Nevada Department of Transportation

NPDES Permit NV0023329 Stormwater Monitoring Plan, 2019 through 2024

February 2019

LOVE NV WATERS
NDOT STORMWATER PROGRAM

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Stormwater Division
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INTRODUCTION

Permit Background

Presented in this document is a description of stormwater monitoring activities that the Nevada Department of Transportation (NDOT) is planning to conduct to meet the requirements of its National Pollutant Discharge Elimination System Municipal Separate Storm Sewer Systems Permit No. NV0023329 (MS4 Permit) that was re-issued August 2018 by the Nevada Division of Environmental Protection (NDEP).

NDOT was originally issued an individual MS4 Permit in 2004. The permit was re-issued in 2010 and most recently in August of 2018.

NDOT owns and operates a statewide MS4 (municipal separate storm sewer system). MS4s (as defined in 40 Code of Federal Regulations [CFR] §122.26[b][8]) include any publicly owned conveyance or system of conveyances used for collecting and conveying stormwater that discharges to "waters of the United States". As an operator of a MS4, NDOT is required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for stormwater, and authorized non-stormwater discharges (as defined in the permit) from its MS4 to Waters of the U.S. throughout Nevada, excluding Tribal Lands.

The NDOT MS4 Permit requires NDOT to develop and implement a stormwater monitoring plan. The monitoring plan is a component of NDOT's comprehensive Stormwater Management Program (SWMP). The SWMP presents NDOT's overall program to comply with MS4 Permit requirements. "Implementation of the approved SWMP will be considered adequate to reduce the discharge of pollutants from the Permittee's MS4 to the maximum extent practicable (MEP) to protect the quality of waters of the U.S." (MS4 Permit B.5.1.1).

This monitoring plan outlines efforts related to monitoring the water quality impacts of stormwater runoff.

This monitoring plan will identify the following for each monitoring site:

- Area where monitoring will occur
- Monitoring strategies
- Water quality parameters to be monitored
- Monitoring schedule
- How monitoring data from the site will be used to achieve a goal or goals of the monitoring plan

Monitoring Requirements Overview

This monitoring plan has been prepared to satisfy Part B.6.1 of the MS4 Permit. The following is a list of the monitoring requirements in the MS4 Permit and a brief description of NDOT's compliance strategy to satisfy the permit:

B.6.1. *Stormwater Monitoring*

B.6.1.1 *The Permittee shall submit a revised draft stormwater monitoring plan to the Division for review for this permit within six (6) months of the issuance of this permit and shall submit a revised final stormwater monitoring plan for Division approval after the public notice process. In developing the plan, the Permittee shall evaluate and update as necessary how monitoring may assist in making decisions about program compliance, the appropriateness of identified best management practices, and progress toward achieving identified measurable goals. The Division shall have thirty (30) days to review and comment on the draft stormwater monitoring plan, after which the Permittee will follow the public notice steps outlined in this Section. Pending approval of the monitoring plan, the Permittee shall implement the existing monitoring plan.*

NDOT Compliance Strategy: This draft plan will be been submitted to NDEP for review and approval within six months of the issuance of the MS4 Permit. An evaluation of the following areas is provided later in this plan:

- How monitoring may assist in making decisions about program compliance
- The appropriateness of identified best management practices
- Progress toward achieving identified measurable goals.

B.6.1.1.1 *The revised stormwater monitoring plan will be subject to Division review and approval and the public notice steps outlined below in this Section, after which the stormwater monitoring plan will be formally incorporated as terms and conditions of this permit.*

NDOT Compliance Strategy: The revised stormwater monitoring plan will be made available for public comment following the requirements of B.6.1.1.2.

B.6.1.1.2 *Before the final revised plan is submitted to the Division for approval, the plan shall be made available for public comment for a minimum of thirty (30) days. The Permittee shall respond to significant public comments, and the Permittee shall hold a public meeting in accordance with NAC 445A.67558; and*

NDOT Compliance Strategy: NDOT will make the stormwater monitoring plan available for public comment and hold a public meeting. NDOT will respond to significant public comments, if any, and then submit a revised plan to NDEP for approval.

B.6.1.1.3 *The Permittee shall compile any comments received as part of the process in Section B.6.1.1.2., describe the actions taken in response to the public comments, and include this information in the revised stormwater monitoring plan.*

NDOT Compliance Strategy: After the public comment period has ended, NDOT will add comments received (if any) to the stormwater monitoring plan.

B.6.1.1.4 *The Permittee shall submit a final revised stormwater monitoring plan to the Division for approval no later than six (6) months after receiving comments from the Division on the draft revised stormwater monitoring plan.*

NDOT Compliance Strategy: NDOT will submit the final revised stormwater monitoring plan as required.

B.6.1.2 *When the Permittee conducts monitoring at the MS4, the Permittee is required to comply with the following:*

B.6.1.2.1 *Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. This requirement does not prevent the Permittee from analyzing or reporting samples that are representative of a limited situation (e.g. concentration at peak flow);*

NDOT Compliance Strategy: NDOT will assess the volume and nature of the monitored discharge and describe sampling practices so that representative samples and measurements are taken and adhere to the requirements of B.6.1.2.1.

B.6.1.2.2 *Test procedures for the analysis of pollutants shall conform to regulations (40 CFR, Part 136) published pursuant to Section 304(h) of the CWA;*

NDOT Compliance Strategy: Water quality samples collected as part of this stormwater monitoring plan will be submitted to a State of Nevada-certified laboratory and test procedures for the analysis of pollutants shall conform to regulations (40 CFR, Part 136) published pursuant to Section 304(h) of the CWA.

B.6.1.3 *Records of monitoring information shall include:*

B.6.1.3.1 *The date, exact place, and time of sampling or measurements;*

NDOT Compliance Strategy: All NDOT stormwater monitoring locations are stored in a geodatabase. Monitoring event information, including the date, exact place, and time of sampling or measurements, is recorded on standardized field forms. This monitoring event information will be retained for a period of at least three (3) years from the termination date of the MS4 Permit.

B.6.1.3.2 *The names(s) of the individual(s) who performed the sampling or measurements;*

NDOT Compliance Strategy: Monitoring event information, including the name(s) of the individuals who performed the sampling or measurements, is recorded on standardized field forms. This monitoring event information will be retained for a period of at least three (3) years from the termination date of the MS4 Permit.

B.6.1.3.3 *The date(s) analyses were performed;*

NDOT Compliance Strategy: The date(s) analyses were performed are included in the analytical report generated by the State of Nevada-certified laboratory that performed the analyses. All analytical reports will be retained for a period of at least three (3) years from the termination date of the MS4 Permit.

B.6.1.3.4 *The names of the individuals who performed the analyses;*

NDOT Compliance Strategy: The name(s) of the individual(s) who performed the analyses are included in the analytical report generated by the State of Nevada-certified laboratory that performed the analyses. All analytical reports will be retained for a period of at least three (3) years from the termination date of the MS4 Permit.

B.6.1.3.5 *The analytical techniques or methods used; and*

NDOT Compliance Strategy: The analytical technique(s) or method(s) used are included in the analytical report generated by the State of Nevada-certified laboratory that performed the analyses. All analytical reports will be retained for a period of at least three (3) years from the termination date of the MS4 Permit.

