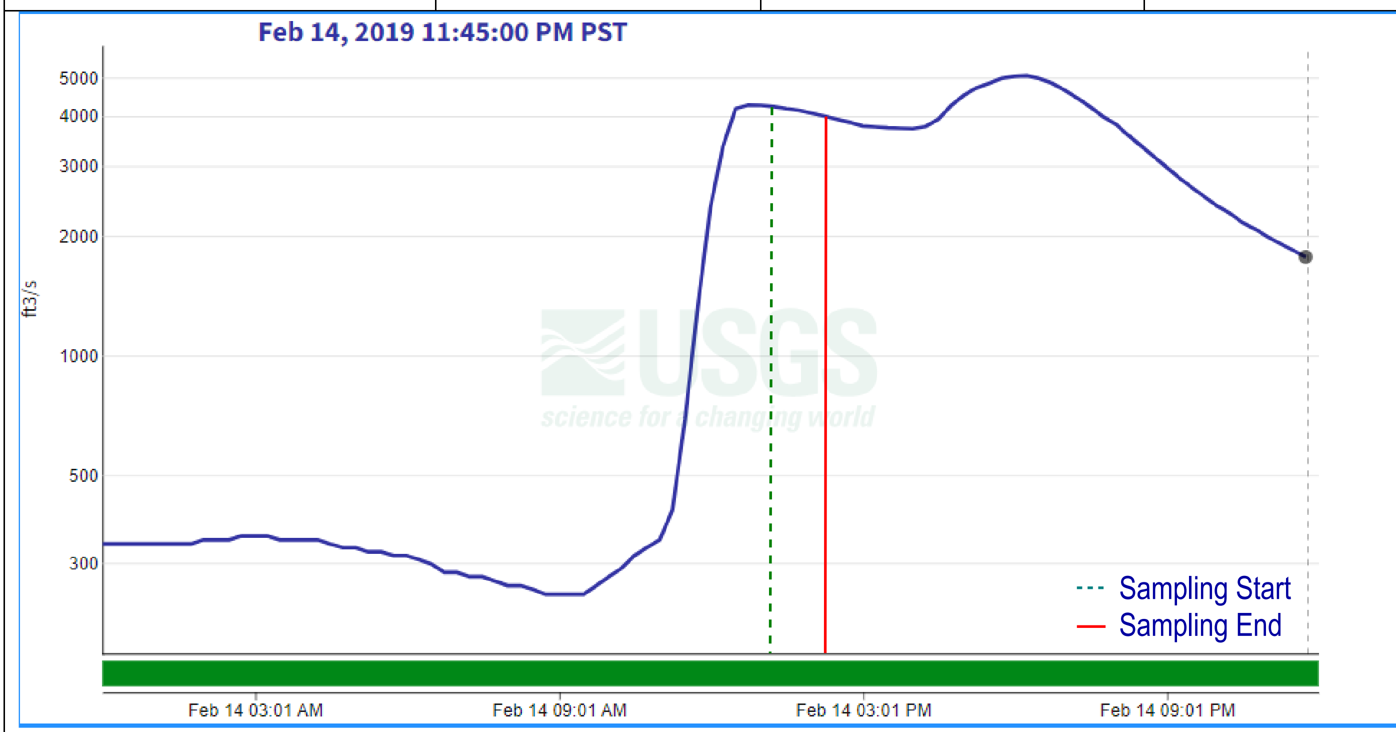
Year:	2019		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	11/28/2019		
Sample Collection Information			
Time of 1st Sample Collected:	8:43 PM		
Time of 24th Sample Collected:	9:52 PM		
Sample Intervals:	3 Minutes		
Flow rate at time of sample (CFS):	2,450	**Flow rate at time of end of Sampling (CFS):**	1,900
Average flow rate (CFS):	2,182	**Max flow rate for the event (CFS):**	2,600
Peak occurs during the sampling time?	No		
TSS (mg/L):	120	**Turbidity (NTU):**	47



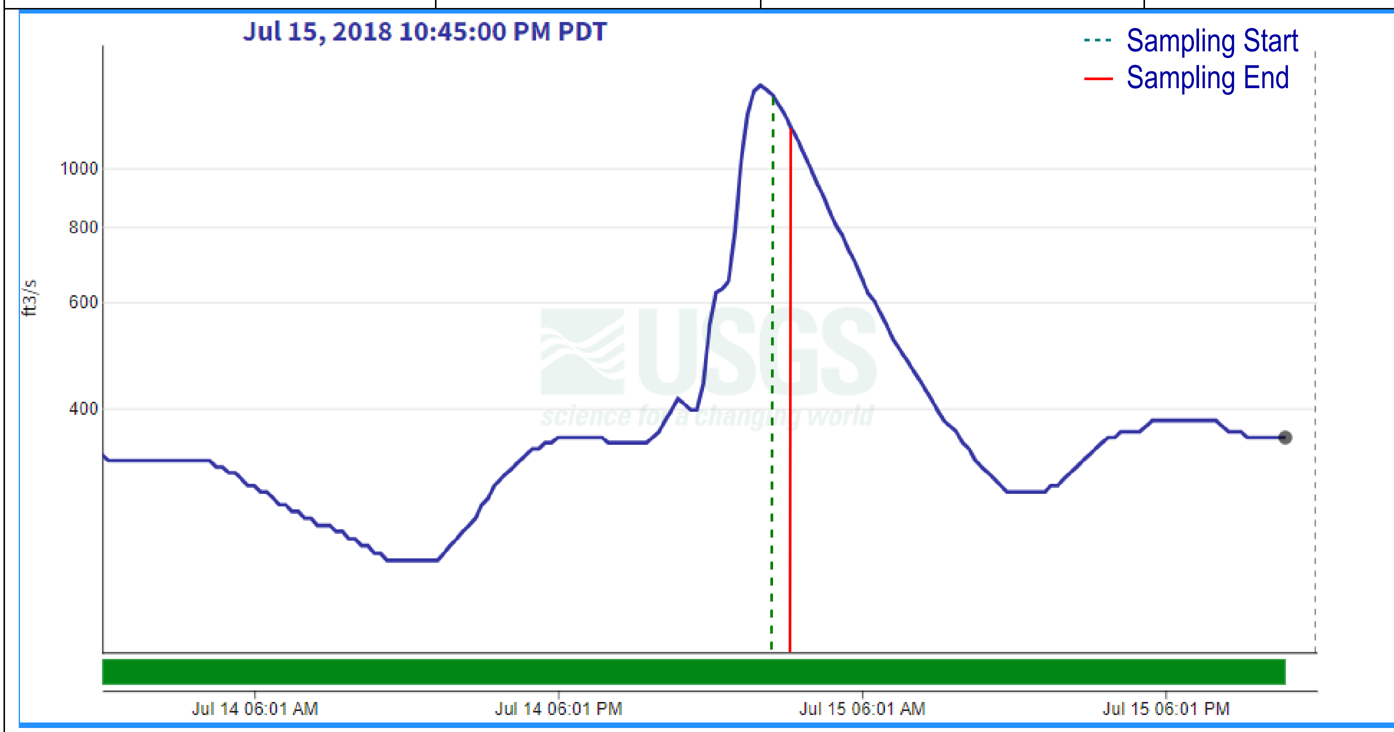
Year:	2019		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	11/20/2019		
Sample Collection Information			
Time of 1st Sample Collected:	11:30 AM		
Time of 24th Sample Collected:	12:16 PM		
Sample Intervals:	2 Minutes		
Flow rate at time of sample (CFS):	2,550	**Flow rate at time of end of Sampling (CFS):**	2,740
Average flow rate (CFS):	2,630	**Max flow rate for the event (CFS):**	2,850
Peak occurs during the sampling time?	No		
TSS (mg/L):	105	**Turbidity (NTU):**	190



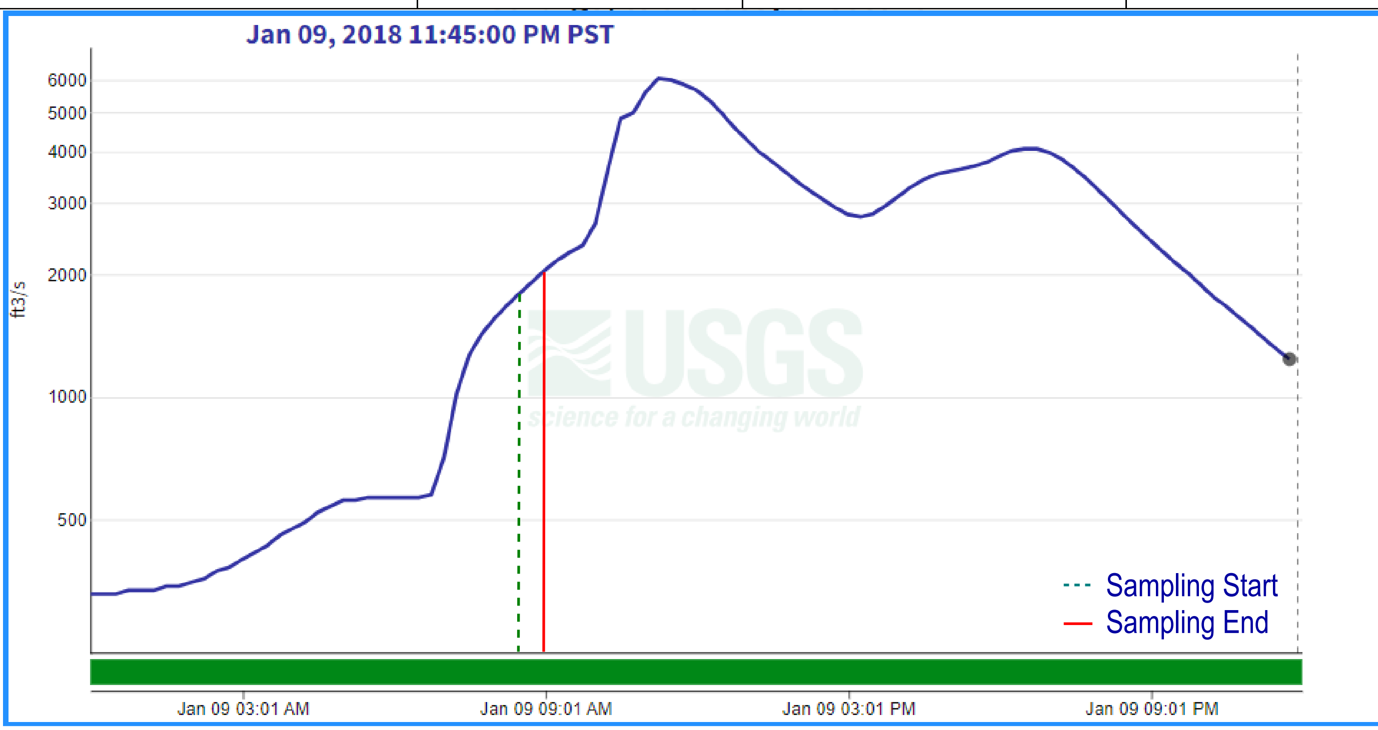
Year:	2019		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	2/14/2019		
Sample Collection Information			
Time of 1st Sample Collected:	1:08 PM		
Time of 24th Sample Collected:	2:17 PM		
Sample Intervals:	3 Minutes		
Flow rate at time of sample (CFS):	4,240	**Flow rate at time of end of Sampling (CFS):**	4,000
Average flow rate (CFS):	4,125	**Max flow rate for the event (CFS):**	5,060
Peak occurs during the sampling time?	No		
TSS (mg/L):	1,180	**Turbidity (NTU):**	605



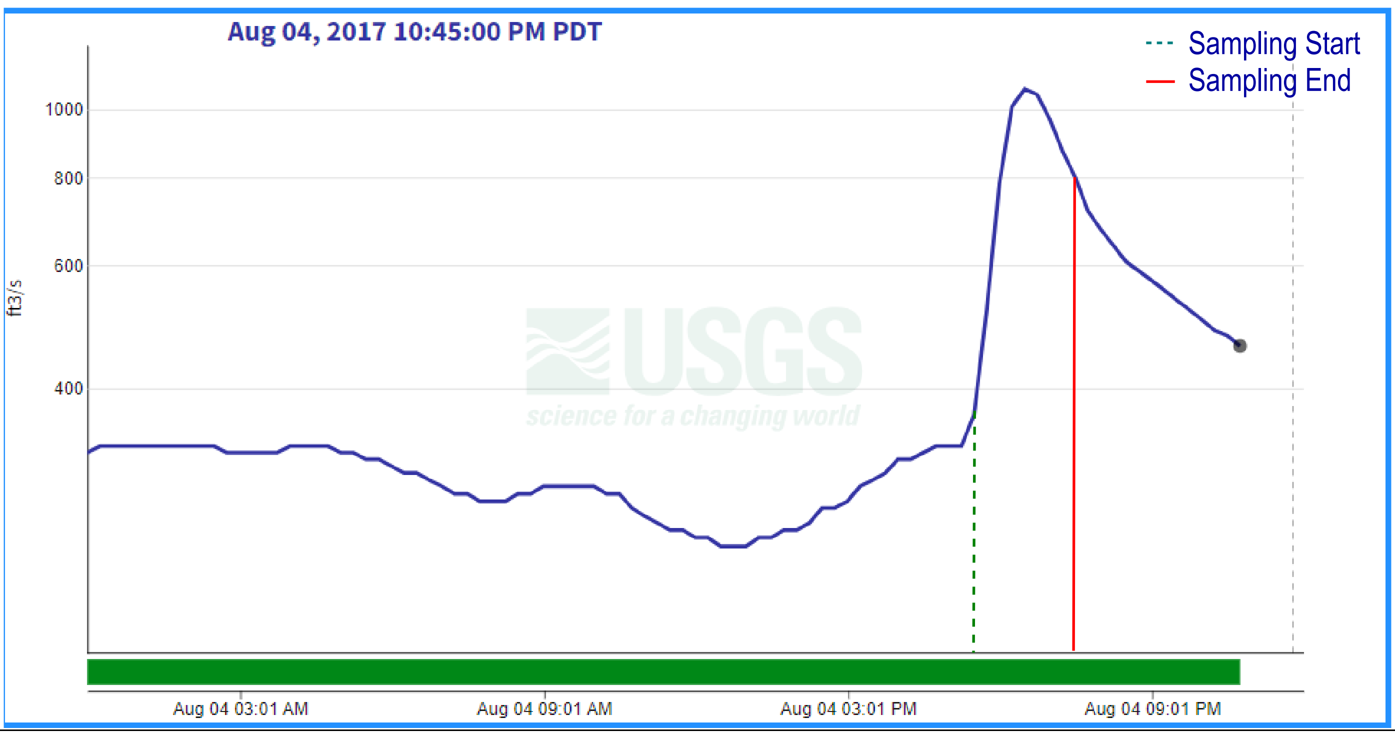
Year:	2018		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	7/15/2018		
Sample Collection Information			
Time of 1st Sample Collected:	2:23 AM		
Time of 24th Sample Collected:	2:52 AM		
Sample Intervals:	1 Minute		
Flow rate at time of sample (CFS):	1,330	**Flow rate at time of end of Sampling (CFS):**	1,250
Average flow rate (CFS):	1,290	**Max flow rate for the event (CFS):**	1,370
Peak occurs during the sampling time?	No		
TSS (mg/L):	145	**Turbidity (NTU):**	137



