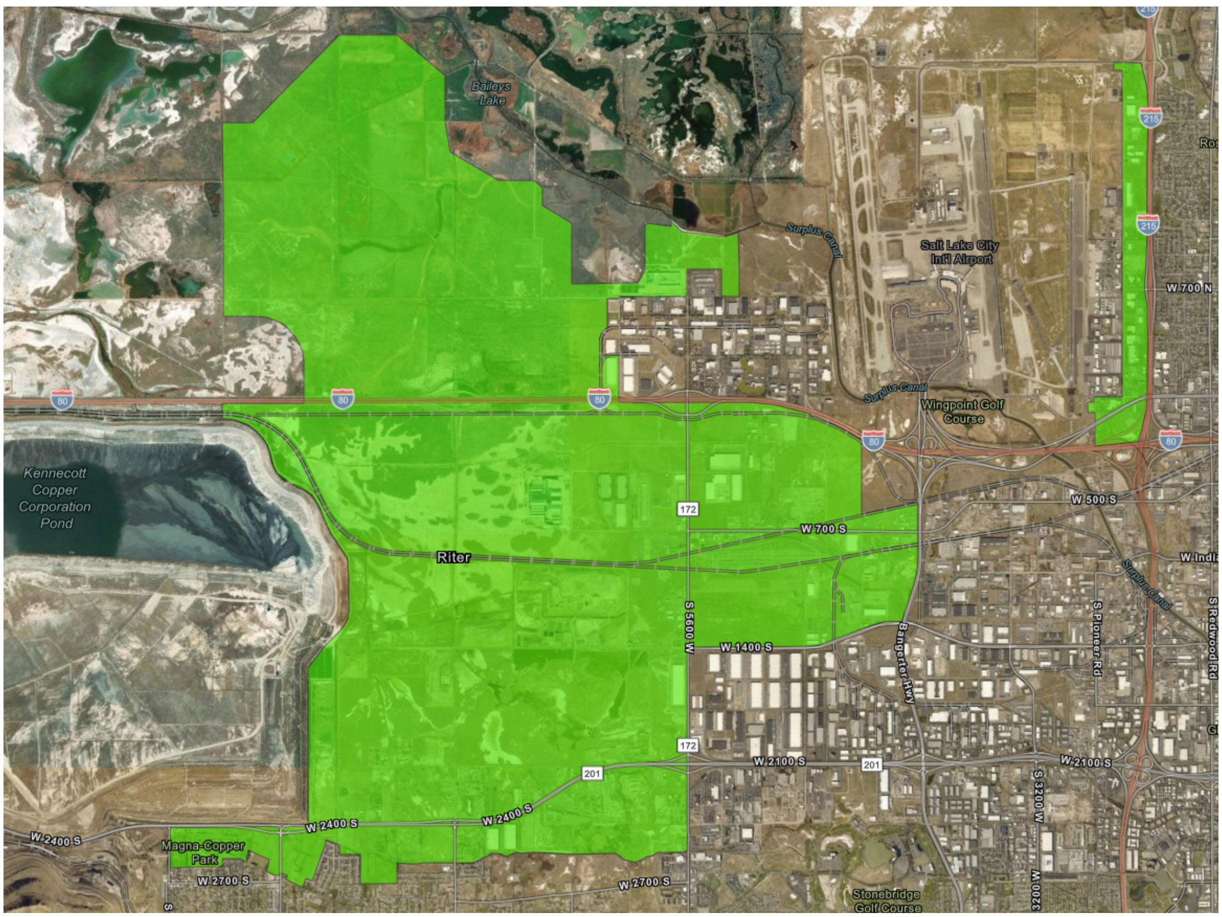
Utah Department of Environmental Quality
Water Quality