B.6.1.3.6 *The results of such analyses.*

NDOT Compliance Strategy: The results of such analyses are included in the analytical report generated by the State of Nevada-certified laboratory that performed the analyses. All analytical reports will be retained for a period of at least three (3) years from the termination date of the MS4 permit.

B.6.1.4 *Analyses shall be performed by a State of Nevada-certified laboratory. Laboratory reports shall be provided, if requested by the Division.*

NDOT Compliance Strategy: Water quality samples collected as part of this stormwater monitoring plan will be submitted to a State of Nevada-certified laboratory and test procedures for the analysis of pollutants shall conform to regulations (40 CFR, Part 136) published pursuant to Section 304(h) of the CWA. All analytical reports will be retained for a period of at least three (3) years from the termination date of the MS4 permit. NDOT will provide any retained laboratory reports requested by NDEP.

B.6.1.5 *If the Permittee performs stormwater monitoring more frequently than required by the stormwater monitoring plan, the results of such monitoring shall be reported. The monitoring results and analyses shall be submitted as part of the Annual Report.*

NDOT Compliance Strategy: When NDOT performs monitoring of a storm event at an identified monitoring point or points within a study area, and that storm event is not a part of the scheduled monitoring identified in this stormwater monitoring plan, then NDOT will submit the monitoring results and analyses together with the other sampled storm events for that monitoring location in the Annual Report.

B.6.1.6 *The Permittee shall evaluate whether existing data collection programs should be modified to improve characterization of stormwater discharges, effects of different*

BMPs on water quality, or ambient water quality. This information shall be submitted for review as part of the annual monitoring plan.

NDOT Compliance Strategy: An evaluation will be provided with the annual report.

B.6.1.7 *The Permittee must complete an annual review of the stormwater monitoring plan in conjunction with preparation of the Annual Report required under Section B.6.3. of this permit.*

NDOT Compliance Strategy: The NDOT Stormwater Design Section will meet at least once a year with the NDOT Stormwater Program Manager and the Stormwater Division Chief to formally review the stormwater monitoring plan.

B.6.1.7.1 *Changes shall be submitted to the Division for approval. Submittals are tentatively approved unless comments are received from the Division within thirty (30) days.*

NDOT Compliance Strategy: NDOT will submit substantial changes to this stormwater monitoring plan to NDEP for approval.

MONITORING PLAN GOALS AND STRATEGIES

Information provided by implementing NDOT's stormwater monitoring plan will improve the ability of NDOT to make sound stormwater management decisions. The following principles provide guidance when developing the details of the monitoring plan and for adaptive management of the plan:

- Monitoring should be focused on decision making; data not helpful in making a decision about clearly defined regulatory, management, or technical issues should not be collected.
- The level of monitoring effort should reflect the potential for impact, with more monitoring allocated to situations where the potential impact (in terms both of the probability of an impact's occurrence and its extent and magnitude) is higher and less monitoring to situations where such potential is lower or where monitoring is not likely to provide useful information.
- Monitoring should be adaptive, in terms of its ability to both trigger follow-on studies as needed, make necessary mid-course corrections, or terminate monitoring.

Monitoring Plan Goals

The goals of the stormwater monitoring plan are identified in Section B.6.1.1 of the MS4 Permit. These goals are to:

- Assist in making decisions about program compliance
- Assist in making decisions about the appropriateness of identified Best Management Practices.
- Assist in making decisions about progress toward achieving identified measurable goals.

Monitoring Strategies

The principal monitoring strategies that can be used to achieve the plan goals include:

- Runoff Characterization – Roads and Maintenance Facilities
- Assessment of BMP Effectiveness
- Receiving Waters Characterization
- Partnerships and Cooperative Agreements

Runoff Characterization Monitoring

NDOT's stormwater monitoring plan includes characterizing runoff from NDOT's roads as well as non-road assets, such as maintenance yards. The goal of this effort is to learn how variables such as asset type, traffic numbers, seasonal changes, maintenance practices, population density, terrain, and surrounding land uses affect the types and concentrations of runoff pollutants throughout NDOT's MS4 Permit area. Understanding the characteristics of stormwater runoff from NDOT's MS4 and assessing trends in stormwater quality will help NDOT evaluate the effectiveness of NDOT's SWMP.

Best Management Practices Assessment

BMP effectiveness monitoring measures the performance of stormwater management strategies and informs adaptive management decisions to improve performance through modifications to existing BMPs and implementation of additional BMPs.

NDOT needs reliable information on the performance of BMPs that have been adopted for general deployment. The data is needed to demonstrate that the identified BMPs are effective for pollutant concentrations and loads expected in stormwater runoff from NDOT's MS4. This data is also necessary to input into stormwater models to estimate the pollutant loads removed as a result of the stormwater BMPs.

The monitoring of site specific BMPs will provide NDOT with an opportunity to assess the effectiveness of stormwater pollutant reduction measures for different elements of NDOT's operations, including post-construction, regular roadway use, and maintenance activities. It is anticipated that monitoring results will be used to help support operational and maintenance-based decisions made by NDOT and to improve and revise the SWMP as needed.

Receiving Water Characterization Monitoring

Receiving water characterization monitoring is conducted to understand how stormwater runoff affects the water quality of the receiving water.

Another objective of NDOT's stormwater monitoring program is to detect water quality trends or changes in stormwater pollutant levels over time. Trend analysis of water quality data is often used to evaluate whether water quality is improving or degrading over time and provides insight on how changes to site conditions or implementation of BMPs influence water quality. Trend analysis is an important and powerful tool in evaluating the overall effectiveness of NDOT's SWMP.

Stormwater quality trend monitoring is important because non-structural BMPs (e.g. street sweeping, catch basin cleaning, sewer cleaning, illicit discharge elimination, etc.), are more difficult to monitor; partly because they tend to be geographically interspersed with many pollutant sources and can be influenced by many factors that cannot be "controlled" in an experimental sense. Some non-structural BMPs, such as public education programs, oil recycling programs, and litter control programs are virtually impossible to monitor or at best can be evaluated using trend monitoring.

Receiving water monitoring may also be conducted to demonstrate that listing conditions do not occur under stormflow conditions (e.g. a receiving water is listed for not meeting water temperature criteria, but water temperature may decrease during stormflows). If NDOT is able to demonstrate that the listing is not the result of stormwater runoff, NDOT would be spared from implementing unnecessary stormwater BMPs.

Partnerships and Cooperative Agreements

NDOT currently has cooperative agreements or informal partnerships to allow resources and data to be shared between agencies, thereby improving efficiency, increasing effectiveness, and reducing the overall cost of the monitoring programs. These agreements or partnerships may be terminated at any time that NDOT determines continued participation is no longer beneficial.

Due to the linear nature of NDOT's MS4 Permit coverage area and because it traverses across many other jurisdictions there is often overlapping permit activities in close proximity to NDOT roads and facilities. Partnerships and agreements between MS4 permittees and/or other agencies or stakeholders can minimize unnecessarily repeating activities and result in using available resources as efficiently as possible. In addition, by forming partnerships, water quality can be examined and improved on a larger, consolidated scale rather than on a piece-meal, site-by-site basis.