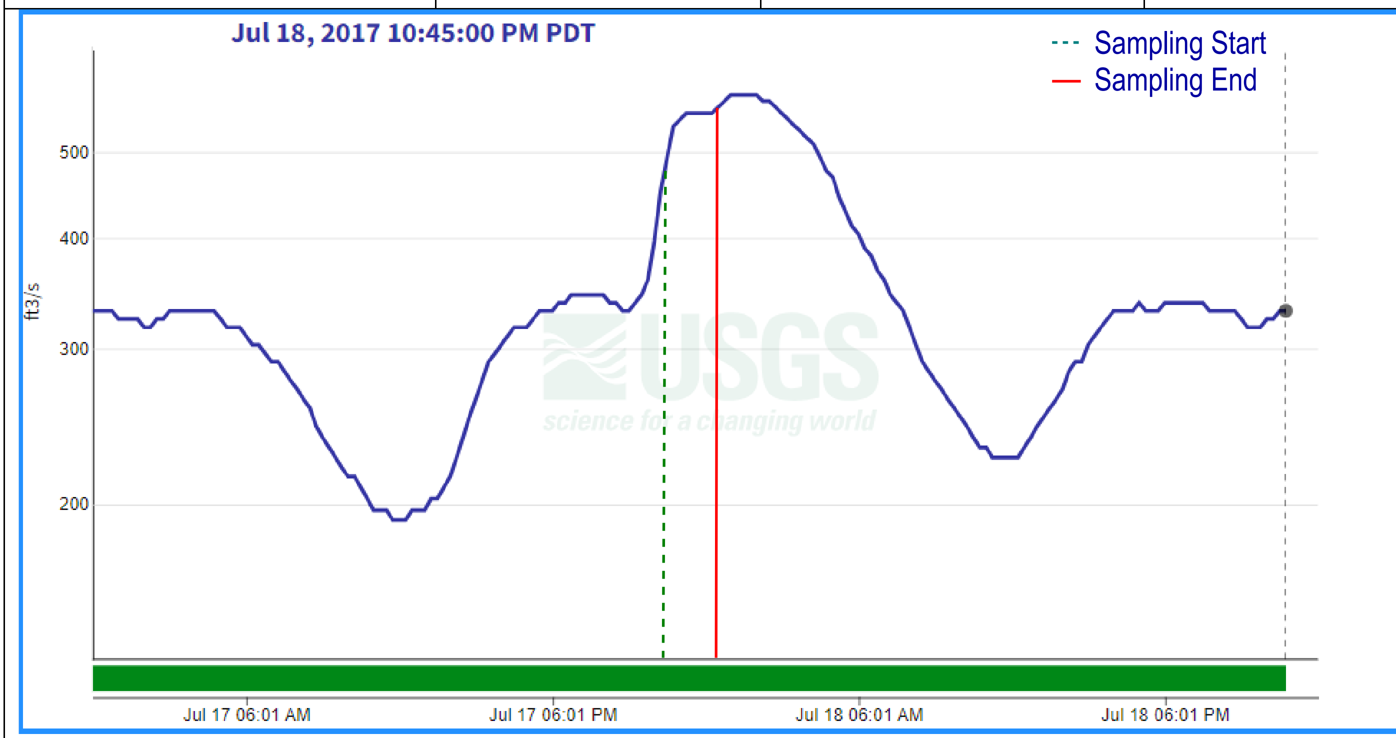
Year:	2018		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	1/09/2018		
Sample Collection Information			
Time of 1st Sample Collected:	8:15 AM		
Time of 24th Sample Collected:	8:56 AM		
Sample Intervals:	1 Minute		
Flow rate at time of sample (CFS):	1,680	**Flow rate at time of end of Sampling (CFS):**	2,020
Average flow rate (CFS):	1,855	**Max flow rate for the event (CFS):**	6,060
Peak occurs during the sampling time?	No		
TSS (mg/L):	775	**Turbidity (NTU):**	512



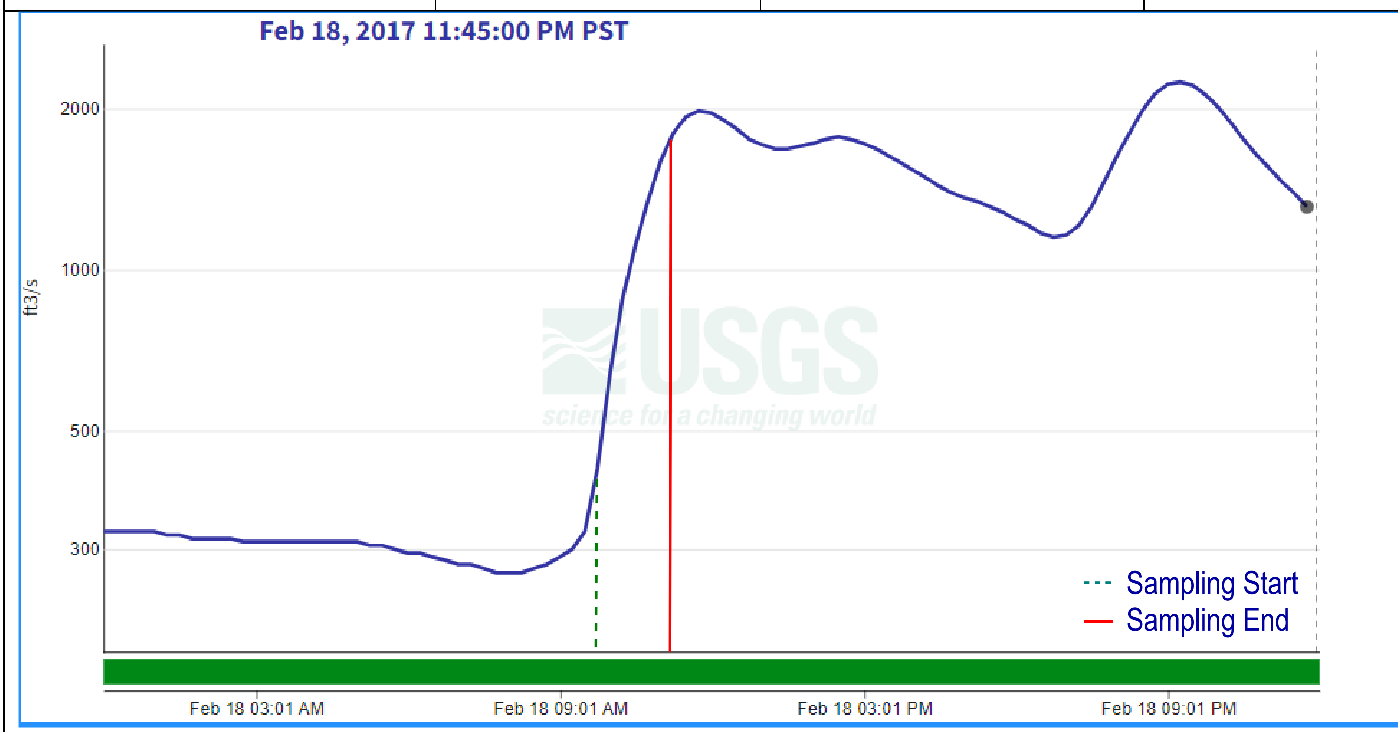
Year:	2017		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	8/4/2017		
Sample Collection Information			
Time of 1st Sample Collected:	5:30 PM		
Time of 24th Sample Collected:	7:30 PM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	367	**Flow rate at time of end of Sampling (CFS):**	800
Average flow rate during sampling (CFS):	825	**Max flow rate for the event (CFS):**	1,070
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	21	**Turbidity (NTU):**	10



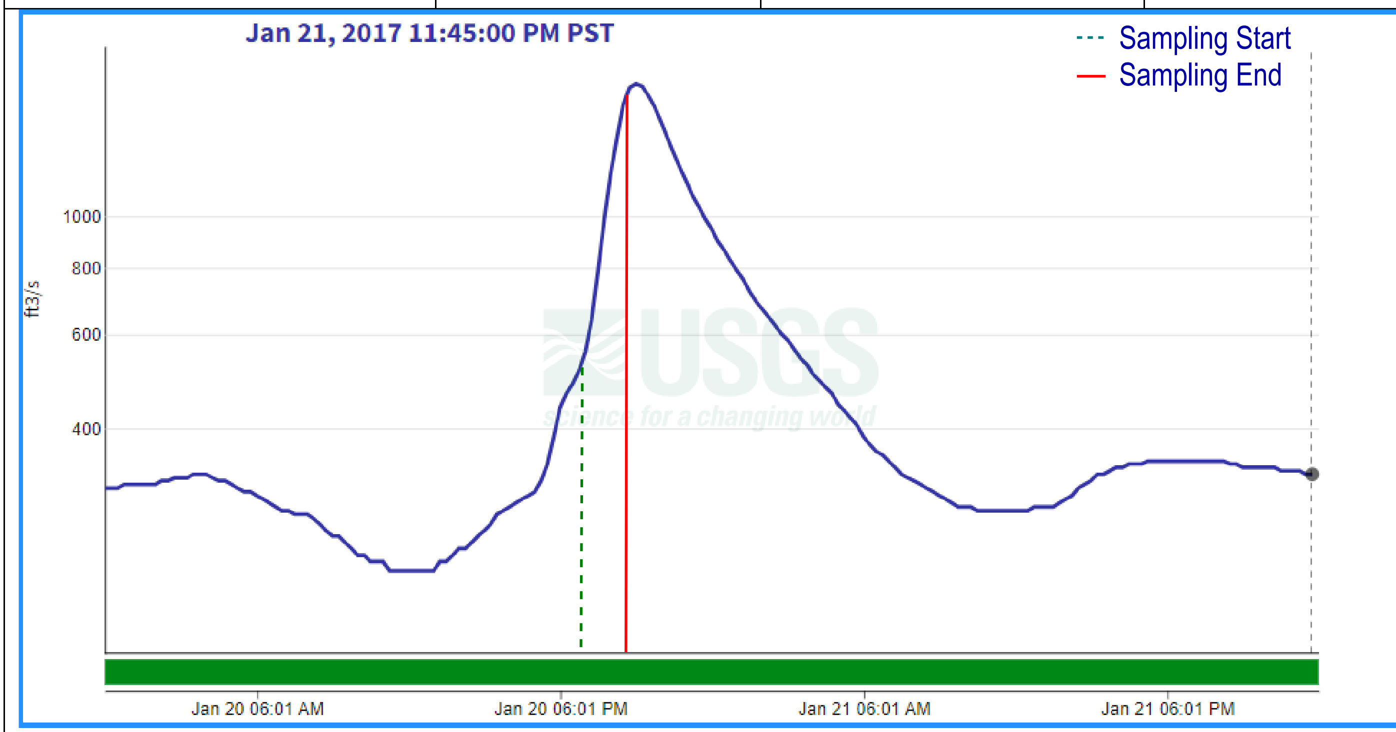
Year:	2017		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	7/17/2017		
Sample Collection Information			
Time of 1st Sample Collected:	10:23 PM		
Time of 24th Sample Collected:	12:18 AM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	460	**Flow rate at time of end of Sampling (CFS):**	558
Average flow rate during sampling (CFS):	538	**Max flow rate for the event (CFS):**	580
Peak occurs during the sampling time?	No		
TSS (mg/L):	< 5.0	**Turbidity (NTU):**	3.0



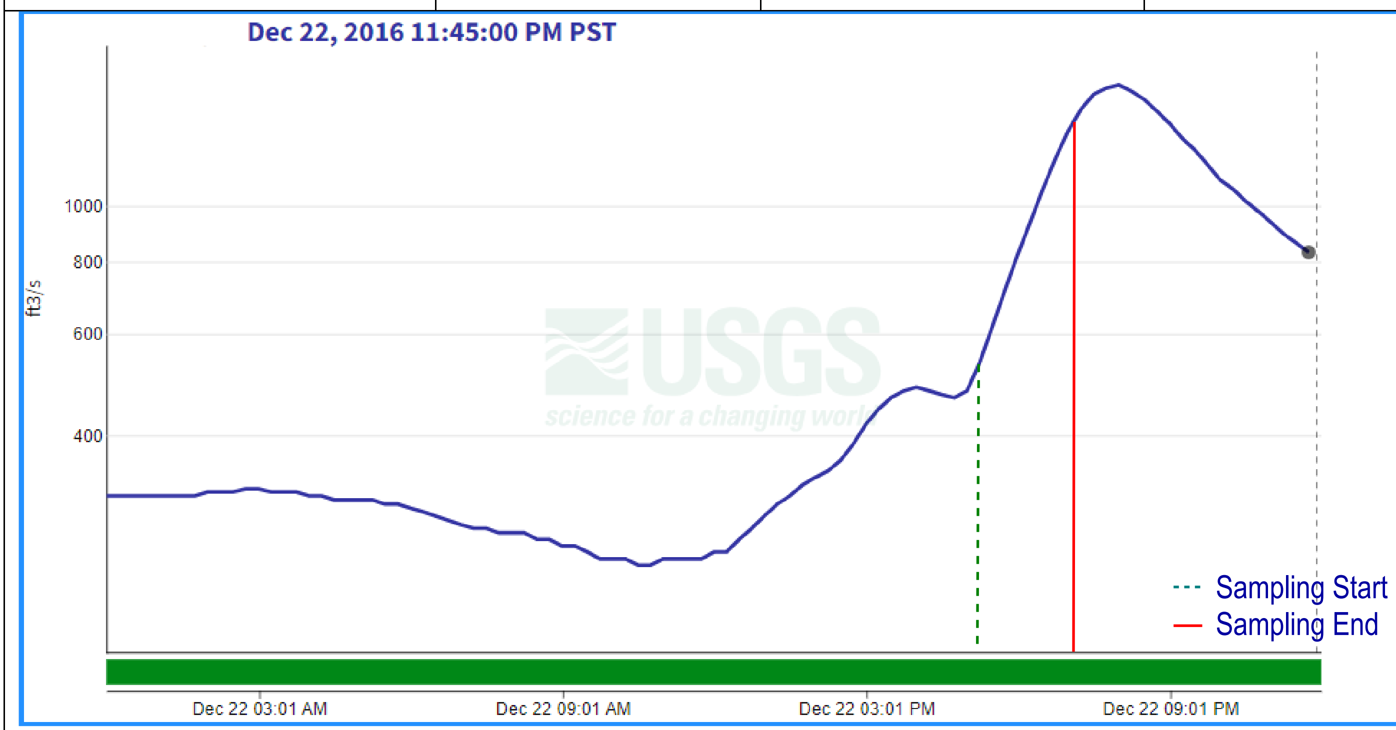
Year:	2017		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	2/18/2017		
Sample Collection Information			
Time of 1st Sample Collected:	9:40 AM		
Time of 24th Sample Collected:	11:25 AM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	420	**Flow rate at time of end of Sampling (CFS):**	1,880
Average flow rate during sampling (CFS):	1,210	**Max flow rate for the event (CFS):**	1,980
Peak occurs during the sampling time?	No		
TSS (mg/L):	492	**Turbidity (NTU):**	152



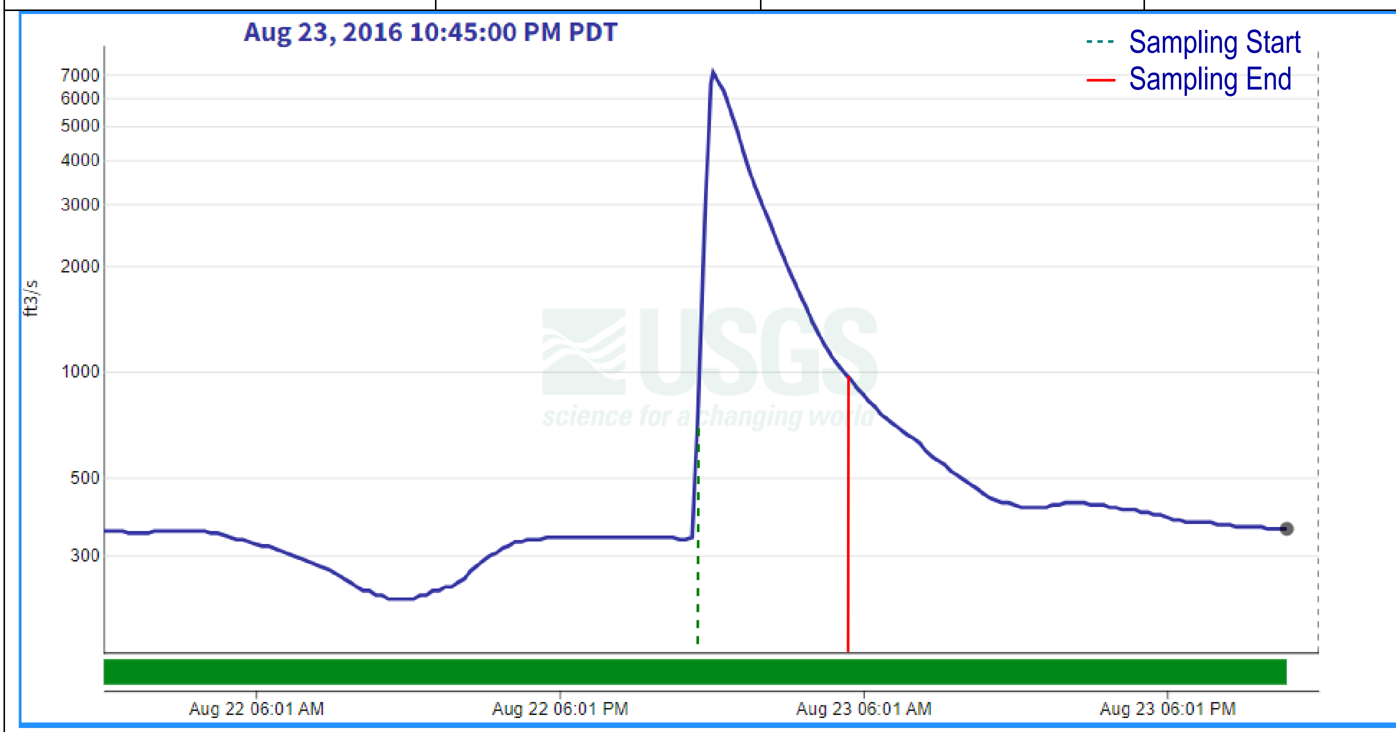
Year:	2017		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	1/20/2017		
Sample Collection Information			
Time of 1st Sample Collected:	6:39 PM		
Time of 24th Sample Collected:	8:34 PM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	500	**Flow rate at time of end of Sampling (CFS):**	1,680
Average flow rate during sampling (CFS):	970	**Max flow rate for the event (CFS):**	1,770
Peak occurs during the sampling time?	No		
TSS (mg/L):	166	**Turbidity (NTU):**	308