Utah Inland Port Storm Water Sampling and Analysis Plan



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Acronyms and Abbreviations

DEQ	Department of Environmental Quality
DPM	Designated Project Manager
DQO	Data Quality Objective
DWQ	Utah Division of Water Quality
EPA	United States Environmental Protection Agency
FPM	Field Project Manager
PARCC	Precision Accuracy Representativeness Comparability and Completeness
QA	Quality Assurance
QAPP	Quality Analysis Project Plan
QC	Quality Control
SAP	Sampling Analysis Plan
SOP	Standard Operating Procedure
TMDL	Total Maximum Daily Load
UIP	Utah Inland Port
USGS	United States Geological Survey

Introduction

This Sampling and Analysis Plan (SAP) was prepared by the Utah Department of Environmental Quality (UDEQ), Division of Water Quality (DWQ) for the collection of storm water samples required to establish baseline water quality conditions associated with the Utah Inland Port (UIP) and quantify any impacts to water quality associated with it. The information obtained from the implementation of this SAP will be used by DWQ staff and researchers to determine the effects of the UIP on storm water quality before, during and following development. Data characterizing current water quality conditions will be used to compare against data collected during and after the development of the UIP. This is to determine the effects of the project on water quality and help direct the implementation of best management practices and mitigation measures to protect and improve it.

Background

Water quality concerns along the southern shore of the Great Salt Lake in the vicinity of the UIP include mercury, selenium, excess nutrients, and trash/debris (DWQ 2014). In high concentrations mercury and selenium can harm wildlife populations, especially birds, through direct toxicity and cause congenital disabilities. Nutrients in excess concentrations can result in harmful algal blooms including toxic cyanobacteria. Trash and debris can directly affect wildlife and affect water management structures located throughout the wetlands by clogging inlets and outlets.

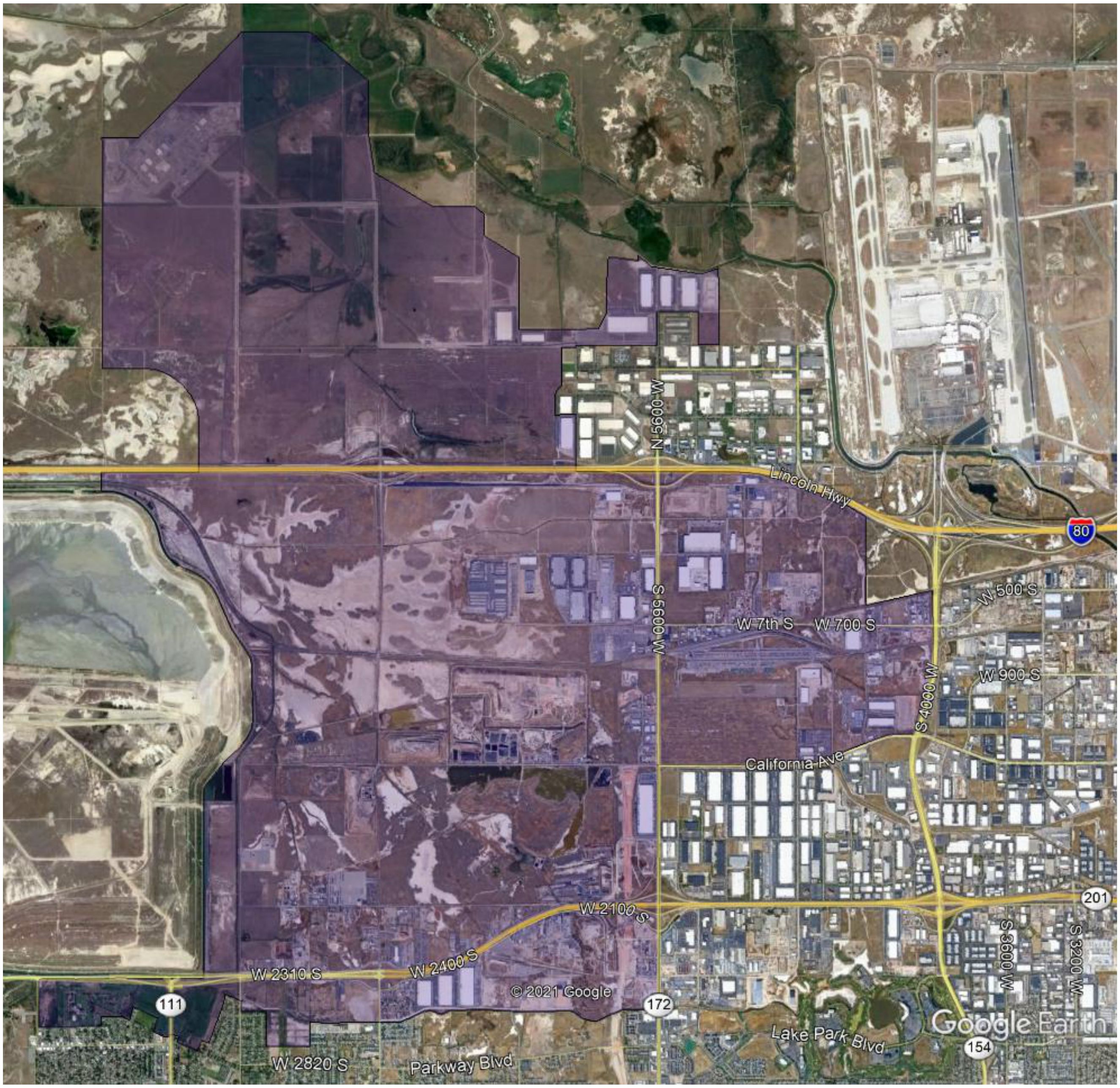
DWQ developed this SAP to evaluate the effects of the UIP on the water quality of surface waters from the site and identify appropriate management measures to mitigate any effects. Specifically, this plan will focus on the change in specific water quality parameters associated with storm water. Storm water runoff is generated from rain and snowmelt events that flow over land or impervious surfaces, such as paved streets, parking lots, and building rooftops, and does not soak into the ground. The runoff picks up pollutants such as trash, chemicals, oils, nutrients, heavy metals, pesticides, fertilizers, herbicides, and dirt/sediment. Storm water can also be contaminated by sanitary sewer overflows and cross connections. Monitoring of storm water is appropriate for determining the effects of development since it is directly related to changes in land use and the generation of pollutants listed above that is commonly associated with development.