Partnerships may include: coordinating and sharing data to help inform watershed decision-making; conducting the monitoring; assisting with funding of monitoring stations that satisfy monitoring plan requirements; performing monitoring station maintenance; providing equipment; review and evaluation of monitoring data; or other activities that are mutually beneficial.

STORMWATER MONITORING PLAN

Monitoring Studies

The following are areas where NDOT will perform stormwater monitoring studies, the targeted monitoring timeframe and the monitoring strategies implemented at each location:

- US50 - Clear Creek watershed
  - Targeted monitoring timeframe: 2019 through 2024
  - BMP Effectiveness
  - Receiving water characterization

- SR431 – Lake Tahoe watershed
  - Targeted monitoring timeframe: 2019 through 2024
  - BMP effectiveness
  - Roadway runoff characterization

- Reno/Sparks Maintenance Yard – Truckee River watershed
  - Targeted monitoring timeframe: 2019 through 2024
  - BMP effectiveness assessment
  - Maintenance facility runoff characterization

- Las Vegas Maintenance Yards – Las Vegas Wash watershed
  - Targeted monitoring timeframe: 2019 through 2024
  - BMP effectiveness assessment
  - Maintenance Facility Runoff characterization

Refer to the Monitoring Studies section of this report for a more detailed discussion of each study. Note: The timeframes for the studies, above, may shift according to NDOT's available resources. These shift's will be discussed in in the annual report, as applicable.

Monitoring Partnerships

The following are monitoring programs that NDOT is currently participating in and the monitoring strategies implemented with each program:

- Lake Tahoe Regional Stormwater Monitoring Program
  - Targeted monitoring timeframe: 2019 through 2024
  - BMP effectiveness
  - Runoff characterization

- Truckee Meadows Stormwater Monitoring Program
  - Targeted monitoring timeframe: 2019 through 2024
  - Receiving water characterization
  - Runoff characterization

- Las Vegas Valley Stormwater Monitoring Program
  - Targeted monitoring timeframe: 2019 through 2024
  - Receiving water characterization

Refer to the Monitoring Partnerships section of this report for more information on these programs.
Note: The timeframes for the programs, above, may shift according to NDOT's available resources. These shift's will be discussed in in the annual report, as applicable.

Standard Monitoring Site Documentation

Samples and measurements taken for the stormwater monitoring plan shall be representative of the volume and nature of the monitored discharge. This requirement does not prevent NDOT from analyzing or reporting samples that are representative of a limited situation (e.g. concentrations at peak flow).

Test procedures for the analysis of pollutants shall conform to regulations (40 CFR, Part 136) published pursuant to Section 304(h) of the Clean Water Act.

Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements,
- the name(s) of the individual(s) who performed the sampling or measurements,
- the date(s) analyses were performed,
- the names of the individuals who performed the analyses,
- the analytical techniques of methods used, and
- the results of such analyses.

Analyses shall be performed by a State of Nevada-certified laboratory.

NDOT electronically retains all stormwater monitoring records on NDOT's servers.

MONITORING STUDIES

US50 – Clear Creek Watershed

Study Area: Clear Creek Watershed

Locations: 4 in-stream monitoring sites and 3 roadway monitoring sites

Description: NDOT and the United States Geological Survey (USGS) will continue their joint long-term receiving water monitoring study of Clear Creek. The in-stream water quality of Clear Creek will be monitored at four locations. At the 4 in-stream receiving water characterization sites discrete water quality samples and instantaneous field measurements are collected at baseflow conditions and during runoff events.

Objectives:

Receiving Water Characterization: This study will continue to evaluate trends and loads of suspended sediment and total sediment from the Clear Creek watershed in context to documented physical land use changes over time including the development of a golf course community, forest thinning, wildfire, and NDOT's erosion mitigation work. The receiving water characterization may also be used to estimate cumulative effectiveness of NDOT's erosion mitigation work on reducing sediment concentrations and loads in the Clear Creek watershed and evaluate salinity patterns and trends in Clear Creek in context to NDOT snow and ice management of US50.

Assessment of BMP Effectiveness: The data from the 4 in-stream monitoring sites can also be used to assess the overall effectiveness of BMPs implemented in the Clear Creek watershed. In 2010, NDOT identified areas most susceptible to erosion and began implementing mitigation projects along US50 and associated right-of-way. Implemented BMPs include abandoning highly erosive drainages and rerouting flow to more stable drainages, armoring existing conveyance channels with riprap, constructing new detention basins, and installing new down drains and culverts while slip-lining some existing culverts.

Characterization of Discharges from NDOT Roads: NDOT will characterize the runoff from US50 in the Clear Creek watershed by monitoring 3 discharge points. Runoff characterization monitoring results will assist with estimating event mean concentrations of targeted pollutants in stormwater runoff from US50 and the associated pollutant loads from US50 to the Clear Creek watershed. This information will also help to calibrate modeling efforts that the United States Geological Survey (USGS) is performing on behalf of NDOT via the Stochastic Empirical Loading and Dilution Model (SELDM). Monitoring results will also inform the selection and design of future stormwater BMPs. Characterization of the pollutants discharged from the highway may also be used by NDOT in the development of stormwater management plans for similar roads throughout NDOT's MS4 Permit area to improve stormwater quality.

Monitoring Parameters and Target Sampling Frequency

NDOT owns and operates in-situ continuous sensors at two of the in-stream monitoring sites that are programmed to collect measurements at set intervals and evaluate baseflow and stormflow in Clear Creek. Thus, the collection of continuous monitoring data is not event based. The in-situ continuous sensors collect the following water quality measurements:

- Discharge
- Specific Conductivity
- Stage
- Turbidity
- Velocity
- Water Temperature

When NDOT conducts site visits at the two locations where in-situ sensors are installed the following instantaneous field measurements are collected with a calibrated field meter:

- Dissolved Oxygen
- pH
- Specific Conductivity
- Turbidity
- Water Temperature

At all 4 in-stream monitoring sites, USGS collects discrete suspended-sediment and major ion/TDS samples during runoff events to characterize suspended sediment concentrations and loads during periods of greatest sediment movement and transport. At one site an automated sampler will be deployed to characterize sediment transport during storm events. Sampling will be triggered when there is a 0.04 ft/h increase in stage. In most cases sampling will be programmed to continue hourly after being triggered until stage returns to normal. All events that reach this threshold are scheduled to be monitored up to a maximum of 8 events in each water year.

USGS collects routine suspended-sediment and major ion/TDS samples during baseflow conditions every 6 to 8 weeks. The USGS collects bedload samples upon observation of bed sediment movement at all four sites.

Water quality samples collected for this study are analyzed for:

- Bicarbonate
- Calcium
- Chloride
- Dissolved solids
- Fluoride
- Hardness
- Iron
- Manganese
- Magnesium
- Potassium
- Sodium
- Specific Conductance

- Sulfate
- Suspended Sediment Concentration
- Turbidity

During all site visits, USGS collects instantaneous field measurements of:

- Discharge
- Dissolved Oxygen
- pH
- Specific Conductivity
- Water Temperature

Depending on monitoring results and resource availability, monitoring parameters may be added and/or dropped from these lists.