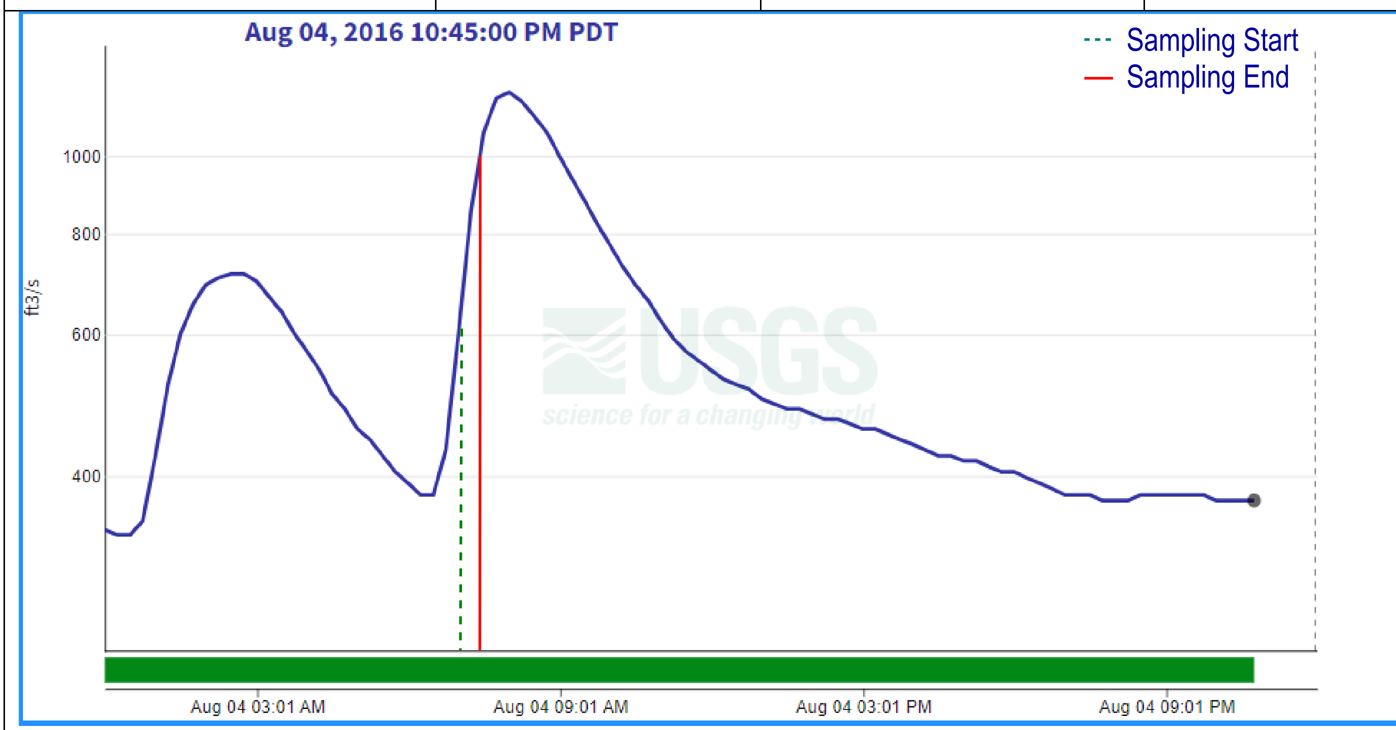
<table>
<tr><td>Year:</td><td colspan="3">2016</td></tr>
<tr><td>Sample Location:</td><td colspan="3">Las Vegas Wash at Rainbow Gardens</td></tr>
<tr><td>Date:</td><td colspan="3">12/22/2016</td></tr>
<tr><td colspan="4">Sample Collection Information</td></tr>
<tr><td>Time of 1st Sample Collected:</td><td colspan="3">5:11 PM</td></tr>
<tr><td>Time of 24th Sample Collected:</td><td colspan="3">7:07 PM</td></tr>
<tr><td>Sample Intervals:</td><td colspan="3">5 minutes</td></tr>
<tr><td>Flow rate at time of sample (CFS):</td><td>530</td><td>Flow rate at time of end of Sampling (CFS):</td><td>1,400</td></tr>
<tr><td>Average flow rate during sampling (CFS):</td><td>960</td><td>Max flow rate for the event (CFS):</td><td>1,620</td></tr>
<tr><td>Peak occurs during the sampling time?</td><td colspan="3">No</td></tr>
<tr><td>TSS (mg/L):</td><td>92</td><td>Turbidity (NTU):</td><td>80</td></tr>
</table>



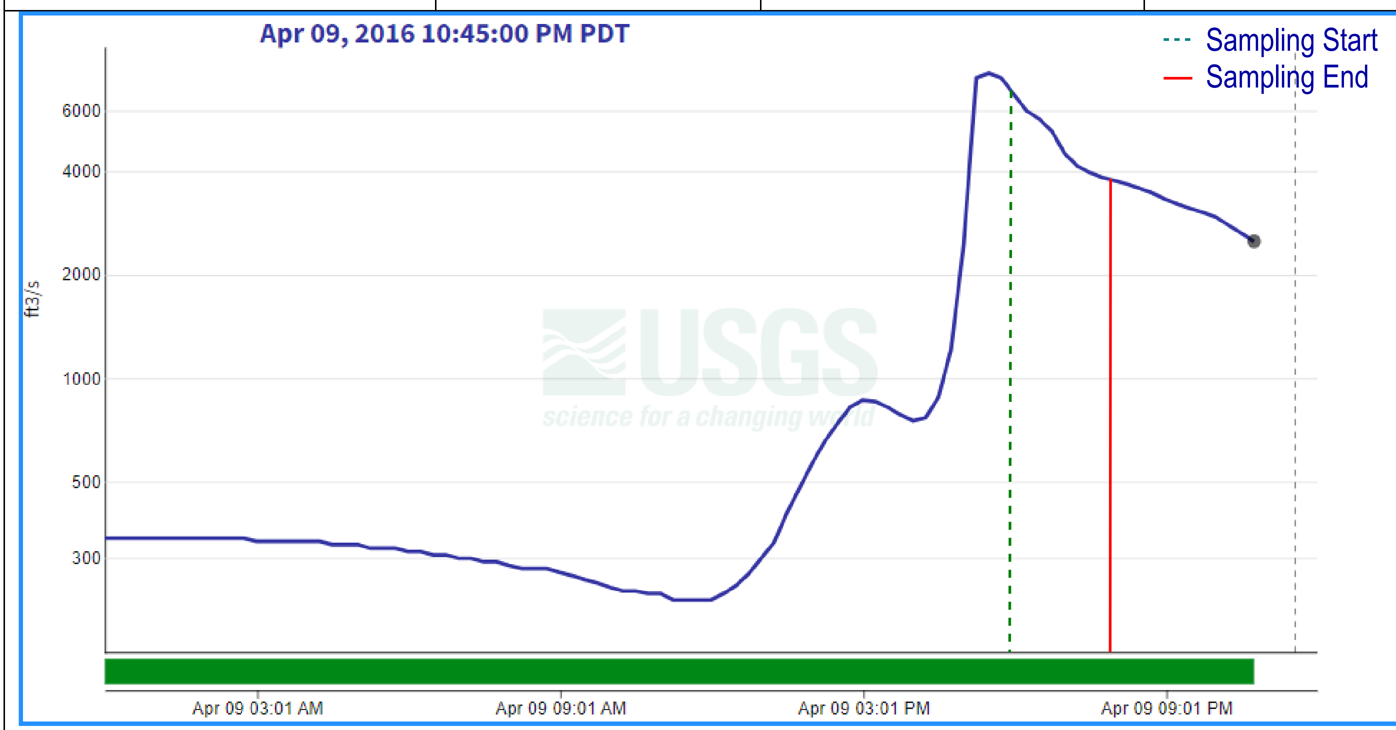
Year:	2016		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	8/23/2016		
Sample Collection Information			
Time of 1st Sample Collected:	Missing record on sampling start time		
Time of 24th Sample Collected:	Missing record on sampling end time		
Sample Intervals:	Missing record on sampling interval		
Flow rate at time of sample (CFS):	800	**Flow rate at time of end of Sampling (CFS):**	950
Average flow rate during sampling (CFS):	Missing	**Max flow rate for the event (CFS):**	7,100
Peak occurs during the sampling time?	Prob not due to automated sampler malfunction		
TSS (mg/L):	525	**Turbidity (NTU):**	730



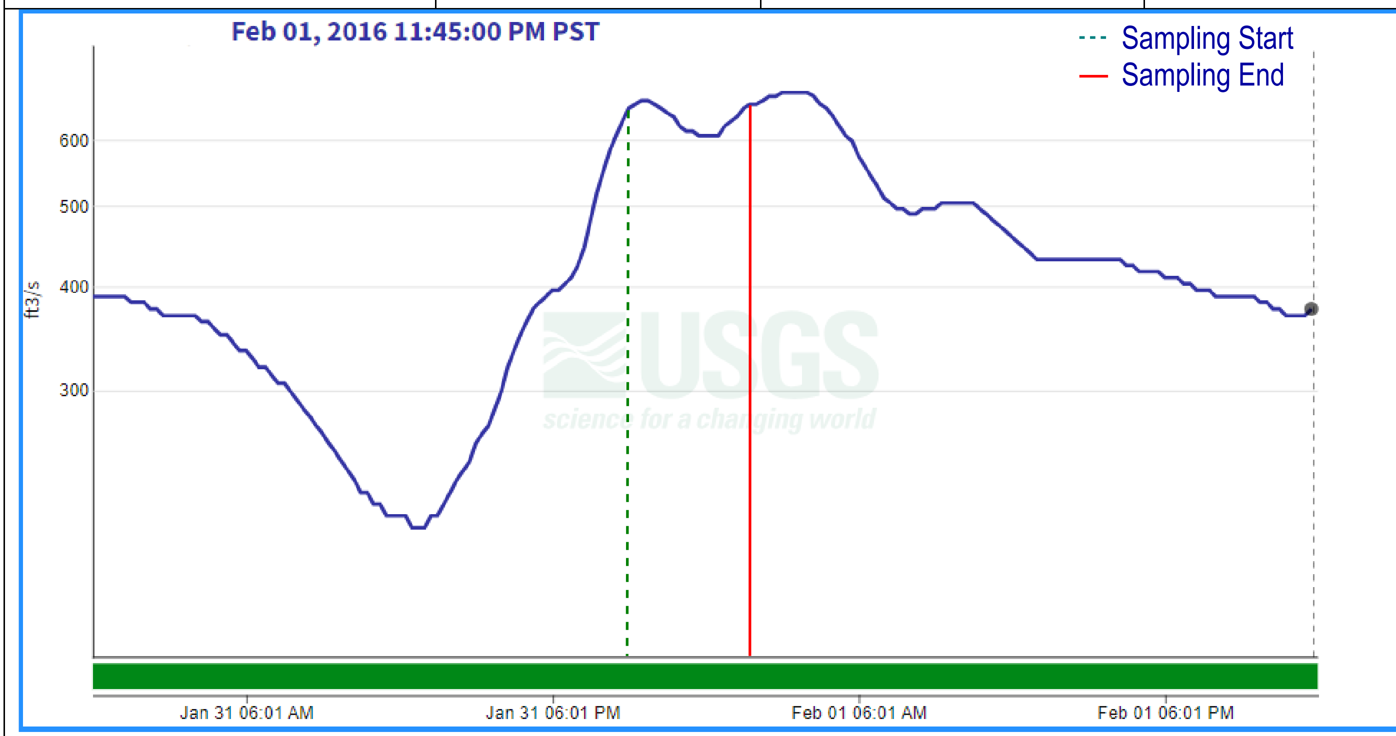
Year:	2016		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	8/4/2016		
Sample Collection Information			
Time of 1st Sample Collected:	7:05 AM		
Time of 24th Sample Collected:	9:01 AM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	625	**Flow rate at time of end of Sampling (CFS):**	1,000
Average flow rate during sampling (CFS):	1,035	**Max flow rate for the event (CFS):**	1,200
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	155	**Turbidity (NTU):**	157



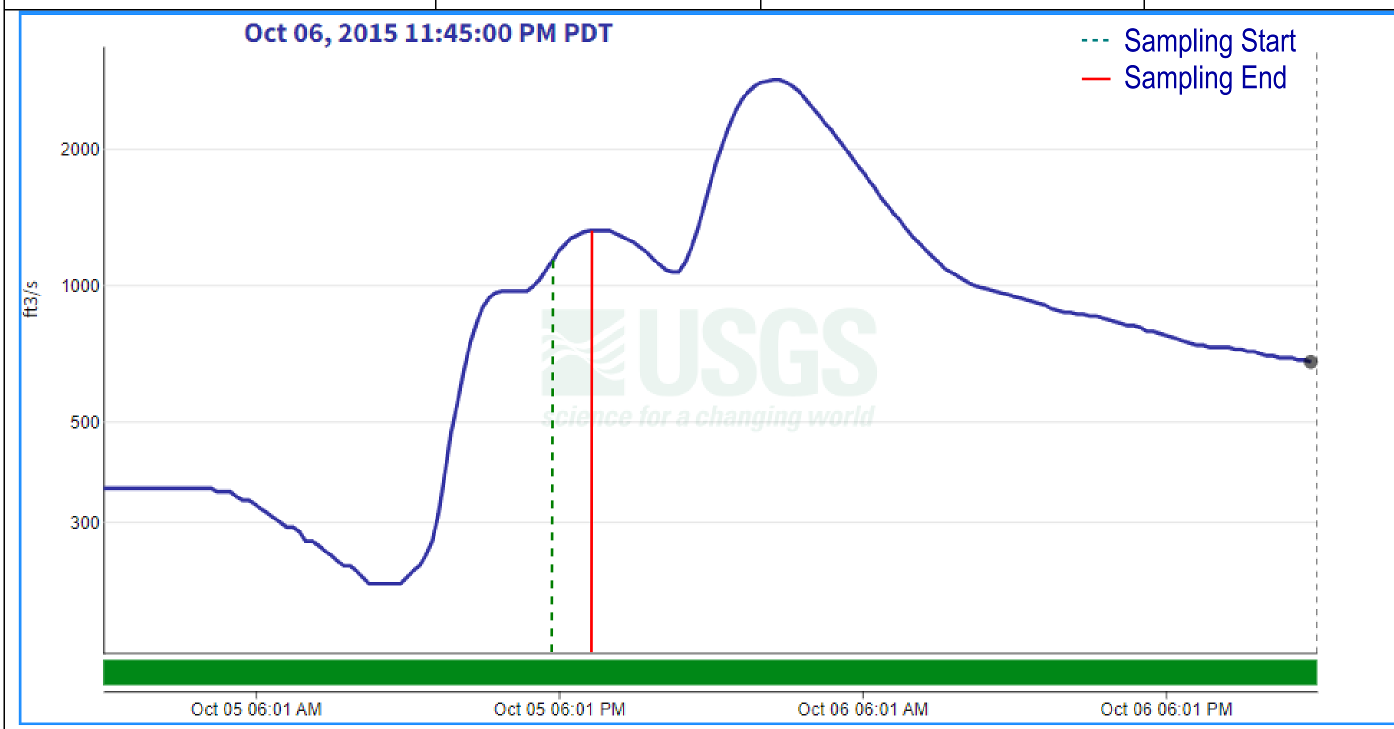
Year:	2016		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	4/9/2016		
Sample Collection Information			
Time of 1st Sample Collected:	5:50 PM		
Time of 24th Sample Collected:	7:50 PM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	7,100	**Flow rate at time of end of Sampling (CFS):**	3,700
Average flow rate during sampling (CFS):	5,215	**Max flow rate for the event (CFS):**	7,700
Peak occurs during the sampling time?	No		
TSS (mg/L):	175	**Turbidity (NTU):**	111