This SAP defines the data quality objectives, sampling and analytical procedures, safety considerations, documentation and reporting requirements to be implemented by the DWQ for the collection of environmental samples.

Site Description

The UIP is generally located to the west of the Salt Lake International Airport, east of the Kennecott Tailings Pond, and north of the Riter Canal (2550 South). A separate part of the UIP lies along the west side of Interstate 215 from the junction with Interstate-80 to 2100 North in Salt Lake City. Storm water monitoring efforts will occur on the portion that lies west of the airport (Figure 1). This area contains two perennial flowing water bodies, Kersey/Lee Creek on the west side of the project area and the Surplus Canal along the east and north.

Figure 1. Study Area of Utah Inland Port



Summary of Project Tasks and Schedule

The tasks associated with this study of the UIP are as follows and shown in Table 1. Project Timeline

1. Implement SAP (spring 2021-fall 2025)
2. Validate field and laboratory results (fall 2021/winter 2025)
3. Analyze data and publish findings (fall 2021/winter 2025)

Table 1. Project Timeline

Task	2021				2022, 2023, 2024				2025					
	Months													
	06	07	09	10	04	05	09	10	04	05	09	10	11	12
Sample collection (grab and/or composite)	X	X	X	X	X	X	X	X	X	X	X	X		
Data Validation				X				X				X		
Data Analysis				X				X				X	X	
Report Writing													X	X
Final Review														X

Objectives and Design of the Study

The United States Environmental Protection Agency's (EPA's) seven-step data quality objective (DQO) process (EPA, 2006) is used to guide the rationale for the Utah Inland Port SAP. The DQO process defines the type, quantity, and quality of data and establishes performance and acceptance criteria to make sure that the collected data supports the goals of the study.