SR431 – Lake Tahoe Watershed

Study Area: Lake Tahoe Watershed

Locations: 2 post-construction BMPs, inflow and outflow at each structural BMP

Description: NDOT will continue to comply with the Nevada Interlocal Agreement by participating in the Lake Tahoe Regional Stormwater Monitoring Program (RSWMP) and continuing the partnership with the Tahoe Resource Conservation District to perform BMP effectiveness monitoring at 2 stormwater treatment vaults along SR431. During runoff events, the inflow to the treatment vaults will be monitored to characterize the stormwater runoff from SR431. The outflow from the treatment vaults will also be monitored to assess the effectiveness these structural BMPs.

Objectives:

<u>Assessment of BMP Effectiveness:</u>
This study will continue to assess the effectiveness of two structural BMPs in the Lake Tahoe watershed. Monitoring will continue to include the inflow and outflow of each BMP.

The current monitoring site evaluates and compares the effectiveness of two adjacent stormwater treatment vaults containing different filter media. A Contech Jellyfish® and a Contech StormFilter® were installed as part of an environmental improvement project in 2013. Four monitoring stations, each with an automated sampler and continuous in-situ sensors, collect data at this site and are located on the inflow and outflow pipes of the Jellyfish® and on the inflow and outflow pipes of the StormFilter®.

Results of this study will also be used to evaluate potential BMP maintenance needs, and to inform stormwater management strategies and support development of plans and budget estimates for implementing stormwater improvement projects.

Depending on monitoring results and resource availability, the monitoring sites may be relocated to perform BMP effectiveness monitoring at other locations.

Characterization of Discharges from NDOT Roads: NDOT will characterize runoff from SR431 in the Lake Tahoe watershed by monitoring the inflow to the two adjacent stormwater treatment vaults. SR431 is the only site in the RSWMP network that isolates the characterization of runoff from NDOT roadways. Runoff characterization monitoring results will assist with estimating event mean concentrations of targeted pollutants in stormwater runoff from SR431 and the associated pollutant loads from SR431 to the Lake Tahoe watershed. Monitoring results will also inform the selection and design of future stormwater BMPs. Characterization of the pollutants discharged from the highway may also be used by NDOT in the development of stormwater management plans for similar roads throughout NDOT's MS4 Permit area to improve stormwater quality.

Monitoring Parameters and Target Sampling Frequency

In-situ sensors deployed at this site measure water quality whenever the sensors are submerged in stormwater runoff. The following water quality measurements will be collected at the inflow and outflow pipes of both treatment vaults by in-situ continuous sensors:

- Specific Conductivity (only measured at the StormFilter® inflow)
- Stage
- Flow
- Turbidity
- Water Temperature

Depending on monitoring results and resource availability, sensors may be added and/or dropped from this list.

Stormwater samples collected by the automated samplers will consist of flow-weighted composite samples. All sampling events will occur during runoff events and sampling is triggered at a site-specific water level (stage). Runoff events are the result of (a) fall rain, (b) rain-on-snow, (c) spring snowmelt, and (d) summer thunderstorms. These four event types are each sampled at least once during the water year at each monitoring station as conditions permit. Fall rain generally occurs in October and November; rain on snow generally occurs December through February; spring snowmelt generally occurs March through May; and summer thunderstorms generally occur June through September.

Stormwater samples collected by the automated sampler may be analyzed for:

- Nitrate + Nitrite
- Total kjeldahl nitrogen (TKN)
- Total nitrogen (Total-N)
- Total phosphorus (Total-P)
- Total suspended solids (TSS)
- Turbidity
- Fine Sediment Particles (FSP)

Depending on monitoring results, parameters may be added and/or dropped from this list.

Reno/Sparks Maintenance Yard – Truckee River watershed

Study Area: Reno/Sparks Maintenance Yard

Location: 1 post-construction BMP, inflow and outflow of one structural BMP

Description: NDOT will monitor one structural BMP at the Reno-Sparks maintenance yard to evaluate its effectiveness. Two monitoring stations will collect data at this site and are located on the inflow and outflow pipes of the structural BMP. Additionally, NDOT will use the inflow monitoring data to characterize the runoff from the Reno-Sparks maintenance yard.

Objectives:

Assessment of BMP Effectiveness: The data from the structural BMP inflow and outflow monitoring stations will be used to assess the performance of maintenance yard BMPs at reducing pollutant loads.

Results of this study will also be used to evaluate potential BMP maintenance needs, and to inform stormwater management strategies and support development of plans and budget estimates for implementing stormwater improvement projects.

Depending on monitoring results and resource availability, the monitoring sites may be relocated to perform BMP effectiveness monitoring at other locations.

Characterization of Discharges from NDOT Maintenance Yards: NDOT will characterize the runoff from the Reno-Sparks maintenance yard by monitoring the inflow of the structural BMP. Runoff characterization monitoring results will assist with estimating event mean concentrations of targeted pollutants in stormwater runoff from the yard. Monitoring results will also inform the selection and design of future stormwater BMPs. Characterization of the pollutants discharged from the yard may also be used by NDOT in the development of facility pollution prevention plans for similar maintenance yards throughout NDOT's MS4 Permit area to improve stormwater quality.

Monitoring Parameters and Target Sampling Frequency

In-situ sensors deployed at this site measure water quality whenever the sensors are submerged in stormwater runoff. The following water quality measurements will be collected at the inflow and outflow pipes of the structural BMP by in-situ continuous sensors:

- Specific Conductivity
- Stage (inflow only)
- Turbidity
- Water Temperature

Depending on monitoring results and resource availability, sensors may be added and/or dropped from this list.

Stormwater samples collected by the automated sampler will consist of a combination of flow-weighted composite samples and grab samples. Stormwater samples for this monitoring effort may be analyzed for:

- Conductivity

- Nitrate
- Nitrite
- Ortho-phosphate (Ortho-P)
- Total dissolved solids (TDS)
- Total kjeldahl nitrogen (TKN)
- Total nitrogen (Total-N)
- Total petroleum hydrocarbons (TPH)
- Total phosphorus (Total-P)
- Total suspended solids (TSS)
- Turbidity

Depending on monitoring results and resource availability, parameters may be added and/or dropped from this list.

Typically, a minimum of 15 total monitoring events is targeted throughout the study duration so that the monitored runoff events cover a diverse set of conditions and situations. Monitoring methods may include automated sampler deployment, continuous monitoring, grab sampling, instantaneous field measurements, and/or passive sampling.

Las Vegas Maintenance Yards – Las Vegas Wash watershed

Study Area: Las Vegas North and South Maintenance Yards

Locations: 2 monitoring stations – North Yard passive sampling location, South Yard passive sampling location

Description: NDOT will continue to characterize the runoff from two maintenance yards in the Las Vegas Valley. Stormwater samples are collected by deploying passive samplers prior to runoff events. These passive samplers collect "first flush" grab samples that consist of the first 1 liter of stormwater runoff.