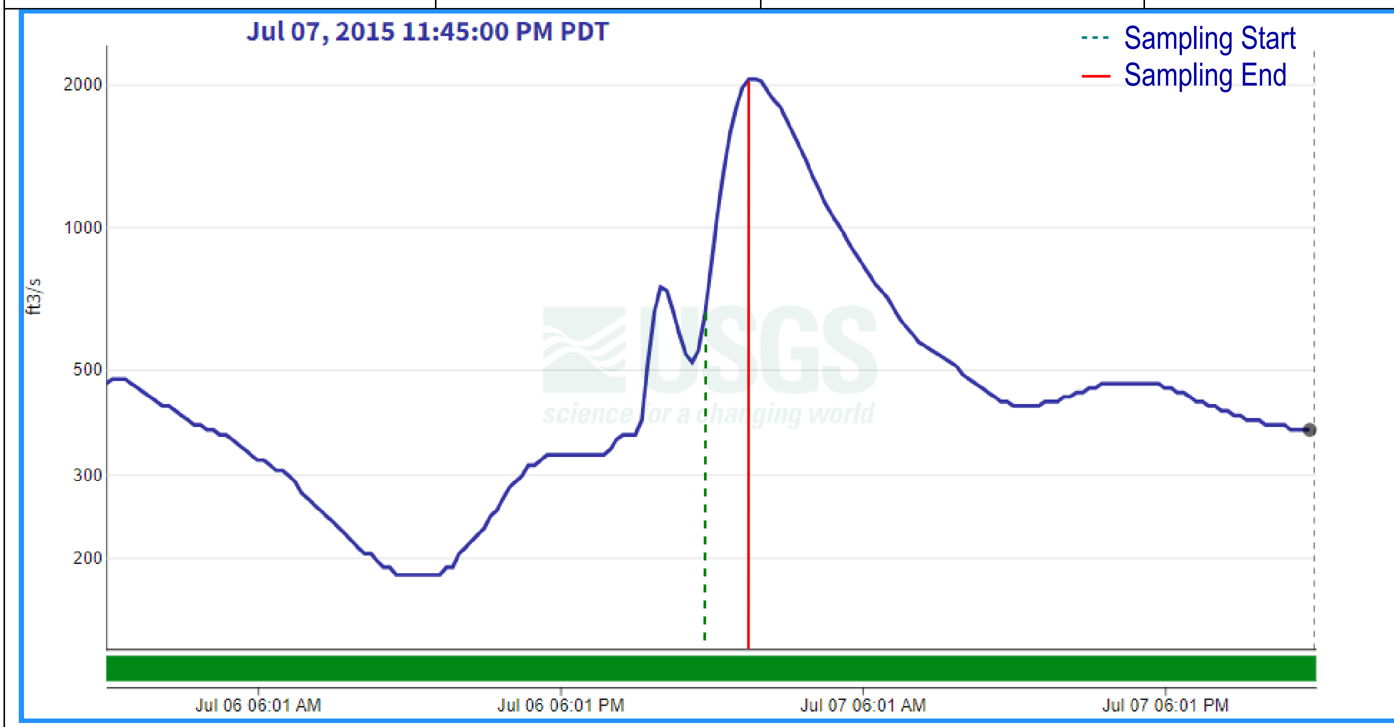
Year:	2016		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	1/31/2016		
Sample Collection Information			
Time of 1st Sample Collected:	Missing record on sampling start time		
Time of 24th Sample Collected:	Missing record on sampling end time		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	645	**Flow rate at time of end of Sampling (CFS):**	662
Average flow rate during sampling (CFS):	Missing	**Max flow rate for the event (CFS):**	669
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	45	**Turbidity (NTU):**	25



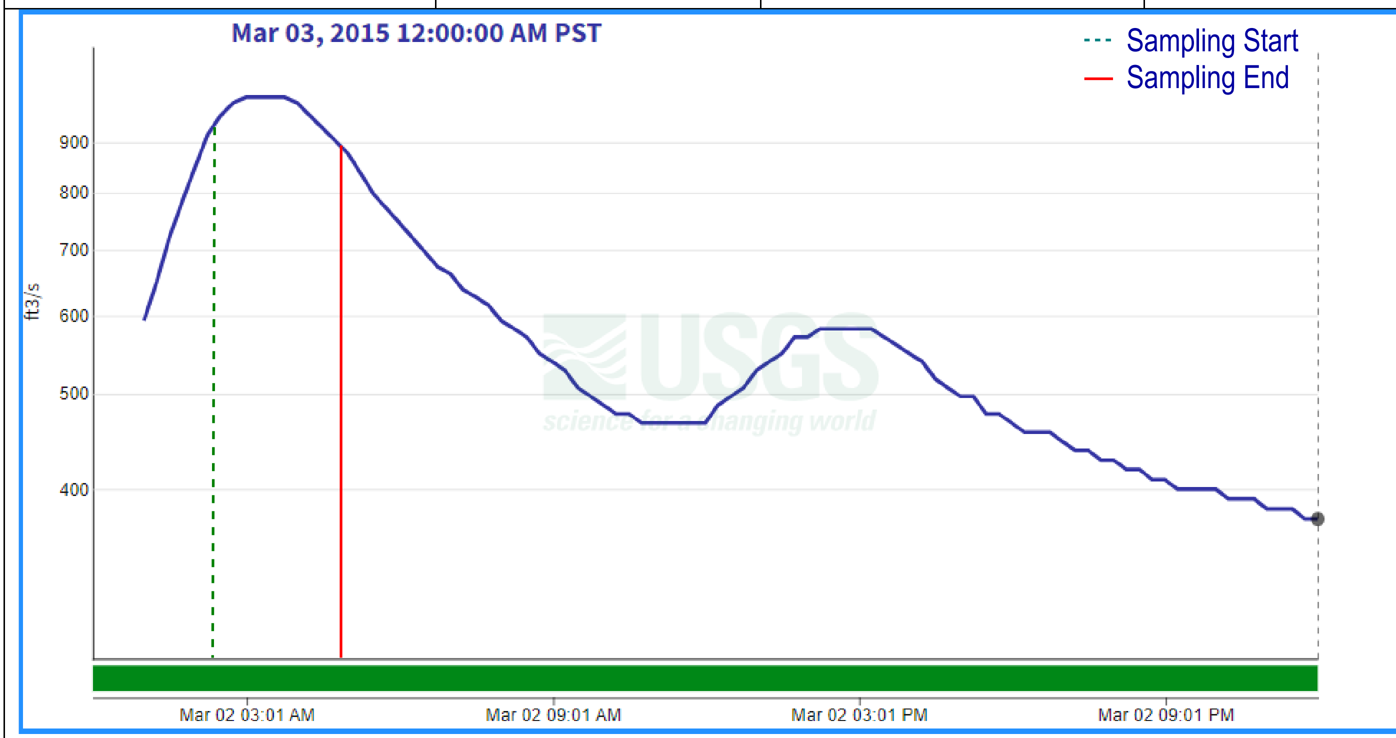
Year:	2015		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	10/05/15		
Sample Collection Information			
Time of 1st Sample Collected:	5:53 PM		
Time of 24th Sample Collected:	7:16 PM		
Sample Intervals:	5 Minutes		
Flow rate at time of sample (CFS):	1,150	**Flow rate at time of end of Sampling (CFS):**	1,320
Average flow rate during sampling (CFS):	1,250	**Max flow rate for the event (CFS):**	1,320
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	725	**Turbidity (NTU):**	813



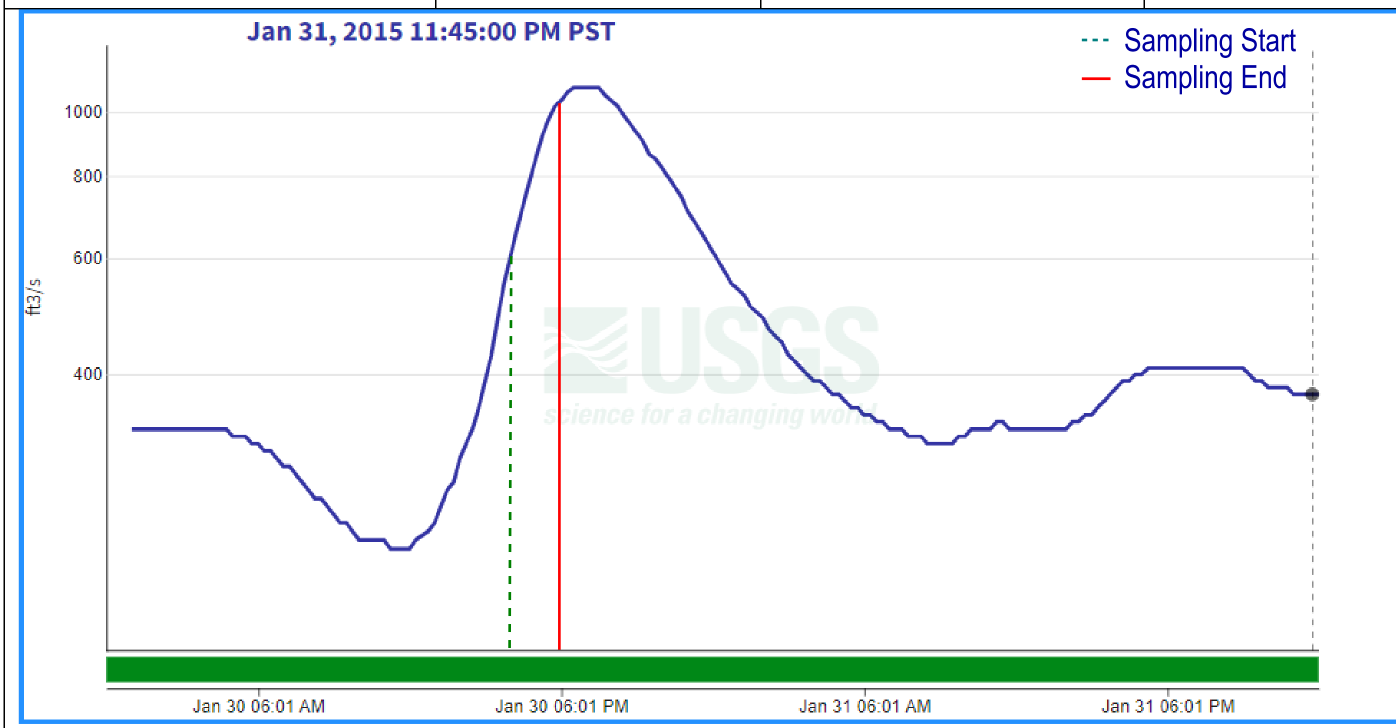
Year:	2015		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	7/06/15		
Sample Collection Information			
Time of 1st Sample Collected:	11:43 PM		
Time of 24th Sample Collected:	1:40 AM		
Sample Intervals:	5 Minutes		
Flow rate at time of sample (CFS):	650	**Flow rate at time of end of Sampling (CFS):**	2,050
Average flow rate during sampling (CFS):	1,200	**Max flow rate for the event (CFS):**	2,050
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	365	**Turbidity (NTU):**	324



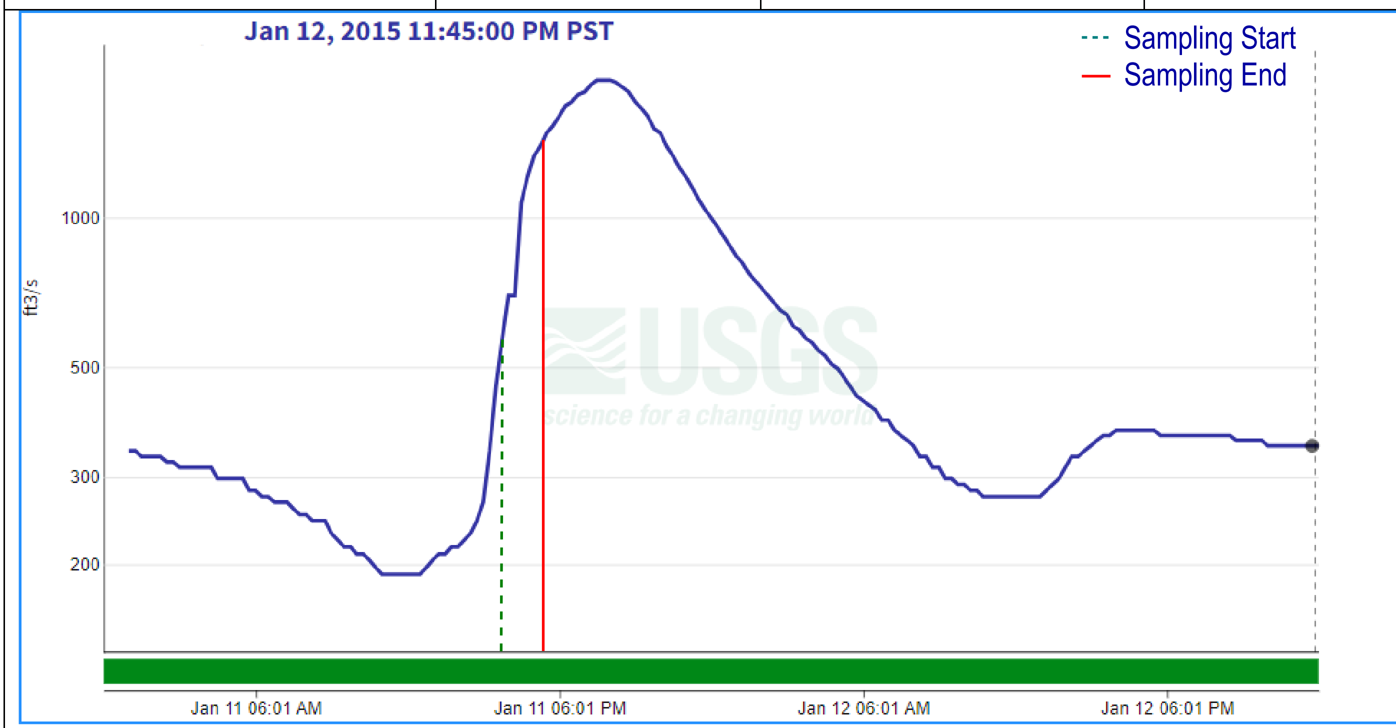
Year:	2015		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	3/02/15		
Sample Collection Information			
Time of 1st Sample Collected:	2:22 AM		
Time of 24th Sample Collected:	4:50 AM		
Sample Intervals:	5 Minutes		
Flow rate at time of sample (CFS):	930	**Flow rate at time of end of Sampling (CFS):**	890
Average flow rate during sampling (CFS):	970	**Max flow rate for the event (CFS):**	1,000
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	120	**Turbidity (NTU):**	112



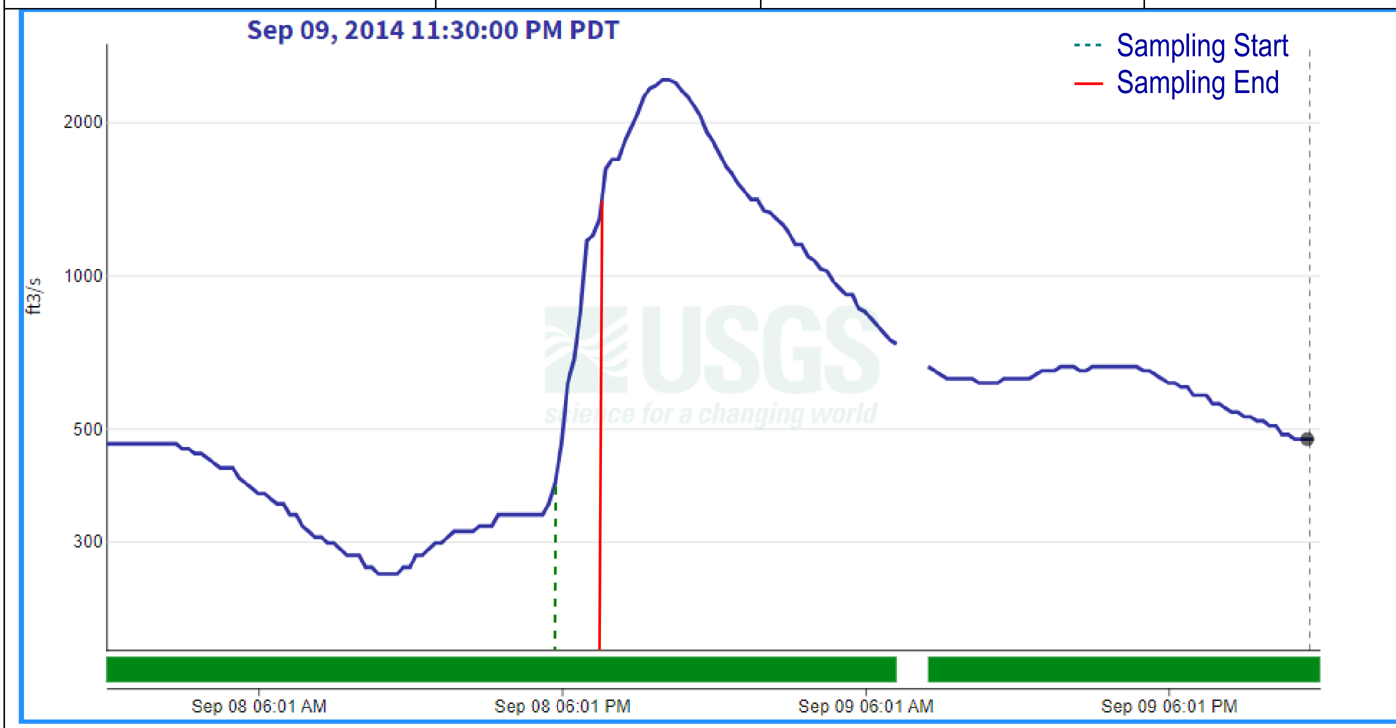
Year:	2015		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	1/30/15		
Sample Collection Information			
Time of 1st Sample Collected:	4:02 PM		
Time of 24th Sample Collected:	6:08 PM		
Sample Intervals:	5 Minutes		
Flow rate at time of sample (CFS):	604	**Flow rate at time of end of Sampling (CFS):**	1,050
Average flow rate during sampling (CFS):	863	**Max flow rate for the event (CFS):**	1,090
Peak occurs during the sampling time?	No		
TSS (mg/L):	110	**Turbidity (NTU):**	54