Specific Objectives of the Study

The specific objective of this study is to collect water quality data in order to characterize the condition of storm water quality associated with the UIP prior to, during and following the development. This is to help identify and prioritize water quality protection and improvement efforts. Project-level data quality objectives (DQOs) for this study are to collect data of the appropriate type, quality, and quantity to test and improve upon current sampling methods. Thus, this SAP will support the assessment of environmental impacts and mitigation measures associated with the UIP, including:

- Characterize the current quality of storm water within the UIP area;
- Track changes in storm water quality during the course of development;
- Use storm water quality data to evaluate best management practice effectiveness and provide information on need for additional measures and/or mitigation.

DQOs are qualitative and quantitative statements derived from systematic planning that clarify the study objective(s), determine the most appropriate type of data to collect, determine the most appropriate conditions from which to collect the data, and specify the level of uncertainty allowed in the collected monitoring data while still meeting the project objectives (EPA, 2006). This information is summarized in Table 2.

Table 2. Data Quality Objectives.

Step	DQOs for Utah Inland Port Storm Water Assessment
1. Problem Statement	Development of the UIP is expected to intensify land uses within its project boundaries including large scale commercial facilities engaged in warehousing and shipping goods. To ensure that appropriate measures are implemented to mitigate development impacts on the sensitive wetland environment along the Great Salt Lake, a long term (5 year) monitoring program is proposed to assess current and future water quality conditions of storm water originating from the UIP area. This baseline information will be compared to future water quality conditions as development progresses to identify the effectiveness of best management practices designed to protect water quality as well as identify any potential impacts and appropriate mitigation measures required to offset those impacts.
2. Goal of Study / Decision Statements	**Key Question[s]** 1. What are the current water quality conditions of storm water in the UIP area and how does it change over time as development occurs? What trends do the water quality parameters indicate? 2. Are there correlations among the water quality parameters and stages of UIP development? If so, how do these correlations relate to on the ground activities such as land clearing, road and building construction? 3. How can correlations between land use activity and storm water quality help identify and locate appropriate best management practices and / or mitigation measures? **Potential Outcomes** 1. Information is adequate to characterize the water quality of storm water over time as land use intensifies from agricultural to industrial and commercial uses. 2. If information is not adequate to characterize the condition of storm water DWQ will evaluate results and provide further recommendations on how to improve the data collection process in 2022.
3. Inputs to Decision	**The following information will be collected:** Field sampling will be conducted with portable samplers on a continual basis for 7 months of each year when non-freezing precipitation events occur (April-October) at 6 sites. . Water chemistry analytes: Total Dissolved Solids, Total Suspended Solids, Volatile and Semi-Volatile Organic Compounds, Total metals, and Total Petroleum Hydrocarbons. Storm water sampling will be conducted at representative locations. Due to the episodic nature of storm water flows, deployment of portable samplers will be required.
4. Study Boundaries	The study area for this project is shown in Figure 1**.** **Practical Constraints on Data Collection** 1. Permission for sampler deployments will need to be obtained from landowners. 2. Staff and funding availability will need to be provided. 3. Availability of field equipment, as well as equipment functionality, may limit some activities. 4. Weather is a significant constraint for all sampling and monitoring activities. This is because storms can limit the ability to safely conduct sampling and measurement activities in the study area. 5. The presence of ice and/or lack of water could limit the ability to collect samples.