Objectives:

Characterization of Discharges from NDOT Maintenance Yards: NDOT will characterize first flush pollutant concentrations in runoff from the Las Vegas North and South maintenance yards by collecting stormwater runoff samples from the yards using passive samplers. Runoff characterization monitoring results will assist with estimating concentrations of targeted pollutants in stormwater runoff from the yards, and the associated pollutant loads from the yard. Results will be used to determine whether additional monitoring of either maintenance yard is necessary, and whether additional BMPs are necessary. Results will also inform the selection and design of future stormwater BMPs. Characterization of the pollutants discharged from the yards may also be used by NDOT in the development of facility pollution prevention plans for similar maintenance yards throughout NDOT's MS4 Permit area to improve stormwater quality.

Monitoring Parameters and Target Sampling Frequency

Stormwater samples for this monitoring effort may be analyzed for:

- Conductivity
- Nitrate
- Nitrite
- Ortho-phosphate (Ortho-P)
- Total dissolved solids (TDS)
- Total kjeldahl nitrogen (TKN)
- Total nitrogen (Total-N)
- Total petroleum hydrocarbons (TPH)
- Total phosphorus (Total-P)
- Total suspended solids (TSS)
- Turbidity

Depending on monitoring results and resource availability, parameters may be added and/or dropped from this list.

Typically, a minimum of 15 total monitoring events is targeted throughout the study duration so that the monitored runoff events cover a diverse set of conditions and situations. Monitoring methods may include automated sampler deployment, continuous monitoring, grab sampling, instantaneous field measurements, and/or passive sampling.

MONITORING PARTNERSHIPS

NDOT currently has cooperative agreements or informal partnerships to allow resources and data to be shared between agencies, thereby improving efficiency, increasing effectiveness, and reducing the overall cost of stormwater monitoring programs. These agreements or partnerships may be terminated when continued participation is no longer beneficial. Currently NDOT is a partner with the following stormwater monitoring programs:

- Lake Tahoe Regional Stormwater Monitoring Program
- Truckee Meadows Stormwater Monitoring Program
- Las Vegas Valley Stormwater Monitoring Program

Lake Tahoe Regional Stormwater Monitoring Program (RSWMP)

The Implementers' Monitoring Program (IMP) is a component of the Lake Tahoe Regional Stormwater Monitoring Program (RSWMP). IMP is a partnership established in 2013 between the Tahoe Resource Conservation District, El Dorado County, Placer County, the City of South Lake Tahoe, Douglas County, Washoe County, the Nevada Tahoe Conservation District, and the Nevada Department of Transportation developed to collectively fulfill California NPDES permit requirements and Nevada Interlocal Agreement commitments.

The IMP monitoring plan aligns with the protocols recommended in the Tahoe Regional Stormwater Monitoring Program Framework and Implementation Guidance Document (RSWMP FIG) completed in March 2015 and updated in October 2017. The RSWMP FIG was developed primarily to achieve compliance with the requirements described in Attachment C, sections IIIA and IIIB of the California permit and the stormwater monitoring commitments in the Nevada Interlocal Agreements, as well as establish long-term urban status and trends monitoring sites in the Tahoe Basin.

The monitoring plan includes:

- Measuring continuous flow at each monitoring station
- Measuring continuous turbidity each monitoring station
- Taking samples across the hydrograph during different storm event types in all seasons
- Analyzing samples for total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS), turbidity, and fine sediment particles (FSP)
- Calculating seasonal and annual runoff volumes and nutrient and sediment loads at each monitoring station.

NDOT will use data from this monitoring effort to:

- Assess BMP effectiveness
- Characterize the water quality of runoff from NDOT roads during storm events
- Comply with the monitoring requirements contained in the stormwater permits and agreements
- Collect long-term data to assess status and trends in each monitored catchment

- Inform jurisdictions' efforts to effectively and efficiently manage their stormwater programs
- Track progress toward TMDL implementation goals

Truckee Meadows Stormwater Monitoring Program

Boynton Slough and Steamboat Creek Continuous Monitoring

In collaboration with the Truckee Meadows Storm Water Permit Coordinating Committee (TMSWPCC), NDOT upgraded 2 of the TMSWPCC's stormwater monitoring sites with continuous real-time water quality equipment. The monitoring sites are Boynton Slough at Steamboat Creek and Steamboat Creek at Clean Water Way.[1] Boynton Slough is tributary to Steamboat Creek which is the largest tributary to the Truckee River in the Truckee Meadows and the contributor of high pollutant concentrations and loads as noted by previous monitoring efforts. These monitoring sites are part of a nested monitoring approach to better isolate sources of pollutants in Truckee River tributaries.

According to the Truckee Meadows Regional Storm Water Quality Management Program's 2018 Stormwater Sampling and Analysis Plan, results of the TMSWPCC's stormwater monitoring program are being used to identify high priority areas or sources of poor stormwater quality and to evaluate the effectiveness of control measures and BMPs and ultimately the success of the overall SWMP. Stormwater quality sampling provides quantitative data to determine the extent of pollutant concentrations in runoff and loads.

The overall goal of the Truckee Meadows Stormwater Sampling Program is:
"Through monitoring, research and investigation, develop a better understanding of how runoff affects the receiving waters within the MS4 Permit area over time."

The Boynton Slough monitoring site drainage area is a subset of the Steamboat Creek watershed, but it is difficult to delineate accurately due to the influence of irrigation ditches and land use modification. Boynton Slough is a major tributary of Steamboat Creek, and it conveys flows from the South Evans Creek and Dry Creek watersheds to Steamboat Creek.

The Steamboat Creek monitoring site drains a watershed area of around 240 square miles. The Truckee Meadows MS4 (Reno, Sparks, Washoe County) is the primary source of stormwater runoff contribution to Boynton Slough and Steamboat Creek. However, there are approximately 115 miles of NDOT maintained roadways within the Steamboat Creek Watershed area, as well as the Winters Ranch, Mt. Rose, Galena, Comanche, and Galena Creek maintenance stations.

At these joint monitoring sites, NDOT will operate and maintain the continuous monitoring equipment, dataloggers, and telemetry. Upgrading these sites with telemetry allows users to observe water quality measurements in real-time and provides the ability to remotely initiate automated sampler and/or change the automated sampler program. NDOT is responsible for analyzing and managing the continuous monitoring data. The TMSWPCC is responsible for

[1] Boynton Slough at Steamboat Creek is located at 39.49682°, -119.731078°. Steamboat Creek at Clean Water Way is located at 39.513077°, -119.712491°.

operating and maintaining the automated sampler units (including ensuring that there is sufficient power to operate the automated samplers and continuous monitoring equipment during storm sampling events); collecting, processing, and analyzing water quality samples; maintaining a record of stage; and developing a stage to discharge rating curve.

NDOT will use data from this monitoring effort to:

- Assess baseflow and stormflow water quality trends in Boynton Slough and Steamboat Creek.
- The Boynton Slough and Steamboat Creek watersheds cover a large portion of the drainage area to the Truckee River south of the river. Therefore, trends in stormwater quality in these watersheds is likely to be representative of overall stormwater quality trends in the Truckee Meadows.
- Collect data that may inform the development of watershed-wide stormwater mitigation strategies to improve water quality in these watersheds.
- Evaluate the effectiveness of deployed monitoring equipment/programming to collect usable/meaningful data, and to continue to fine tune monitoring stations equipment/programming as needed to this end.