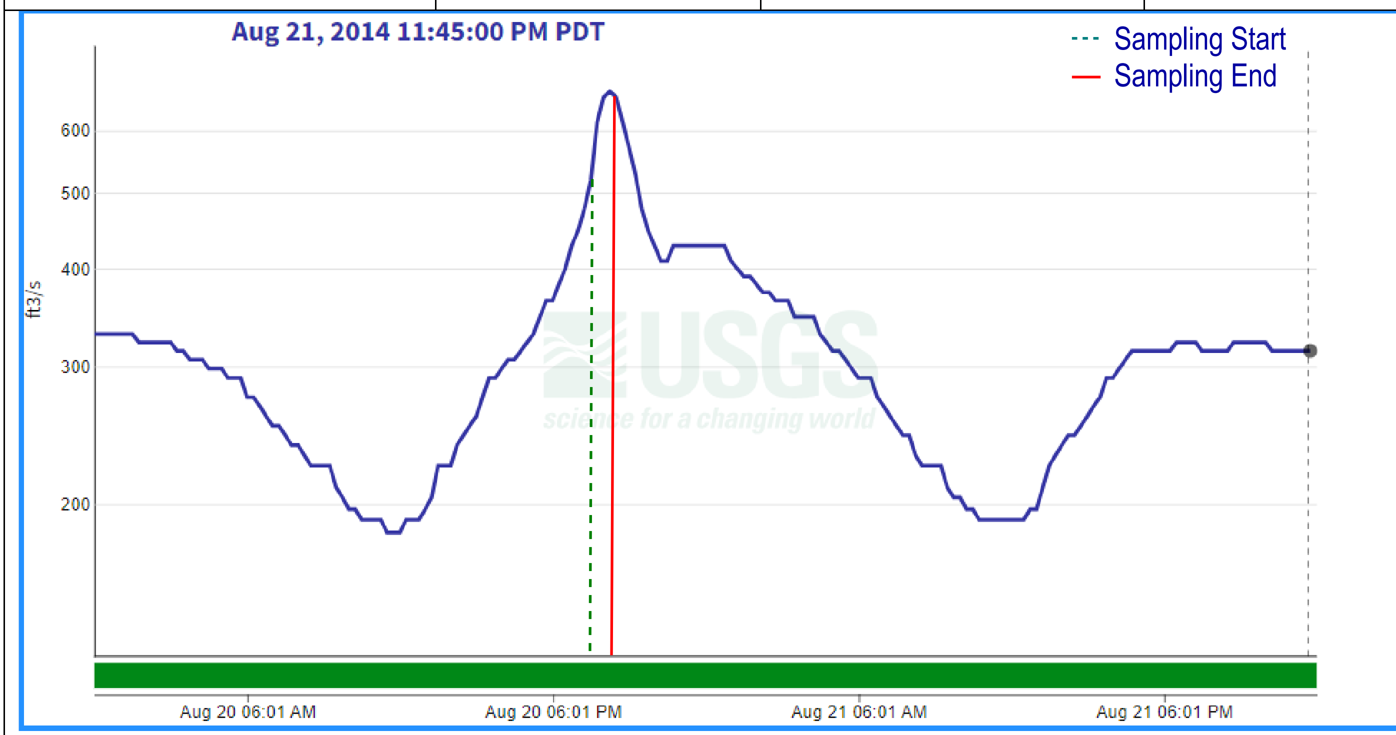
Year:	2015		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	1/11/15		
Sample Collection Information			
Time of 1st Sample Collected:	3:40 PM		
Time of 24th Sample Collected:	5:40 PM		
Sample Intervals:	5 Minutes		
Flow rate at time of sample (CFS):	560	**Flow rate at time of end of Sampling (CFS):**	1,500
Average flow rate during sampling (CFS):	1,050	**Max flow rate for the event (CFS):**	1,890
Peak occurs during the sampling time?	No		
TSS (mg/L):	295	**Turbidity (NTU):**	183



Year:	2014		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	9/08/14		
Sample Collection Information			
Time of 1st Sample Collected:	5:42 PM		
Time of 24th Sample Collected:	7:37 PM		
Sample Intervals:	5 Minutes		
Flow rate at time of sample (CFS):	388	**Flow rate at time of end of Sampling (CFS):**	1,300
Average flow rate during sampling (CFS):	835	**Max flow rate for the event (CFS):**	2,420
Peak occurs during the sampling time?	No		
TSS (mg/L):	850	**Turbidity (NTU):**	658



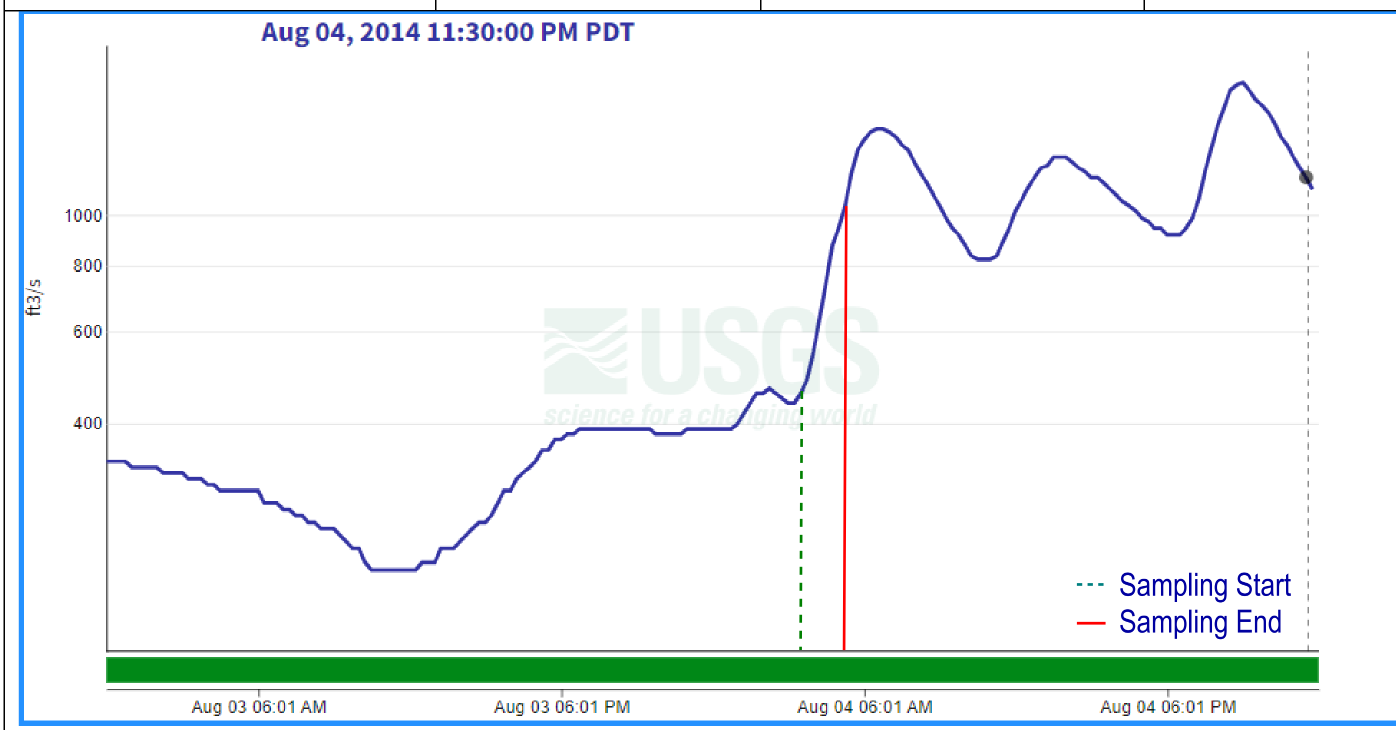
Year:	2014		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	8/20/2014		
Sample Collection Information			
Time of 1st Sample Collected:	7:30 PM		
Time of 24th Sample Collected:	8:30 PM		
Sample Intervals:	Missing record on sampling interval		
Flow rate at time of sample (CFS):	518	**Flow rate at time of end of Sampling (CFS):**	662
Average flow rate during sampling (CFS):	625	**Max flow rate for the event (CFS):**	673
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	260	**Turbidity (NTU):**	305



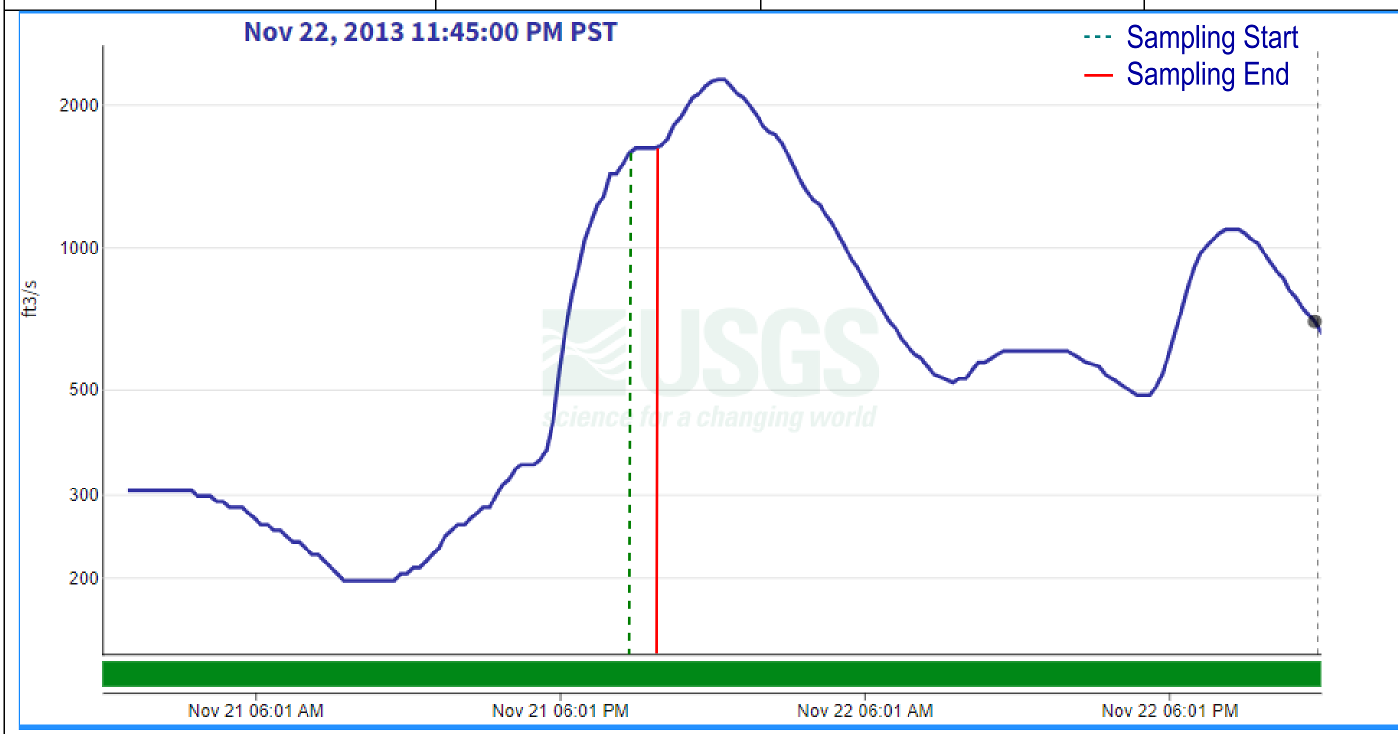
Year:	2014
Sample Location:	Las Vegas Wash at Rainbow Gardens
Date:	8/04/2014

Sample Collection Information

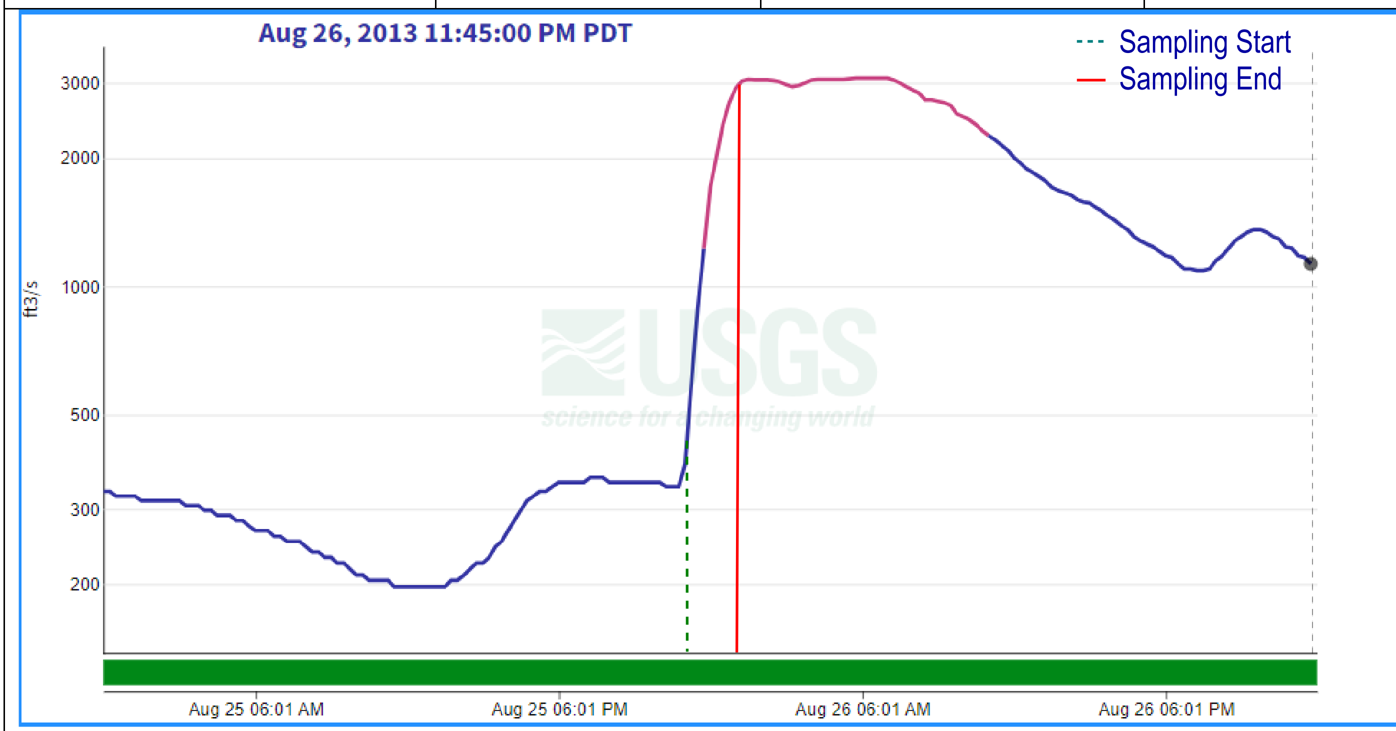
Time of 1st Sample Collected:	3:30 AM		
Time of 24th Sample Collected:	5:15 AM		
Sample Intervals:	5 Minutes		
Flow rate at time of sample (CFS):	457	**Flow rate at time of end of Sampling (CFS):**	1,040
Average flow rate during sampling (CFS):	718	**Max flow rate for the event (CFS):**	1,460
Peak occurs during the sampling time?	No		
TSS (mg/L):	548	**Turbidity (NTU):**	473



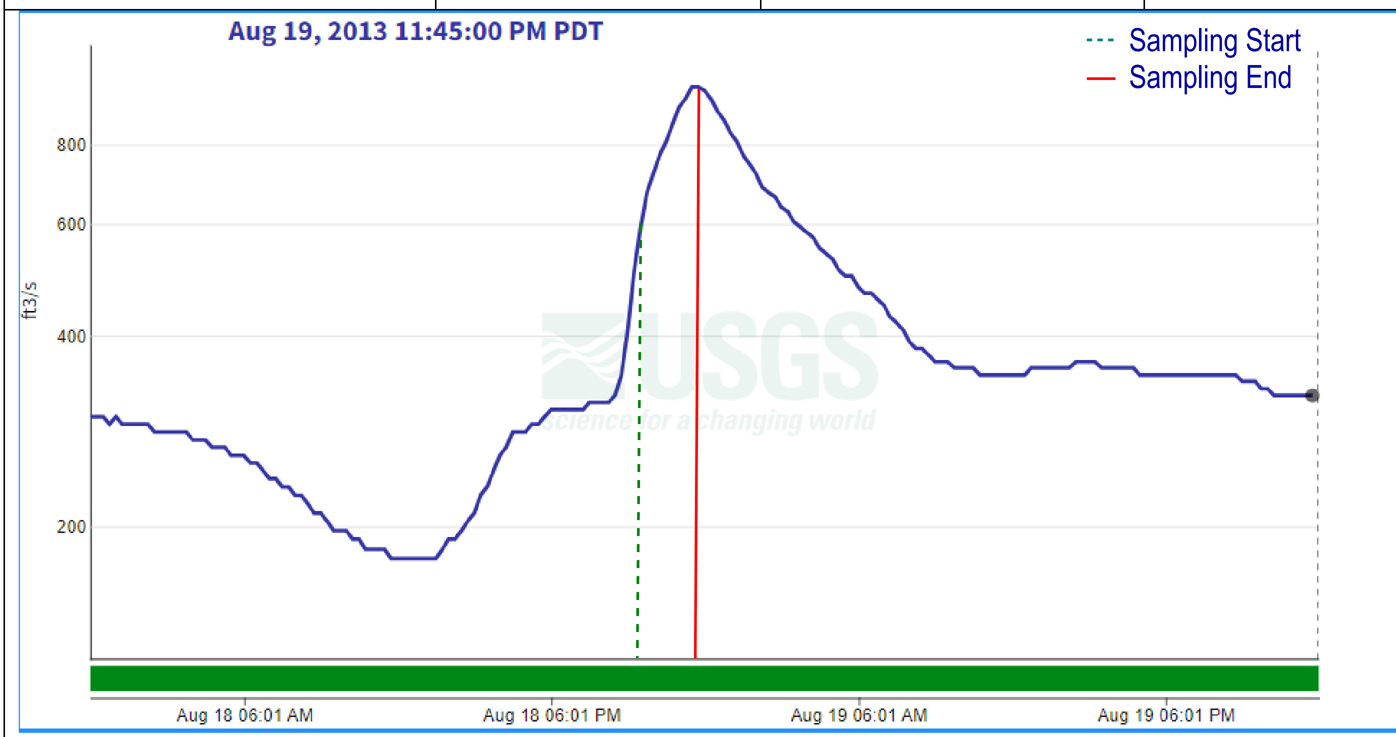
Year:	2013		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	11/21/2013		
Sample Collection Information			
Time of 1st Sample Collected:	8:45 PM		
Time of 24th Sample Collected:	9:45 PM		
Sample Intervals:	2 minutes		
Flow rate at time of sample (CFS):	1,580	**Flow rate at time of end of Sampling (CFS):**	1,620
Average flow rate during sampling (CFS):	1,612	**Max flow rate for the event (CFS):**	2,260
Peak occurs during the sampling time?	No		
TSS (mg/L):	860	**Turbidity (NTU):**	734