Step	DQOs for Utah Inland Port Storm Water Assessment
5. Decision Rules	The data collected under the scope of this SAP will support the goals of the study. They will guide the DWQ on how to decide whether the available data is sufficient to characterize changes in storm water quality associated with the UIP, assess the effectiveness of best management practices used, and determine appropriate measures to mitigate any negative effects. If information is not adequate the DWQ will evaluate results and provide recommendations for the 2022 SAP.
6. Acceptance Criteria	▪ **Precision—**field replicates will be collected for all water chemistry parameters at least once per each site per monitoring season. ▪ **Accuracy**—special efforts will be made to minimize contamination of water chemistry samples through proper collection of field samples, monitoring of sampling bottle blanks, and the use of appropriate laboratories for analysis. ▪ **Representativeness**—the sampling locations have been selected based on a review of aerial photos. The sites were chosen due to their accessibility and setting along major drainages within the UIP. Sites were chosen to encompass potentially unique characteristics of different conditions, such as water sources and potential pollutant inputs. Field sampling will occur following appropriate sample collection procedures as described in SOPs for each method. Site photos and field notes will be collected at each site and can be used to describe any unusual conditions that may occur. ▪ **Completeness—**to ensure the sampling goal of 100 percent completeness at the end of the season, we will use field reconnaissance to verify that sites have the proper hydrologic conditions. ▪ **Comparability**—all field sampling and analytical procedures will be completed following both previously tested and newly developed SOPs for each metric. They will be performed by the same field crew to the extent possible throughout the sampling season. ● DWQ's QAPP specifies the minimum QA/QC objectives for sample measurement.
7. Sampling Plan and Design	The baseline sampling program includes the following: Field observations, collection and analysis of water for chemical and physical attributes, as appropriate.

Sampling Design

The objective of this SAP is to assess the condition of water quality before, during and after UIP development through the analysis of chemical data collected from 6 monitoring locations (Figure 2). Samples will be collected from storm drain channels in developing areas of the UIP to assess changes in water quality over time. Monitoring locations are strategically placed within areas that are currently under development, or will be in the near future.

Figure 2. Utah Inland Port Storm Water Monitoring Sites.

Table 3 summarizes the list of sampling sites, their approximate drainage area within the UIP, and predominant land use within that area. All of these sites are open channels but have different characteristics depending on their drainage area and level of development within them.

The four storm water drainage channels along the northern periphery of the study area (4991299, 4991302, 4991303, and 4991305) flow towards Goggin Drain while the two to the south (4991297 and 4991313) flow west towards Lee Creek. The channels receive storm water flows from the streets they parallel and the adjacent developed areas that discharge to them. Based on the current level of construction activity these areas are anticipated to be largely converted from agricultural to industrial and commercial uses within the next several years.

Table 3. Utah Inland Port Monitoring Sites

Site ID	Site Name	Latitude	Longitude	Drainage Area (ac)	Land Uses
4991297	Storm Drain Channel at 8000 W North Temple	40.77155	-112.08308	144	Agricultural Institutional
4991299	Storm Drain Channel at 7200 W and 1300 N	40.79863	-112.06399	157	Developing Industrial
4991302	Storm Drain Channel at 1100 N 6550 W	40.79447	-112.04880	204	Developing Industrial
4991303	Storm Drain Channel at 6000 W 700 N	40.78396	-112.04408	316	Developing Industrial
4991305	Storm Drain Channel at end of John Cannon Dr	40.78732	-112.01642	109	Developing Industrial
4991313	Storm Drain Channel at 150 S 5600 W	40.76567	-112.02543	180	Developing Industrial

Sites are listed in the sequence composite samples will be collected following a qualifying storm event. Composite storm water samples will be collected from portable samplers from April through October and are contingent on precipitation events of at least 0.1 inch to generate runoff. Qualifying storm events that generate runoff for sample analysis will include those greater than 0.1 inch and at least 2 weeks from the previously measurable—greater than 0.1 inch rainfall—storm event. Samples will be collected as a composite throughout the duration of the runoff event on a flow weighted basis.

Measured Parameters

Water quality monitoring activities will aim to understand the temporal and spatial condition of storm water within the UIP area. Storm water samples will be characterized by a suite of select parameters that are responsive to environmental conditions within their contributing area and will help managers understand the temporal and spatial condition of storm water before, during, and after Utah Inland Port development.