In-situ sensors deployed at these sites are programmed to collect data at set intervals and measure baseflow and stormflow in Boynton Slough and Steamboat Creek. Thus, the collection of continuous monitoring data is not event based. In-situ continuous sensors collect the following water quality measurements:

- Dissolved Oxygen
- pH
- Specific Conductivity
- Turbidity
- Water Level (Boynton Slough only)
- Water Temperature

Depending on monitoring results and resource availability, sensors may be added and/or dropped from this list.

The Steamboat Creek at Clean Water Way monitoring site is co-located with USGS gaging station 10349300 which measures discharge and stage.

When NDOT conducts site visits of these 2 continuous monitoring stations, the following instantaneous field measurements are collected with a calibrated field meter:

- Dissolved Oxygen
- pH
- Specific Conductivity
- Turbidity
- Water Temperature

Las Vegas Valley Stormwater Monitoring Program

In collaboration with Las Vegas Valley Stormwater Management Committee and the Clark County Regional Flood Control District (CCRFCD), NDOT upgraded 1 of the CCRFCD's wet weather

monitoring sites with continuous real-time water quality equipment. The monitoring site is the Las Vegas Wash at LVW11.5.[2] This monitoring site is co-located with the Clark County Regional Flood Control District's wet weather monitoring station. This monitoring site provides information on an area with Nevada's largest urban population. NDOT's Las Vegas Wash Monitoring Station is the only continuous monitoring site on the Las Vegas Wash dedicated to collecting stormwater data without influence from wastewater treatment plant discharges. Although the Las Vegas Wash is a perennial stream at the monitoring site, water quality is not monitored unless the sensors are submerged by stormwater runoff.[3]

At this joint monitoring site, NDOT will operate and maintain the continuous monitoring equipment, dataloggers, and telemetry. NDOT is responsible for analyzing and managing the continuous monitoring data. The CCRFCD is responsible for operating and maintaining the automated sampler unit (including ensuring that there is sufficient power to operate the automated sampler and continuous monitoring equipment during storm sampling events); and collecting, processing, and analyzing water quality samples. According to the Las Vegas Valley Municipal Separate Storm Sewer System Permit: Stormwater Management Plan, water quality samples are collected from 3 qualifying storm events per year.

NDOT will use data from this monitoring effort to:

- Characterize the receiving water quality during storm events.
- Assess stormflow water quality trends in the Las Vegas Wash.
- The watershed of the Las Vegas Wash includes the urbanized Las Vegas Valley and beyond. Therefore, trends in stormwater quality at this monitoring is likely to be representative of overall stormwater quality trends in the Las Vegas Valley.
- Collect data that may inform the development of watershed-wide stormwater mitigation strategies to improve water quality in the Las Vegas Wash watershed.

In-situ sensors deployed at this site measure water quality whenever the sensors are submerged in stormwater runoff. In-situ continuous sensors collect the following water quality measurements:

- Specific Conductivity
- Turbidity
- Water Temperature

Depending on the monitoring results and resource availability, sensors may be added and/or dropped from this list.

[2] The Las Vegas Wash at LVW11.5 monitoring site is located at 36.139749°, -115.043171°.
[3] Discharge and precipitation are measured 0.2 miles upstream of this location at of USGS gaging station 094196783. Under non-storm conditions, urban dry weather runoff and shallow groundwater maintains a regular baseflow in the Las Vegas Wash, which typically ranges from 5 to 15 cfs at USGS gaging station 094196783. Stormwater monitoring sensors are positioned above the baseflow such that sensors are not submerged until about 965 cfs, as measured by USGS gaging station 094196783.

EVALUATION OF MONITORING PLAN

How monitoring may assist in making decisions about program compliance

NDOT's MS4 Permit requires an evaluation of how monitoring may assist in making decisions about program compliance. The monitoring plan is a component of NDOT's comprehensive Stormwater Management Program (SWMP). The SWMP presents NDOT's overall program to comply with requirements of the MS4 Permit.

NDOT has identified five programs contained in the SWMP where the monitoring identified in this plan will assist with making decisions about program compliance:

- Discharges to waters of the U.S. on the 303(d) list
- Public Involvement / Participation Program
- Construction Site BMP Program
- New Development and Redevelopment Planning Program
- Maintenance Facility Program

Although the stormwater monitoring contained in this plan does play a role in providing information to all the required programs that information is typically not used to make decisions about the compliance of those programs.

The following is a discussion on how the monitoring studies identified in this plan may assist in making program compliance decisions:

Discharges to waters of the U.S. on the 303(d) list (Permit B.4)

The monitoring studies identified in this plan include receiving water monitoring, characterization of stormwater discharges from NDOT roads and maintenance facilities and BMP effectiveness studies.

Conducting receiving water monitoring allows NDOT to directly assess how these waterbodies are impacted by stormwater runoff. The runoff characterization monitoring data could identify pollutant concentrations typically discharged from NDOT roads and maintenance facilities. This information may assist in determining whether stormwater discharges from any part of the NDOT MS4 contributes directly or indirectly to the listing of a receiving waterbody on the current 303(d) list.

In areas where NDOT discharges to a water of the U.S. with a TMDL the runoff characterization data may assist with determining whether the approved TMDL is for a pollutant likely to be found in discharges from NDOT's MS4.

The runoff characterization studies and BMP effectiveness studies identified in this plan can also be used to estimate pollutants load reductions when BMPs are implemented in the watershed of a 303(d) listed water.

Public Involvement / Participation Program (Permit B5.6)

A goal of NDOTs Public Outreach Program is to inform the public about actions individuals can take to reduce stormwater pollutants and improve water quality. The monitoring studies identified in this plan include characterization monitoring that will help the Public Outreach Program select which "priority" pollutants are targeted.

The Public Outreach Program is required to develop partnerships and cooperative outreach programs, where feasible, with other MS4s and jurisdictions (Permit B.5.6.2.5.2). The monitoring partnerships identified in this plan may assist in making decisions about program compliance related to this requirement.

Construction Site BMP Program (Permit B.5.7)

NDOT's Construction Site BMP Program is required to implement and maintain structural and non-structural BMPs to reduce pollutants to the MEP in stormwater runoff from construction sites. The monitoring studies identified in this report include assessment of BMP effectiveness that may be used to select appropriate structural and non-structural BMPs that could be implemented to reduce pollutants discharged from construction sites to the MEP.

New Development and Redevelopment Planning Program (Permit B.5.9)

NDOTs New Development and Redevelopment Planning Program is required to develop and implement comprehensive planning procedures and BMPs to prevent or minimize water quality impacts from areas of new development and redevelopment statewide. The monitoring studies identified in this plan include receiving water characterization, runoff characterization and assessment of BMP effectiveness. This monitoring data can be used to identify the appropriate BMPs that will most effectively prevent or minimize water quality impacts.

NDOT's post-construction stormwater pollution control program must include maintenance of post-construction stormwater pollution control BMPs. BMP effectiveness studies can be used to identify appropriate maintenance practices and intervals between maintenance.

NDOT is required to install stormwater pollution controls for all newly developed or redeveloped roadways that discharge stormwater runoff to waters of the U.S. on the 303(d) List. For other areas within the MS4 Permit area, NDOT is required to evaluate the need for permanent post-construction stormwater pollution control BMPs. Runoff characterization and BMP effectiveness monitoring data collected by implementing this monitoring plan will allow NDOT to select appropriate stormwater pollution controls and may assist in the evaluation of the need for permanent post-construction BMPs in other areas that do not discharge to a water of the U.S. on the 303(d) List.