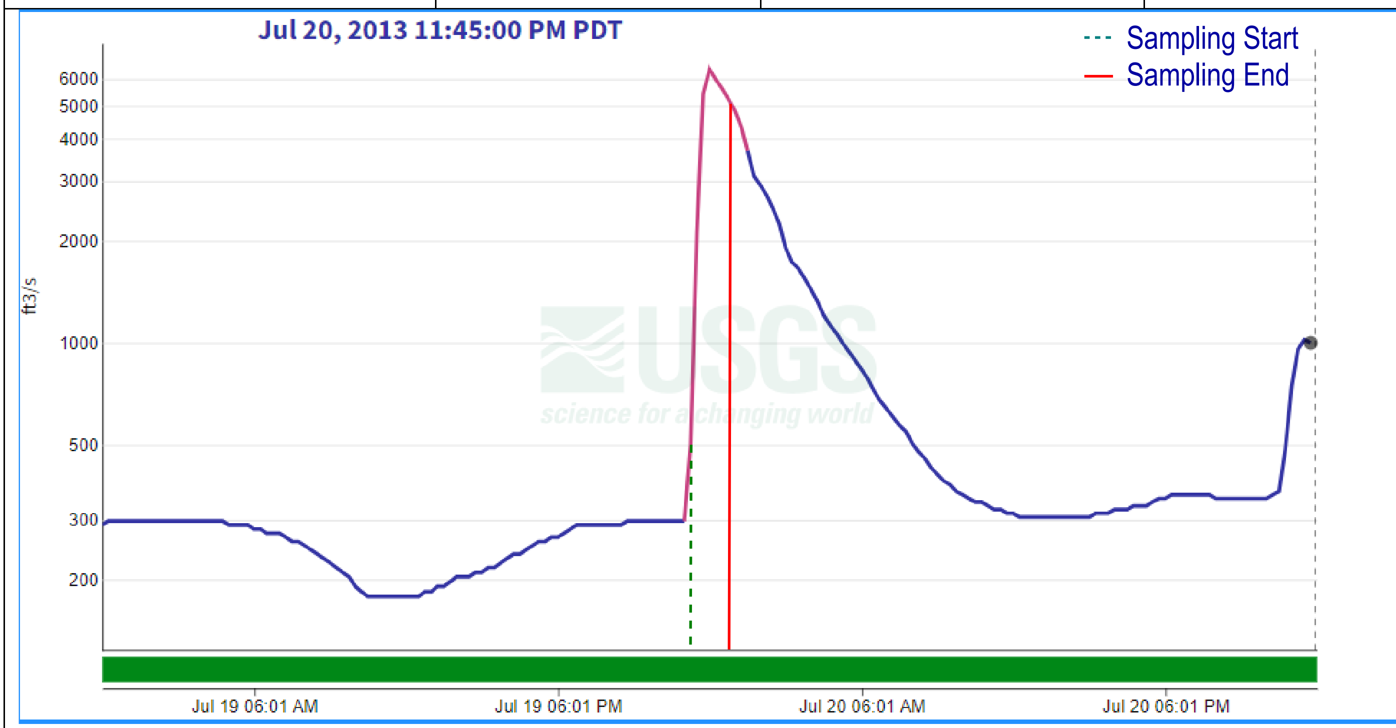
Year:	2013		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	8/25/2013		
Sample Collection Information			
Time of 1st Sample Collected:	11:09 PM		
Time of 24th Sample Collected:	1:04 AM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	408	**Flow rate at time of end of Sampling (CFS):**	2,950
Average flow rate during sampling (CFS):	1,780	**Max flow rate for the event (CFS):**	3,080
Peak occurs during the sampling time?	No		
TSS (mg/L):	1,003	**Turbidity (NTU):**	906



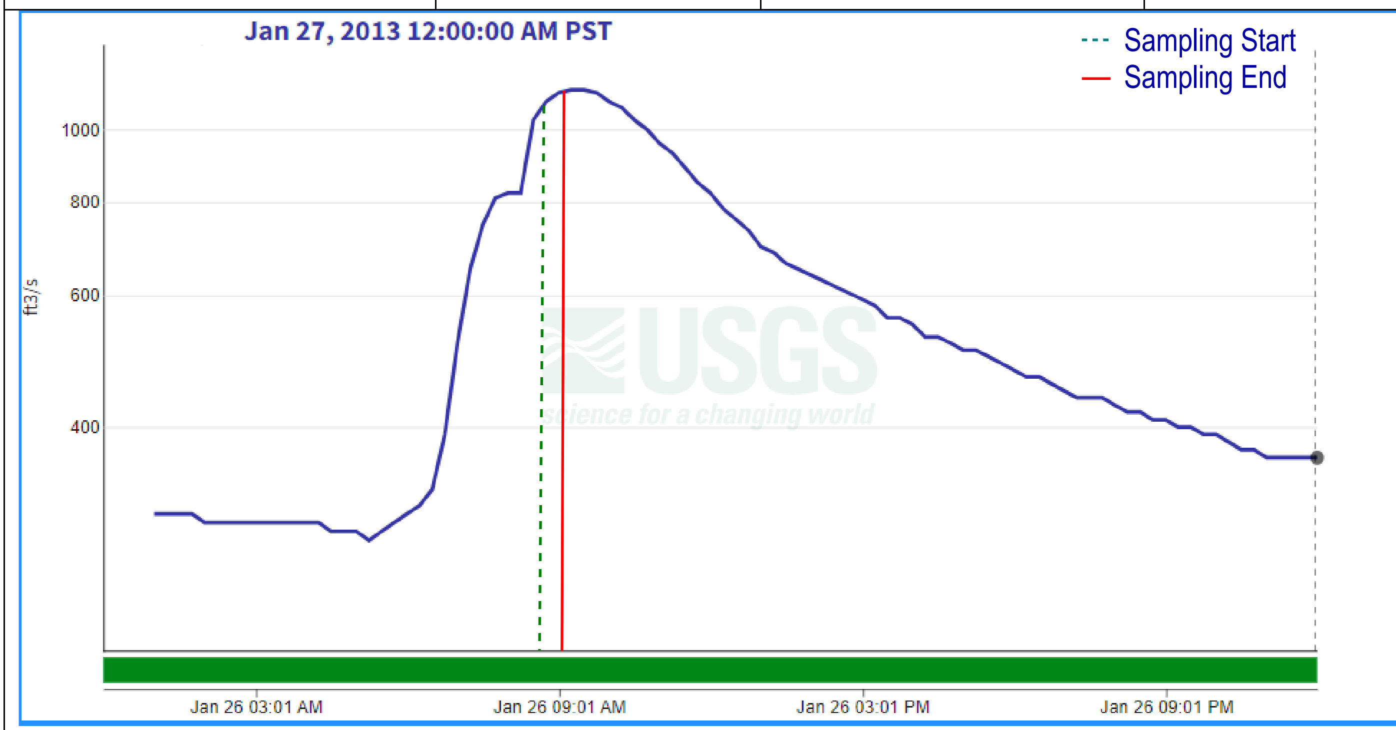
Year:	2013		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	8/18/2013		
Sample Collection Information			
Time of 1st Sample Collected:	9:32 PM		
Time of 24th Sample Collected:	11:46 PM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	593	**Flow rate at time of end of Sampling (CFS):**	987
Average flow rate during sampling (CFS):	825	**Max flow rate for the event (CFS):**	987
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	153	**Turbidity (NTU):**	133



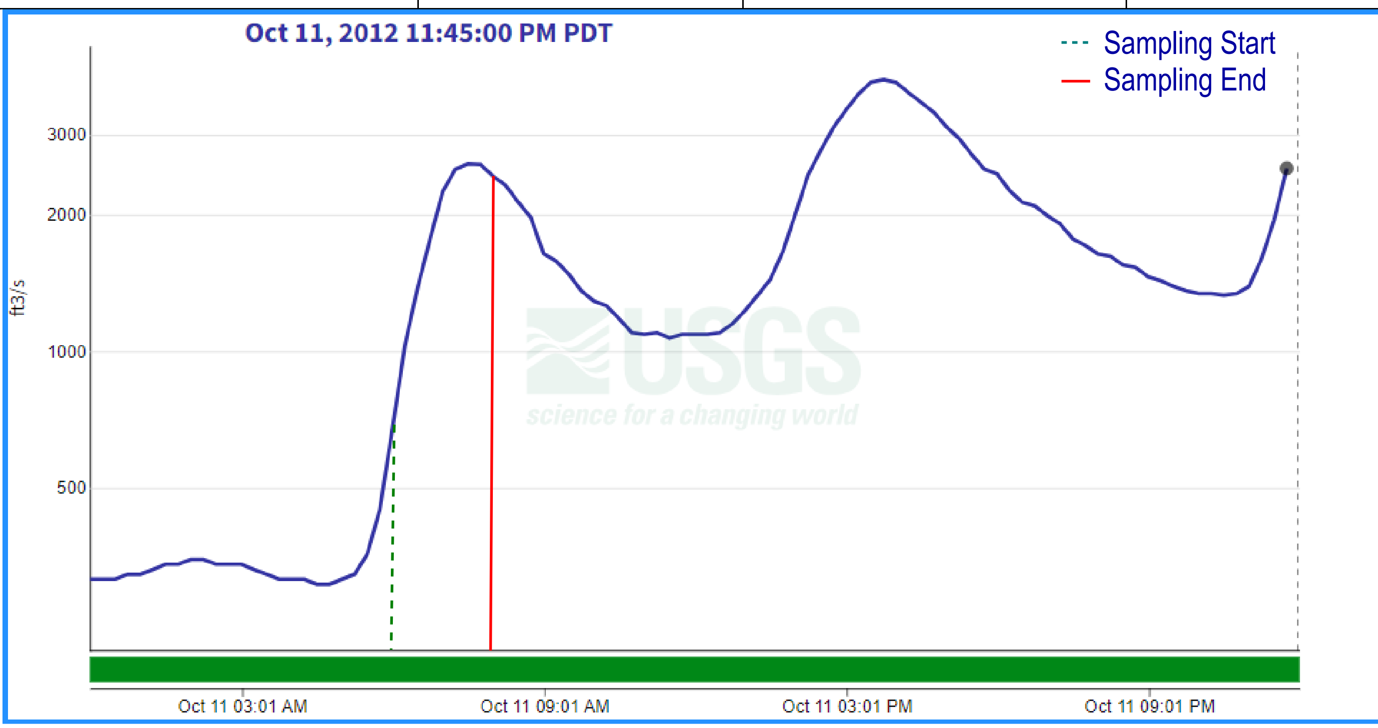
Year:	2013		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	7/19/2013		
Sample Collection Information			
Time of 1st Sample Collected:	11:13 PM		
Time of 24th Sample Collected:	12:55 AM		
Sample Intervals:	Missing record on sampling interval		
Flow rate at time of sample (CFS):	500	**Flow rate at time of end of Sampling (CFS):**	5,000
Average flow rate during sampling (CFS):	4,430	**Max flow rate for the event (CFS):**	6,390
Peak occurs during the sampling time?	Missing		
TSS (mg/L):	2,585	**Turbidity (NTU):**	203



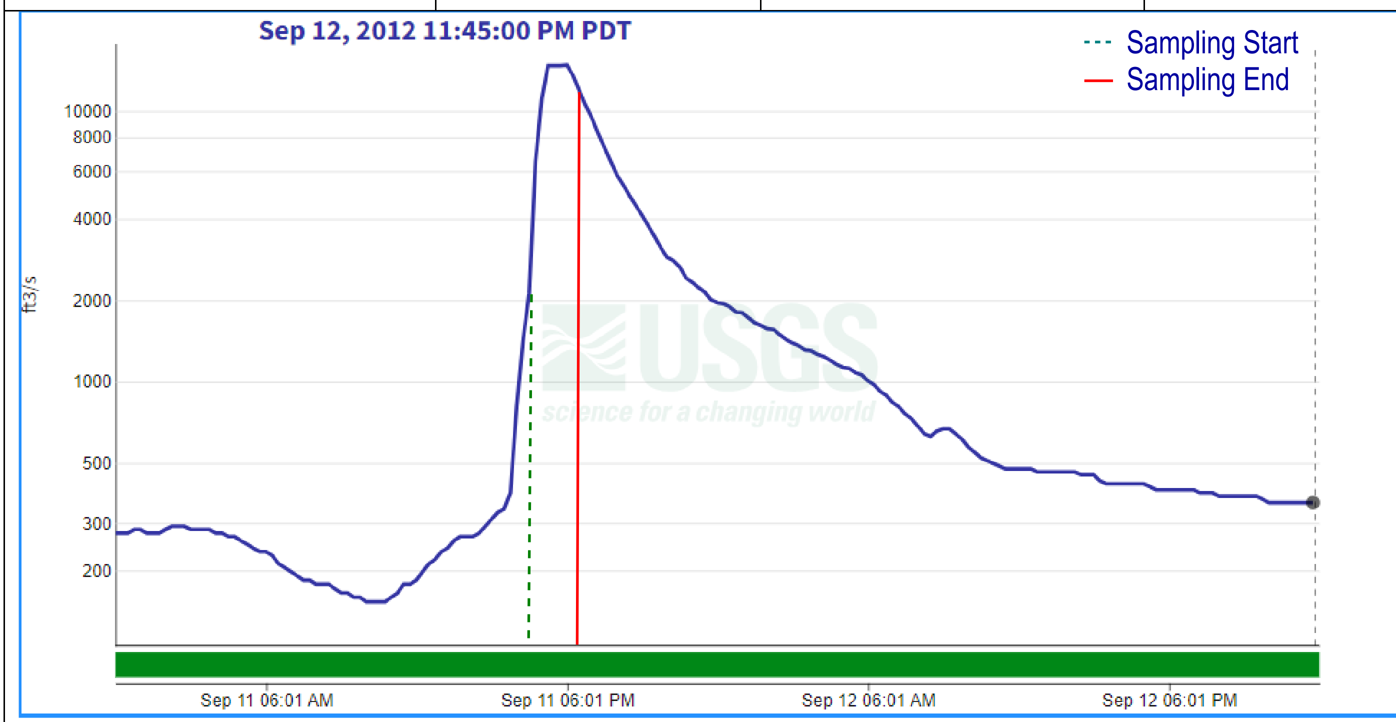
Year:	2013		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	1/26/2013		
Sample Collection Information			
Time of 1st Sample Collected:	8:45 AM		
Time of 24th Sample Collected:	9:10 AM		
Sample Intervals:	2 Minutes		
Flow rate at time of sample (CFS):	1,090	**Flow rate at time of end of Sampling (CFS):**	1,120
Average flow rate during sampling (CFS):	1,124	**Max flow rate for the event (CFS):**	1,130
Peak occurs during the sampling time?	No		
TSS (mg/L):	370	**Turbidity (NTU):**	170