Environmental Sample Collection

DWQ's resources will be dedicated to collecting environmental samples that describe the condition of storm water flows. This data will be critical in benchmarking the present condition and identifying changes in water quality associated with the development of the Utah Inland Port project. This section provides a detailed summary of the approach the DWQ will use beginning in 2021.

Sampling Storm Waters

Composite storm water samples will be collected from April through October during qualifying storm induced runoff events through the use of portable samplers. Water chemistry samples will help determine the temporal and spatial conditions of these waters before, during and after project development.

Table 4 shows the chemical analytes that will be collected at these sites, allowable hold times of when samples must be analyzed, and the estimated budget for analysis costs. Table 5 shows the sampling equipment required to complete this monitoring effort and the estimated budget for acquiring this equipment. Sampling procedures, analytical methods, and quality assurance requirements are found in the QAPP in Appendix D.

Table 4. Parameters to Be Measured, Hold Times, and Analysis Budget.

Description	Collection Method	Details	Parameters	Analytical Hold Times	Cost per sample*	Total Cost**
General Chemistry	Portable Sampler Composite Sample	One 500 mL plastic bottle unpreserved	Total suspended solids Volatile suspended solids Total dissolved solids	7 days 7 days 7 days	$15 $20 $15	$2,160 $2,880 $2,160
Total Nutrients	Portable Sampler Composite Sample	One 500 mL plastic bottle with H_2SO_4 preservative to pH <2	Ammonia Nitrate/Nitrite Total Phosphorus Total Nitrogen	28 days 28 days 28 days 28 days	$38 $13 $40 $53	$5,472 $1,872 $5,760 $7,632
Total Metals	Portable Sampler Composite Sample	One 250 mL plastic bottle with HNO_3 preservative to pH <2	Zinc Lead Cadmium Arsenic Copper Selenium Mercury	6 months 6 months 6 months 6 months 6 months 6 months 28 days	$108 for all	$15,552
	Grand Total of Estimated Cost for Analysis					$43,488
	* Costs are provided for estimating purposes only and do not necessarily reflect current rates at private analytical laboratories.					
	** Total sample analysis estimate assumes 2 composite portable sampler storm water sample collected each month (April, May, September, and October) at all 6 monitoring locations for three years for a total of 144 samples analyzed.					

Table 5. Portable Sampler Equipment Budget Table.

Description	Quantity	Unit Price	Total Cost
Portable Sampler Includes controller, top cover, center section, base, distributor arm, instruction manual, and pocket guide.	6	$2,974.09	$ 17,844.54
Signature® Area Velocity flow meter system includes base meter, TIENet 350 area velocity sensor with 10m cable, manual, and pocket guide.	6	$3759.00	$22,554.00
CDMA LTE cellular modem with magnetic mount antenna for Signature® meter.	6	$883.87	$5,303.22
Sample bottles 24-bottle Configuration for 3700 Full Size Portable Sampler. Includes 24 polypropylene 1-liter bottles with caps, bottle retaining ring, and two pump tubes.	6	$202.27	$ 1,213.62
Solar Panel Assembly and 12V Regulator Controller Includes PLM50P -50-Watt Solar Panel with 20' lead and PM50U Pole Mount Bracket	6	$345	$ 2,070.00
Miscellaneous cables, tubing, strainers, and couplers	6	$248.90	$ 1,493.40
Sampler Housing	6	$1,636.25	$ 9,817.50
Grand Total			$ 60,296.28

Project Team and Responsibilities

As defined by DEQ's Quality Management Plan (QMP), any monitoring activity conducted or overseen by DWQ must have a Designated Project Manager (DPM), a staff member who is responsible for a specific project and has immediate managerial or technical control of the project. The DPM is responsible for specifying the quality of the data required for each project and initiating corrective actions when quality control is not being met. The DPM may also be a program manager. The DPM is responsible for designing monitoring strategies, setting project-specific data quality objectives (DQOs), and developing project-specific SAPs. DPMs are responsible for making sure all personnel involved with the project are briefed and/or trained on the procedures to be used.