NDOT is also required to install post-construction controls for all newly developed or redeveloped roadways within the MS4 Permit area where appropriate. Runoff from these roadways and the MS4 shall be treated by post-construction stormwater pollution control BMPs prior to the runoff leaving NDOT's MS4 and/or entering waters of the U.S. The receiving water and runoff characterization monitoring data may assist NDOT in making decisions on where it is appropriate to install post-construction controls in within the MS4 compliance areas. The BMP effectiveness monitoring data may assist in making decisions on the appropriate post-construction BMP to implement.

Maintenance Facility Program (Permit B.5.13)

NDOT is required to implement its maintenance facility program to reduce pollutant discharges to the MEP from maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas and salt and sand storage locations and snow disposal areas. The monitoring studies identified in this plan include characterization of discharges from maintenance facilities and assessment of BMP effectiveness. Together this monitoring data may be used to make decisions on: the pollutants to be targeted; selection of the appropriate temporary or permanent BMP to be implemented; and development of the SWPPP for the maintenance facility.

Evaluating the appropriateness of identified best management practices

The monitoring studies identified in this plan include characterization of roadway and maintenance facility runoff, characterization of receiving waters, and assessment of BMP effectiveness. Together this data may be used to help NDOT determine: the pollutants of concern to be targeted in the subject area; appropriate BMPs for the pollutants of concern; locations where BMPs are needed, estimates of potential load reduction by implementing the BMP, and potential maintenance needs for the BMP. Taken together the monitoring practices that are identified in the plan all play a role in evaluating the appropriateness of identified best management practices.

Evaluating progress toward achieving identified measurable goals

The following matrix lists measurable goals contained in NDOTs current SWMP where monitoring has been identified as playing a significant role in the evaluation of NDOT's progress toward achieving the measurable goal.

Note that the SWMP and measurable goals were developed prior to the issuance of NDOT's current MS4 Permit. The measurable goals in this Stormwater Monitoring Plan may change. Upon implementing the new SWMP, the Stormwater Monitoring Plan will be modified to reflect the new measurable goals.

SWMP Section	BMP Title	Measurable Goal	How monitoring may assist in making decisions about progress toward achieving identified measurable goals
New Development and Re-Development Planning Program	Plan Review Process	Review project plans to ensure that stormwater runoff from new and re-development projects is adequately addressed and treated to the MEP	Stormwater monitoring data obtained from the studies identified in this plan may assist with determining the pollutants of concern for a project, locations where BMPs are needed, and which BMPs to implement in order to adequately address and treat discharges to the MEP.
NDOT Organization & Responsibility	Departmental Stormwater Coordination	Continue to facilitate, develop, and promote inner Department and inter-agency relationships	Stormwater monitoring data is an important component of inner Department and inter-agency outreach and education. The partnerships and agreements between permittees and/or other agencies or stakeholders contained in this monitoring plan helps achieve progress toward this goal, can minimize redundant monitoring efforts and results in using available resources as efficiently as possible. In addition, by forming partnerships, water quality can be examined and improved on a larger, consolidated scale rather than on a piece-meal, site-by-site basis.
Water Quality Impaired Waters	Impaired Waters	Determine if the impaired constituents are commonly found in stormwater discharge from NDOT's MS4	The monitoring identified in this plan include runoff characterization which may improve NDOTs ability to achieve this goal.
		Initiate a process to identify BMPs for implementation as appropriate	The data obtained from implementing the monitoring studies contained in this plan may be used to: identify the location where BMPS are needed; determine which BMPs to implement (type, size, frequency, etc.); assess BMP effectiveness; and improve performance through modifications to existing BMPs and construction of additional BMPs (adaptive management).
Water Quality Impaired Waters	TMDL Listed Waters	Determine if the TMDL constituents are commonly found in stormwater discharge from NDOT's MS4	NDOT has included runoff characterization monitoring in the monitoring studies identified in this monitoring plan.
		Initiate a process to identify BMPs for implementation as appropriate	Stormwater monitoring data obtained from the monitoring studies identified in this plan may be used to: identify the location where BMPS are needed; determine which BMPs to implement (type, size, frequency, etc.); assess BMP effectiveness; and improve performance through modifications to existing BMPs and construction of additional BMPs (adaptive management). Stormwater management infrastructure can be a significant investment for NDOT, running from thousands to millions of dollars. Selection, sizing, and design of the infrastructure frequently rely on accurate stormwater monitoring data. The use of monitoring data will facilitate a more efficient use of NDOT funds for improving water quality.
Lake Tahoe TMDL Program	Lake Tahoe TMDL Memorandum of Agreement	Upon entering into the MOA, begin developing a plan to accomplish NDOT's responsibilities for TMDL compliance	NDOT is required by the *Interlocal Agreement to Implement Lake Tahoe Total Maximum Daily Load* to implement a stormwater monitoring program in the Lake Tahoe basin. Continued implementation of the approved Implementers Monitoring Program (IMP) component of the Regional Stormwater Monitoring Program (RSWMP) fulfills NDOT's commitment.
New Development and Re-Development Planning Program	Low Impact Development (LID) Techniques	From the list, identify the most viable LID techniques for use on highway projects in Nevada	To be effective in NDOT's MS4 Permit area, LID installations must be specifically designed to the site including arid conditions, intermittent and unpredictable precipitation patterns, rapid freeze/thaw cycles and sediment loading. Stormwater monitoring will help determine the viability of LIDs for use on highway projects in Nevada. For example, runoff characterization monitoring will improve NDOT's understanding of the pollutant concentrations and loads in stormwater runoff from its MS4. This knowledge will help identify which LID techniques are viable for use on highway projects in Nevada.
Stormwater Education Program	Public Outreach and Education Events	Participate in at least one public stormwater related outreach and education event annually	Stormwater monitoring data is often a component of public outreach and education. Runoff characterization monitoring is required to definitively determine the target pollutants (and concentrations) that are a part of the public outreach and education program. Additionally, receiving water monitoring helps the public outreach and education program determine the "priority" pollutants to focus efforts on in each watershed.
Stormwater Education Program	Partnerships and Affiliations	Continue partnering efforts and affiliations	The monitoring partnerships identified in this plan help NDOT achieve this measurable goal.
Stormwater Monitoring Program	Demonstration Projects	Continue evaluating new technologies and practices for improving stormwater runoff quality	NDOT will continue to evaluate new technologies and practices for improving stormwater runoff quality by conducting the monitoring described in this plan.