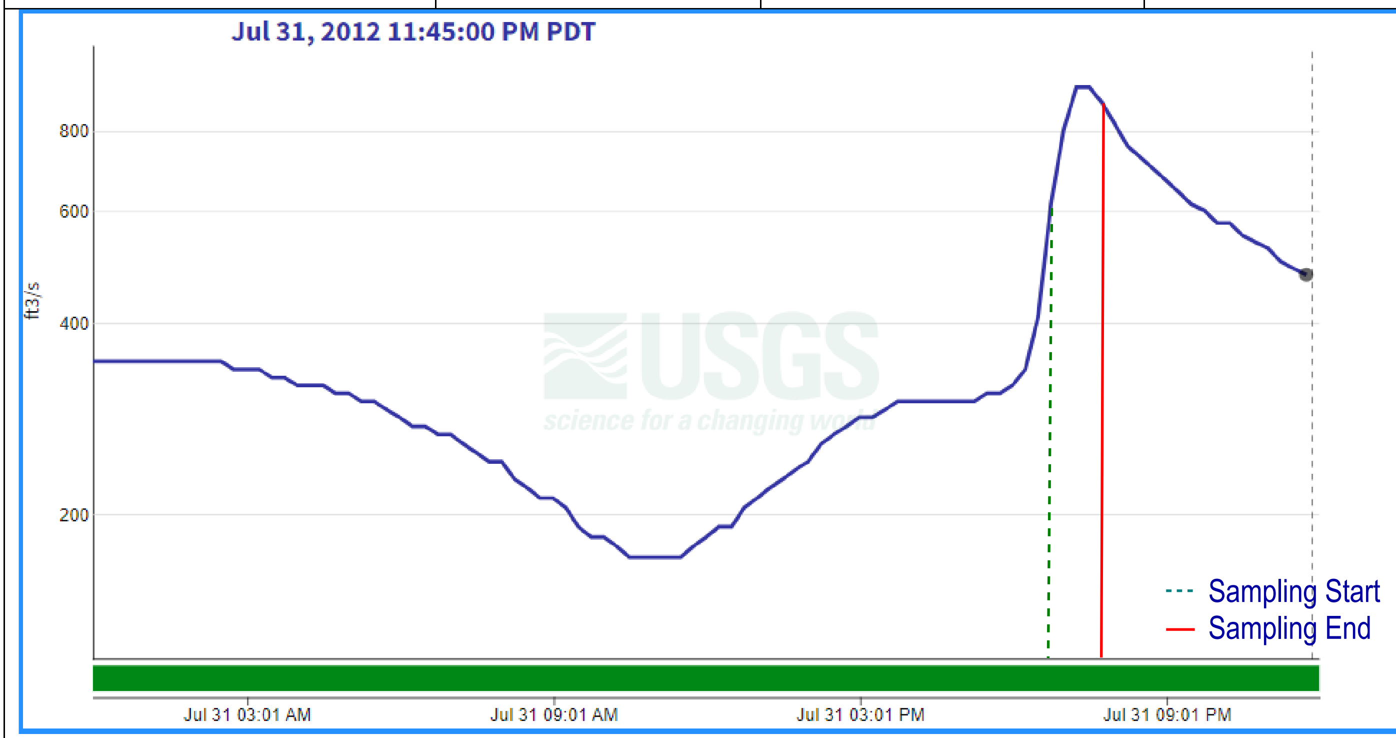
Year:	2012		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	10/11/2012		
Sample Collection Information			
Time of 1st Sample Collected:	5:56 AM		
Time of 24th Sample Collected:	7:51 AM		
Sample Intervals:	5 Minutes		
Flow rate at time of sample (CFS):	670	**Flow rate at time of end of Sampling (CFS):**	2,540
Average flow rate during sampling (CFS):	1,925	**Max flow rate for the event (CFS):**	2,590
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	1,200	**Turbidity (NTU):**	720



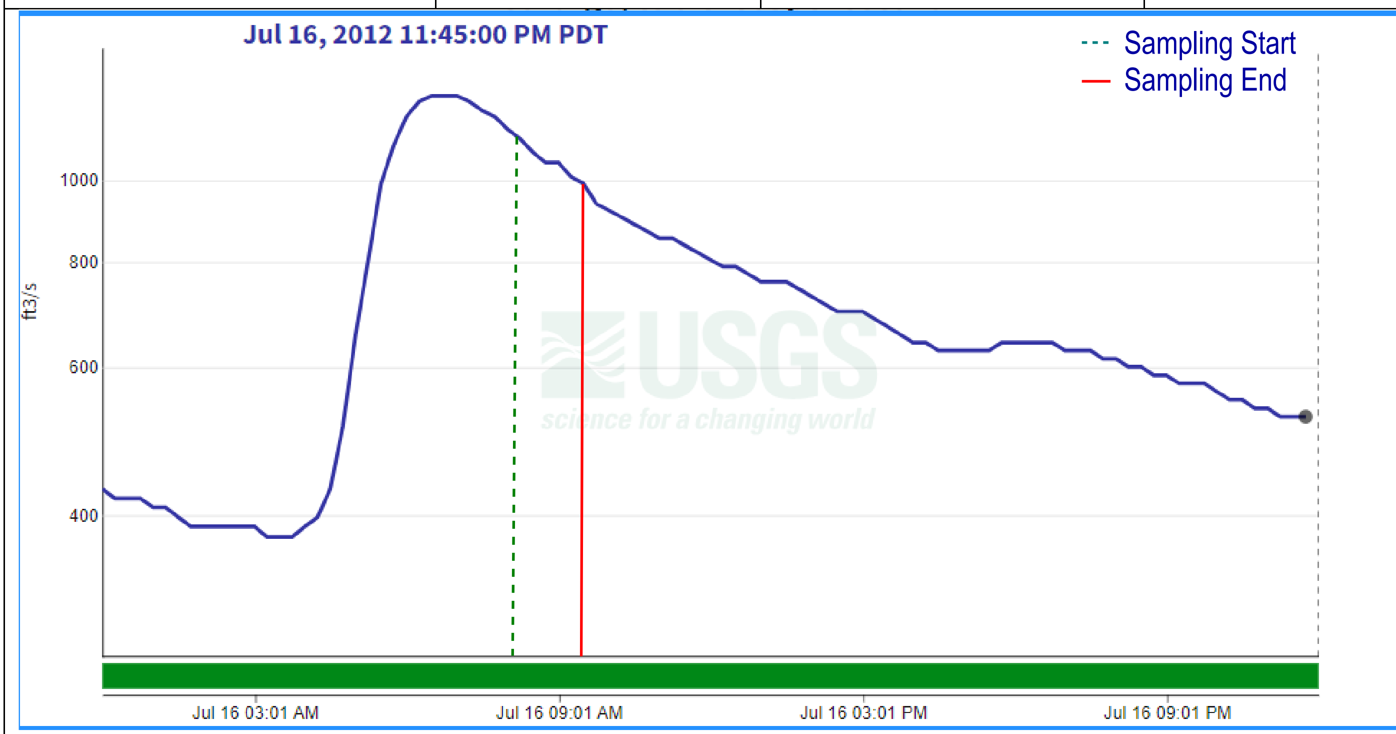
Year:	2012		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	9/11/2012		
Sample Collection Information			
Time of 1st Sample Collected:	4:30 PM		
Time of 24th Sample Collected:	6:30 PM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	2,130	**Flow rate at time of end of Sampling (CFS):**	11,900
Average flow rate during sampling (CFS):	11,560	**Max flow rate for the event (CFS):**	14,700
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	12,000	**Turbidity (NTU):**	3,700



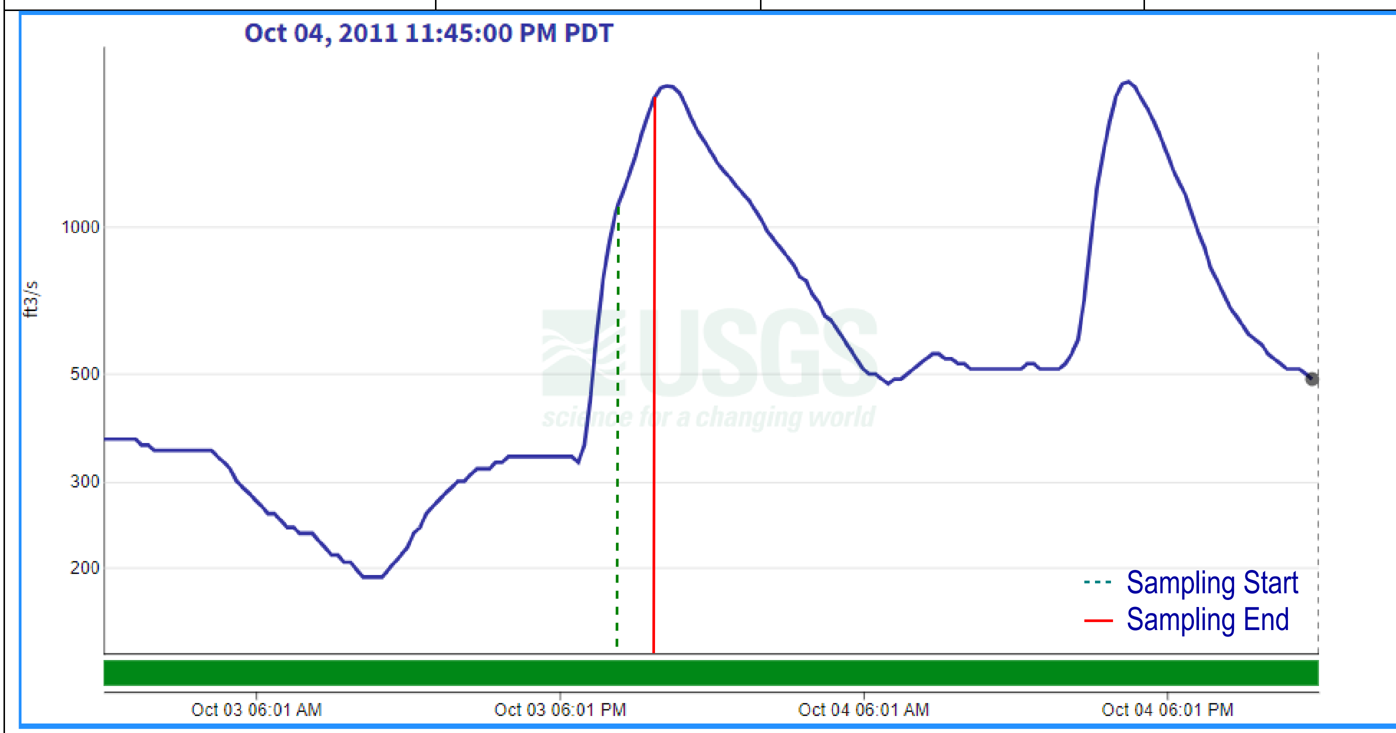
Year:	2012		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	7/31/2012		
Sample Collection Information			
Time of 1st Sample Collected:	6:41 PM		
Time of 24th Sample Collected:	7:46 PM		
Sample Intervals:	5 Minutes		
Flow rate at time of sample (CFS):	610	**Flow rate at time of end of Sampling (CFS):**	887
Average flow rate during sampling (CFS):	835	**Max flow rate for the event (CFS):**	938
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	150	**Turbidity (NTU):**	83



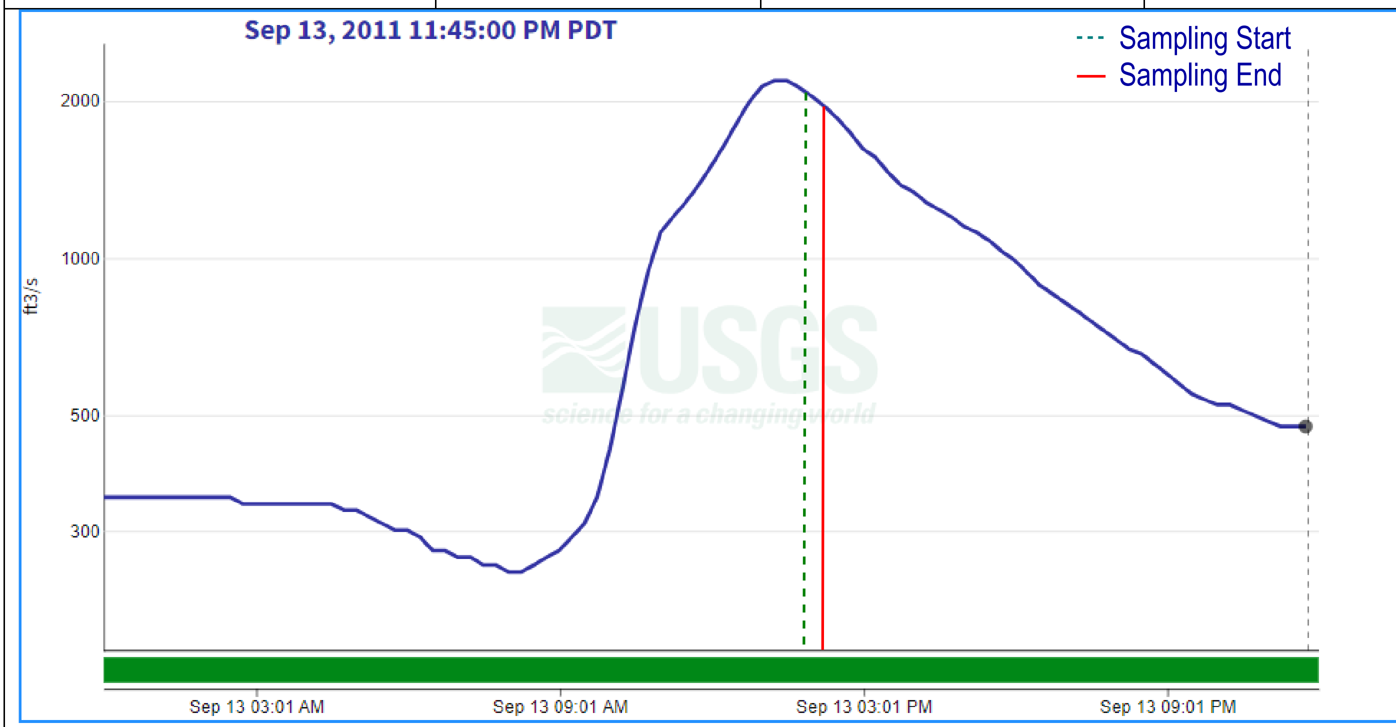
Year:	2012		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	7/16/2012		
Sample Collection Information			
Time of 1st Sample Collected:	8:15 AM		
Time of 24th Sample Collected:	9:27 AM		
Sample Intervals:	3 Minutes		
Flow rate at time of sample (CFS):	1,120	**Flow rate at time of end of Sampling (CFS):**	990
Average flow rate during sampling (CFS):	1,050	**Max flow rate for the event (CFS):**	1,260
Peak occurs during the sampling time?	No		
TSS (mg/L):	150	**Turbidity (NTU):**	170



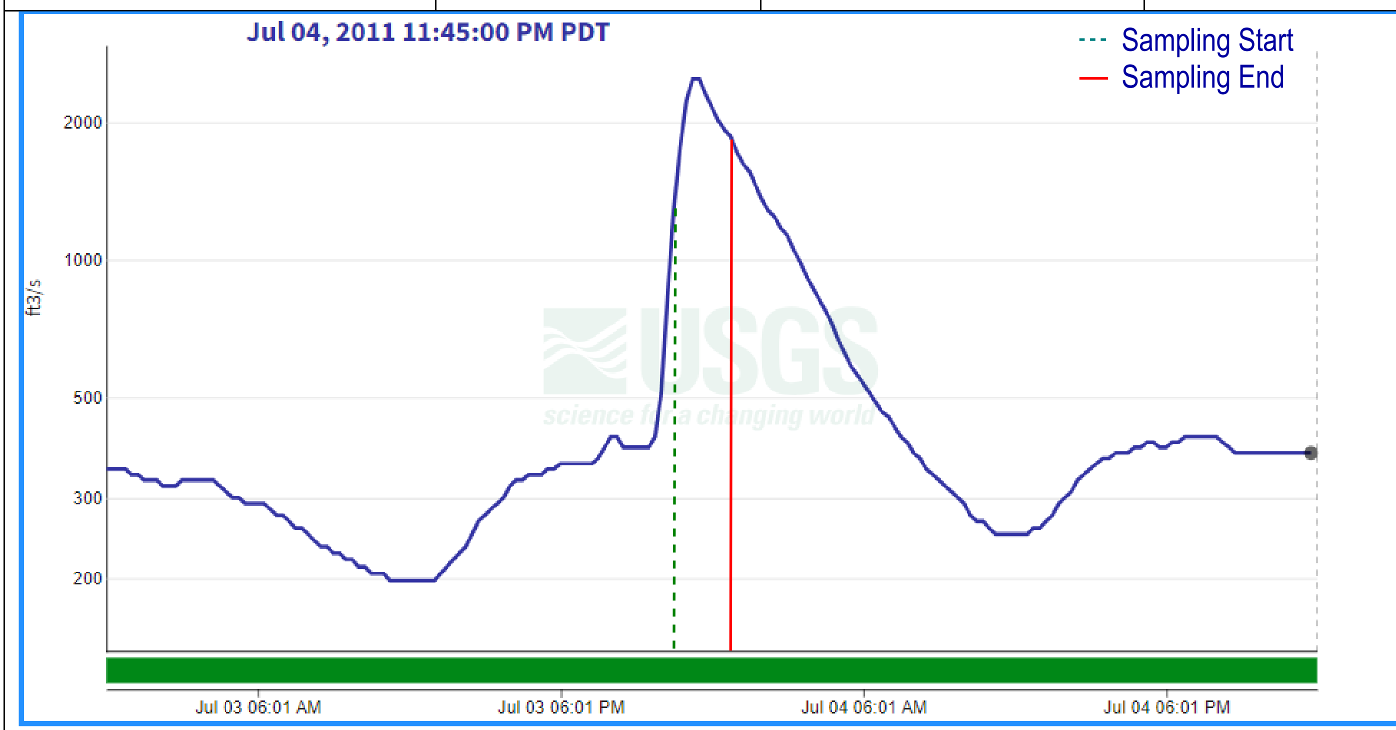
Year:	2011		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	10/3/2011		
Sample Collection Information			
Time of 1st Sample Collected:	8:15 PM		
Time of 24th Sample Collected:	9:50 PM		
Sample Intervals:	4 minutes		
Flow rate at time of sample (CFS):	1,080	**Flow rate at time of end of Sampling (CFS):**	1,870
Average flow rate during sampling (CFS):	1,480	**Max flow rate for the event (CFS):**	1,940
Peak occurs during the sampling time?	No		
TSS (mg/L):	420	**Turbidity (NTU):**	110