Any monitoring activity conducted or overseen by DWQ must also have a Field Project Manager (FPM). The FPM will be responsible for checking the field note forms, data collection sheets, field lab sheets/Chain of Custody (COCs) forms for completeness. These sheets will be checked for completeness within 72 hours (or within a week of sample collection). Field notes will be filled out in the field for all sites whether samples were taken. Any information missing from field forms will be verified by the field crew. A list of missing samples or data will be provided to the DPM for data tracking purposes. After the data sheets are reviewed for completeness, all data will be scanned and entered into electronic worksheet files for storage in the "U:\INFODATA\Sampling\Project Sampling\STORMWATER_PORTABLE_SAMPLERS\UIP_LAB_rawdata" folder on the network drive which is backed up daily. When entered into an electronic worksheet, the person who enters the data will double check the information for errors and save the files, so they can be reviewed by the FPM and/or QA Project Manager for quality.

Implementation of the SAP will require an interdisciplinary effort. The team that will implement the SAP consists of various members from UDWQ. Table 6 lists and identifies the key project personnel and their responsibilities. The overall efforts will be coordinated closely with other ongoing research groups and stakeholders.

Table 6. Project Team Members and Contact Information.

Title	Name	Affiliation	Key Tasks or Responsibilities	Contact Information	
				E-mail	Phone
Designated Project Manager	Carl Adams	DWQ	Oversees direction of project, data analysis, reporting	carladams@utah.gov	w: 385-382-6685
Field Project Manager	Alex Anderson	DWQ	Directs day-to-day work of project, performs field data collection	aranderson@utah.gov	435 760 4286
Quality Assurance (QA) Project Manager	Toby Hooker	DWQ	Oversees QA for Division, responds to QA issues, supervises monitoring team	tobyhooker@utah.gov	w: 801-536-4289

Field Activities

Field operations will be overseen by Alex Anderson, an experienced member of the DWQ Monitoring Section.

Field/Lab Sheets and Chain Of Custody Forms

Preprinted lab sheets, Chain of Custody forms, and the Portable Sampler Field Form (Appendix A, Appendix B and Appendix C respectively) will be used on the monitoring run. Hard copies of field notes are kept in a binder at UDWQ.

All field and lab data and paperwork will include a unique Trip ID: UIP (YYMMDD) or UIP 210314, which reflects a sample trip that began on March 14th, 2021. Composite samples retrieved from the portable samplers will be designated as Sample Type “COMP”. The Project Code for this study will be 303.

Field Sampling Methods

This section summarizes the methodology for environmental sample collection at the sites and incorporates the DQOs outlined in previous sections, the safety precautions, and workflow.

Field protocols

This section provides a brief overview of the field sampling activities to be performed at each site. Specific instructions, including required equipment and procedures, are located in the SOPs.

SOP For Portable Samplers

https://documents.deq.utah.gov/water-quality/monitoring-reporting/sop/DWQ-2020-008444.pdf

SOP For Chain of Custody Samples

https://documents.deq.utah.gov/water-quality/monitoring-reporting/sop/DWQ-2019-001920.pdf

Health and Safety

Safety must be a primary concern at all times and in all sampling situations for field sampling personnel. In any marginal or questionable situation, monitoring personnel (monitors) are required to assume worst case conditions and use safety precautions and equipment appropriate to that situation. Monitors who encounter conditions which in their best professional judgment may exceed the protection of their safety equipment or may in any way represent a potential hazard to human health and safety, should immediately leave the area and contact their supervisor.

There must be a minimum of two sampling personnel present in the field. To avoid direct contact with contaminated water, latex or rubber gloves will be worn when sampling surface water. Monitors will wash hands and arms thoroughly with bacterial soap after sampling or before eating and drinking. Monitors should be familiar with basic first aid and cardiopulmonary resuscitation (CPR).

Monitors are strongly encouraged to carry a cell phone. Monitors will inform a supervisor when they leave for the field and their estimated time of return. The supervisor will initiate an emergency action plan if the samplers have not returned to the office within the allocated time. To avoid unnecessary worry and concern, samplers will call the office if they are behind schedule.