			The SR431 monitoring evaluates and compares the effectiveness of two adjacent stormwater treatment vaults containing different filter media (Contech Jellyfish® and a Contech StormFilter®). The Reno/Sparks Maintenance Yard monitoring evaluates the performance of a structural BMP in the maintenance yard to determine its effectiveness at reducing pollutant loads. The US50 Clear Creek monitoring evaluates trends and loads of suspended sediment and total sediment from the Clear Creek watershed in context to documented physical land use changes over time including the development of a golf course community, forest thinning, wildfire, and NDOT's erosion mitigation work. The results of this study may be used to estimate cumulative effectiveness of NDOT's erosion mitigation work on reducing sediment concentrations and loads and evaluate salinity patterns and trends on a watershed scale.
		Explore options to disseminate information and/or knowledge gained to the public from stormwater related projects	Monitoring data from the SR431 monitoring is available in near real-time to the public through a Data Management System (https://monitoring.laketahoeinfo.org/RSWMP). Monitoring data collected by the USGS as part of the US50 Clear Creek watershed study is available on the National Water Information System (https://waterdata.usgs.gov/nwis). NDOT will explore the feasibility and utility of making other monitoring data available to the public.
		Begin disseminating this information	Through monitoring partnerships discussed previously (Lake Tahoe RSMP, TMSWPCC, and CCRFCD), stormwater monitoring data is disseminated to the public through annual monitoring reports. Through our partnership with the USGS, Clear Creek water quality monitoring data is disseminated to the public and stakeholders via USGS Scientific Investigations Reports. Additionally, the Lake Tahoe Regional Stormwater Monitoring Program monitoring data is available to the public through a Data Management System (https://monitoring.laketahoeinfo.org/RSWMP). Monitoring data collected by the USGS as part of the US50 Clear Creek watershed study is available on the National Water Information System (https://waterdata.usgs.gov/nwis).
Stormwater Monitoring Program	Stormwater Monitoring Plan	Submit a stormwater monitoring plan to NDEP by October 1st annually	The requirement to submit a stormwater monitoring plan to NDEP by October 1st annually has been replaced in NDOT's MS4 Permit re-issued August 2018.
		Evaluate the data collected to assist with stormwater related decision making	This evaluation will be included in the Annual Report
		Conduct a yearly assessment of the adequacy of the stormwater monitoring program	This evaluation will be included in the Annual Report
Record Keeping	Record Keeping	Develop a procedure to collect and retain stormwater monitoring related records	NDOT electronically retains all stormwater monitoring records in specific folders on NDOT's server. All stormwater monitoring field forms are completed using Survey123 for ArcGIS. The data from the field forms is retained on GIS servers. A copy of field form data is also stored on NDOT's server.
		Implement the record keeping plan	NDOT is implementing its record keeping plan by electronically retaining all stormwater monitoring records on NDOT's server. NDOT is also pursuing a comprehensive stormwater quality data management system to supplant the current record keeping plan of retaining all stormwater monitoring related records on NDOT's server.
Public Streets Maintenance Program	Snow and Ice Control Program	Identify any deficiencies in the existing program with respect to the requirements outline in the Permit	Stormwater monitoring can help identify deficiencies in the existing snow and ice control program. Monitoring for constituents of deicing chemicals in highway runoff and/or in receiving waters can inform snow and ice control practices. Monitoring data collected will inform the Stormwater and Maintenance and Asset Management Divisions and the three Districts as they continue to implement both the NDOT *Maintenance Manual* and the NDOT *Maintenance Facility Best Management Practices (BMPs) Manual.* Activities and responsibilities for implementing the Snow and Ice Control Program are outlined in the 2017 NDOT SWMP Manual. NDOT is collaborating with USGS to evaluate salinity patterns and trends in Clear Creek in context to NDOT snow and ice management of US50. At a minimum, all water quality samples collected as part of NDOT's runoff characterization studies are analyzed for Conductivity and Total Dissolved Solids which are water quality parameters used to describe salinity. In addition, most of NDOT's runoff characterization studies include an in-situ sensor that measures Specific Conductivity. All of NDOT's receiving water monitoring studies include an in-situ sensor that measures Specific Conductivity. Concentrations of road-salt constituents such as Calcium,

			Sodium, and Chloride in runoff can be estimated from theoretical and empirical relations between Specific Conductivity and the concentrations of these ions. Furthermore, the water quality samples collected by NDOT's monitoring partners (e.g. CCRFCD and TMSWPCC) are analyzed for water quality parameters that are indicators of salinity.
		Develop BMPs as needed to address any deficiencies in the program	As noted above, water quality parameters that are indicators of salinity are monitored as part of this plan. It is necessary to understand the concentrations and loads of pollutants associated with the snow and ice control program in order to develop BMPs. Activities and responsibilities for implementing the Snow and Ice Control Program, including implementation of BMPs within the Snow and Ice Control Program, are outlined in the 2017 NDOT SWMP (section 4.10.3).
Maintenance Facility Stormwater Discharge Control Program	Maintenance Facility FPPPs	Develop FPPPs for the NDOT's Major Maintenance Facilities	As part of this plan, NDOT is conducting runoff characterization monitoring at 3 maintenance facilities: • Las Vegas North Maintenance Yard • Las Vegas South Maintenance Yard • Reno/Sparks Maintenance Yard NDOT is also conducting BMP effectiveness monitoring at the Reno/Sparks Maintenance Yard as part of this plan. The primary objective of a Facility Pollution Prevention Plan (FPPP) is to prevent (or reduce to the maximum extent practicable) stormwater pollutant discharges into receiving waterways from NDOT Maintenance facilities. Key elements in meeting this objective are: 1. Understanding maintenance facility operations and their potential for contributing pollutants to stormwater runoff. 2. The development and implementation of best management practices (BMPs) for Maintenance facility operations. Before BMPs can be developed and implemented, the nature of the stormwater runoff must be understood so appropriate BMPs will be developed and implemented. Runoff characterization monitoring will help to determine the concentrations/loads of pollutants in stormwater runoff from maintenance facilities. Runoff characterization monitoring results will assist with estimating concentrations of targeted pollutants in stormwater runoff from the maintenance yards, and the associated pollutant loads from the yards. Results will be used to determine whether additional BMPs are necessary. Results will also inform the selection and design of future stormwater BMPs. Characterization of the pollutants discharged from the yards may also be used by NDOT in the development of facility pollution prevention plans for similar maintenance yards throughout NDOT's MS4 Permit area to improve stormwater quality. The data from the BMP effectiveness monitoring at the Reno/Sparks maintenance yard will demonstrate whether adequate treatment is being provided by the structural BMP. Results of this study will also be used to evaluate potential BMP maintenance needs, and to inform stormwater management strategies and support development of plans and budget estimates for implementing stormwater improvement projects which are all important components of FPPPs.
Maintenance Facility Stormwater Discharge Control Program	Maintenance Facility Inspections	Maintain BMPs listed in the FPPP in effective operating condition. Perform maintenance on ineffective BMPs within 7 calendar days of discovery and before the next anticipated storm event	The BMP effectiveness monitoring at the Reno/Sparks maintenance yard will assist with determining whether this BMP is being maintained in effective operating condition. Results of this monitoring may also be used by NDOT to assess the maintenance of similar BMPs throughout NDOT's MS4 Permit area.
Maintenance Facility Stormwater Discharge Control Program	Maintenance Facility BMP Manual	Develop a Maintenance Facility-specific BMP manual and disseminate for use	The BMP effectiveness monitoring at the Reno/Sparks maintenance yard will assist with the development of a Maintenance Facility-specific BMP manual. This monitoring will provide a better understanding of the effectiveness of existing maintenance practices and will aid in the development of Maintenance Facility-specific BMP manuals for maintenance facilities with this type of structural BMP.