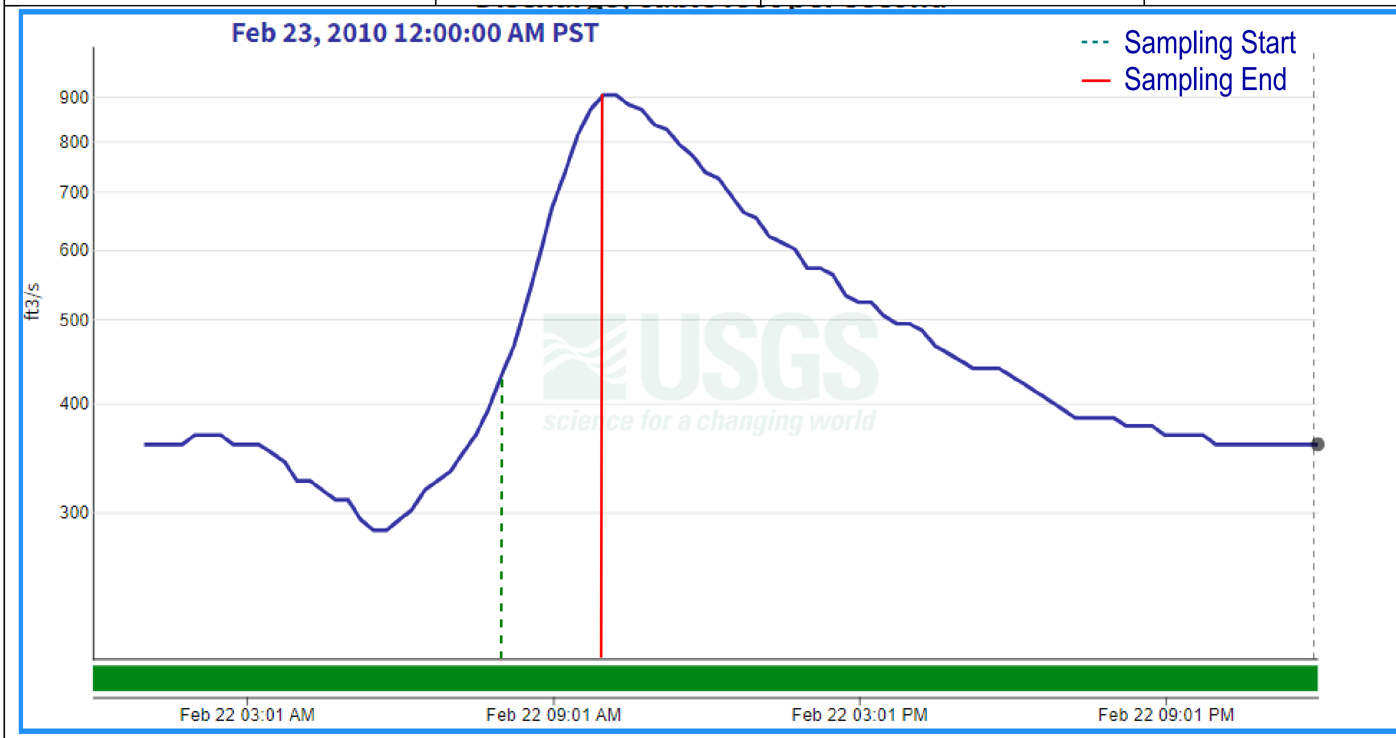
Year:	2011		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	9/13/2011		
Sample Collection Information			
Time of 1st Sample Collected:	1:40 PM		
Time of 24th Sample Collected:	2:25 PM		
Sample Intervals:	Missing record on sampling interval		
Flow rate at time of sample (CFS):	2,150	**Flow rate at time of end of Sampling (CFS):**	1,870
Average flow rate during sampling (CFS):	2,000	**Max flow rate for the event (CFS):**	2,190
Peak occurs during the sampling time?	No		
TSS (mg/L):	630	**Turbidity (NTU):**	240



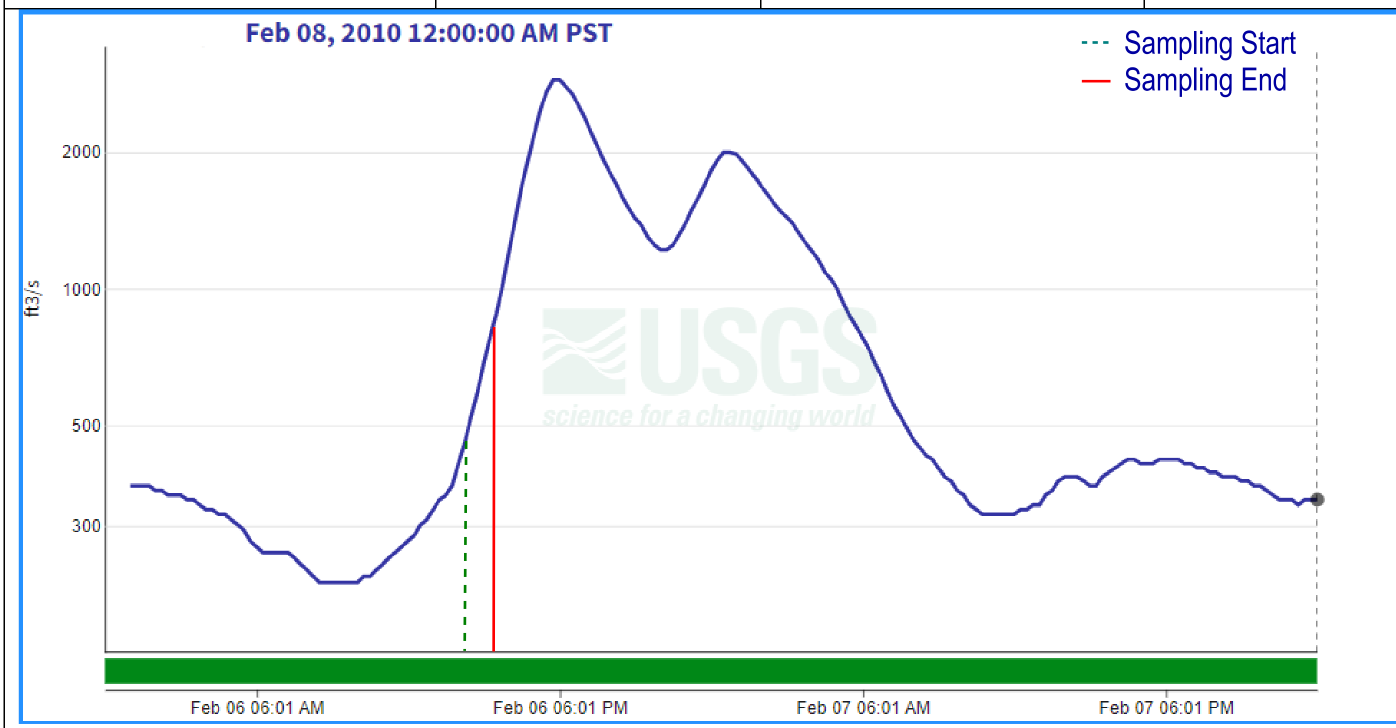
Year:	2011		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	7/3/2011		
Sample Collection Information			
Time of 1st Sample Collected:	10:30 PM		
Time of 24th Sample Collected:	12:30 AM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	1,300	**Flow rate at time of end of Sampling (CFS):**	1,930
Average flow rate during sampling (CFS):	2,080	**Max flow rate for the event (CFS):**	2,490
Peak occurs during the sampling time?			
TSS (mg/L):	3,800	**Turbidity (NTU):**	260



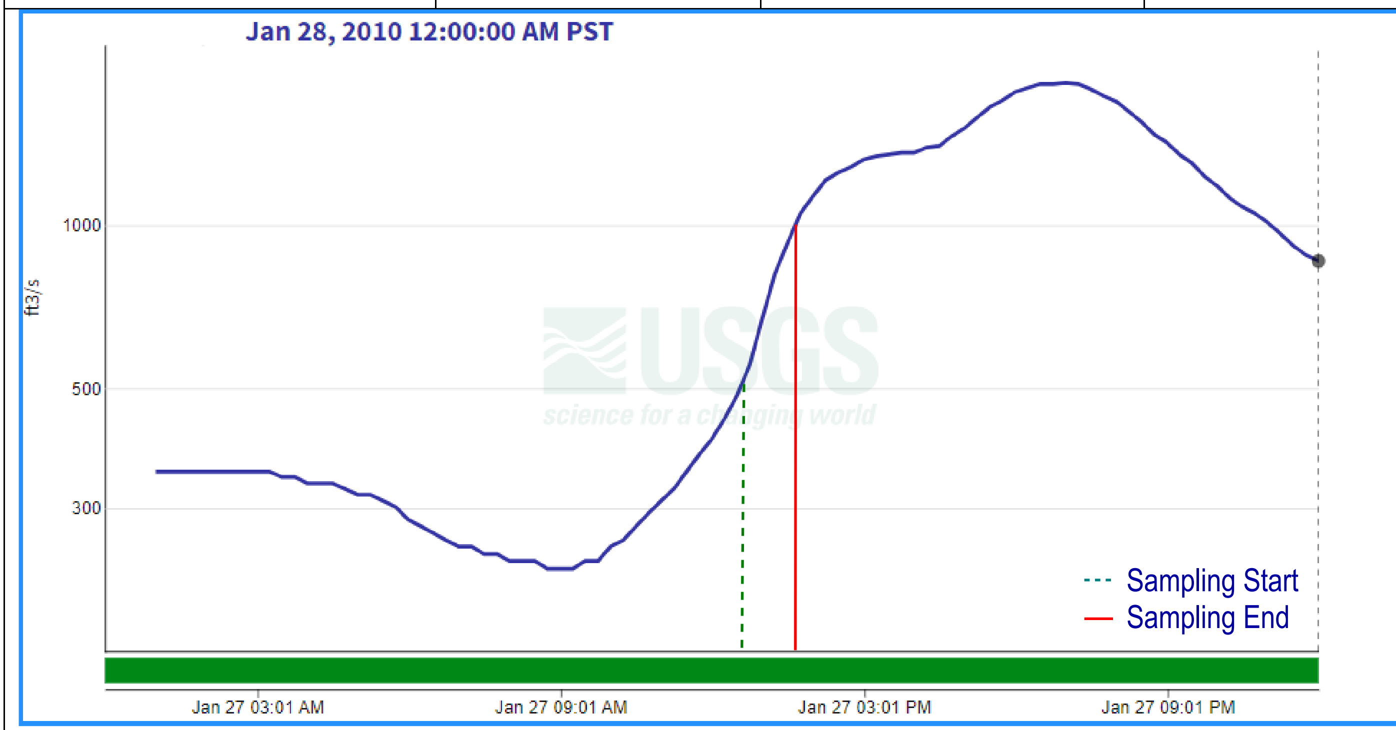
Year:	2010		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	2/22/2010		
Sample Collection Information			
Time of 1st Sample Collected:	8 AM		
Time of 24th Sample Collected:	10 AM		
Sample Intervals:	5 minutes		
Flow rate at time of sample (CFS):	430	**Flow rate at time of end of Sampling (CFS):**	904
Average flow rate during sampling (CFS):	668	**Max flow rate for the event (CFS):**	904
Peak occurs during the sampling time?	Yes		
TSS (mg/L):	120	**Turbidity (NTU):**	61



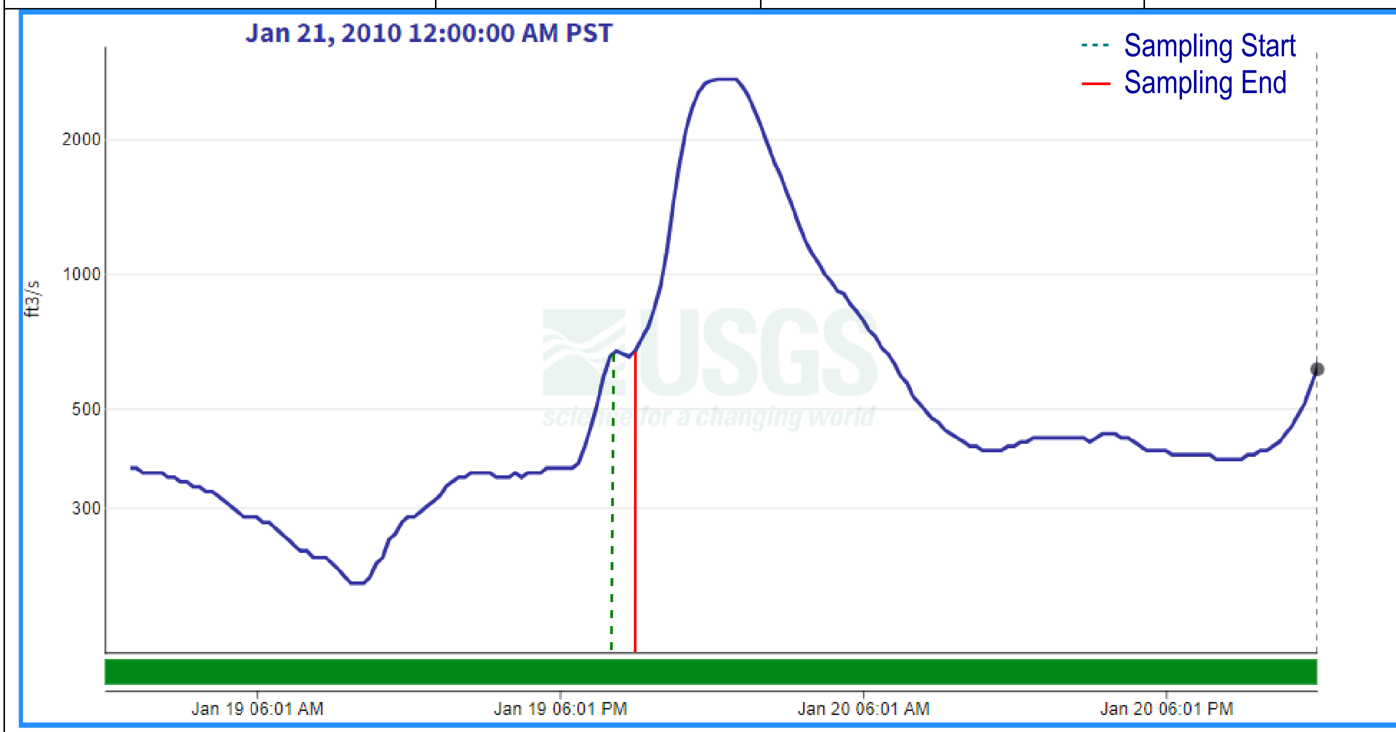
Year:	2010		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	2/6/2010		
Sample Collection Information			
Time of 1st Sample Collected:	2:15 PM		
Time of 24th Sample Collected:	3:15 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	457	**Flow rate at time of end of Sampling (CFS):**	781
Average flow rate during sampling (CFS):	608	**Max flow rate for the event (CFS):**	2,890
Peak occurs during the sampling time?	No		
TSS (mg/L):	240	**Turbidity (NTU):**	48



Year:	2010		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	1/27/2010		
Sample Collection Information			
Time of 1st Sample Collected:	12:40 PM		
Time of 24th Sample Collected:	1:40 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	510	**Flow rate at time of end of Sampling (CFS):**	1,000
Average flow rate during sampling (CFS):	785	**Max flow rate for the event (CFS):**	1,820
Peak occurs during the sampling time?	No		
TSS (mg/L):	430	**Turbidity (NTU):**	200



Year:	2010		
Sample Location:	Las Vegas Wash at Rainbow Gardens		
Date:	1/19/2010		
Sample Collection Information			
Time of 1st Sample Collected:	8:05 PM		
Time of 24th Sample Collected:	9:05 PM		
Sample Intervals:	3 minutes		
Flow rate at time of sample (CFS):	655	**Flow rate at time of end of Sampling (CFS):**	680
Average flow rate during sampling (CFS):	665	**Max flow rate for the event (CFS):**	2,720
Peak occurs during the sampling time?	No		
TSS (mg/L):	540	**Turbidity (NTU):**	320



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