Safety Precautions and Plan

Field personnel will take appropriate precautions when operating watercraft and working on, in, or around water; possibly steep or unconsolidated banks; or edges of ponds. All field crews will follow appropriate safety procedures and be equipped with safety equipment such as proper wading gear, gloves, first aid kits, cellular phone, etc. All boats should be equipped with safety equipment such as personal floatation devices, oars, air horn, etc. Utah's Boating Laws and Rules shall be followed by all field personnel.

Field personnel will be aware that hazardous conditions potentially exist at every water body. If unfavorable conditions are present at the time of sampling, it is recommended for staff to reschedule the sample visit. If hazardous weather conditions arise during sampling, such as lightning or high winds, personnel should cease sampling and move to a safe location.

Most often, sample bottles are prepared by the State Lab and already contain preservative. During packing and handling of bottles, the field personnel must be careful and should confirm that caps are tightly sealed in order to avoid contact with preservative (acid). If minor skin contact occurs, field personnel should rinse with copious amounts of water. If major skin or internal contact occurs, affected personnel should seek medical attention.

Monitors should take care to reduce the possibility to contracting diseases carried by insect vectors such as West Nile virus (mosquitoes) and tularemia (horse flies). Other factors to consider are dehydration, weather exposure, stings, and potential site access issues such as barbed-wire fences, broken glass, steep slopes, and mud.

Equipment

Equipment Testing, Inspection, and Maintenance

DWQ field monitors will inspect all sampling equipment before every sampling event. Equipment maintenance will be scheduled and completed based on these inspections and review of the collected data. The QA Project Manager will regularly review all calibration and maintenance records, so the minimum required maintenance occurs. Detailed procedures for the maintenance of equipment are provided in the corresponding SOPs.

The designated laboratories for this project will be responsible for and expected to follow their standard procedures for preventative/unscheduled maintenance, calibration, and correction action for all laboratory instruments. DWQ is not responsible for the maintenance of the designated laboratories' equipment.

The frequency of collection and analysis of quality control checks, including field duplicates and equipment blanks is outlined in Table 7 below.

Table 7. Sample Quality Control.

Parameter	QC Check	Frequency	Acceptable Range	Correction Actions
Field Duplicates	Repeatability of sample collection and analysis, and measure of sample heterogeneity	1/10 sites	Relative percent difference of ± 20%	Notify staff if missing; audit and train; decide to allow or reject data
Equipment Blank	Cross contamination between samples	1/ 10 sites or at end of sampling day	Non-detect	Notify staff, repeat procedure, find contamination source, decide to accept or reject data

Laboratories and Sample Handling Procedures

Laboratories

Water chemistry samples will be analyzed by the Chemical and Environmental Services Bureau of the State of Utah's Public Health Laboratories (hereafter referred to as the State Lab). The State Lab maintains an in-house QAPP, available from the QAO (Toby Hooker).

Table 8 summarizes the laboratory, the analyses conducted, and point of contact for this study.

Table 8. Analysis and Laboratory.

Analysis	Laboratory	Contact	Phone
Water Chemistry , Nutrients and Metals	UPHL	David Dick	801-965-2405

Sample Handling

It is the responsibility of the field crew to coordinate with laboratory staff to obtain their own sample bottles at least one week in advance. Samples should not be shipped or delivered to the labs unless they have been informed two days in advance. Water chemistry samples will be stored in coolers in the field or in refrigerators at the TSC when not in the field. After sample collection and compilation, it is the responsibility of the field crew to turn in samples to the laboratory for analysis.

Sample bottles used in this study need to be handled with care in order to protect the integrity of the sample. All bottles and paperwork shall be reviewed for discrepancies and corrected before leaving samples in the laboratory's custody.

UDWQ's laboratory coordinator, Toby Hooker, works directly with UPHL Sample Receiving and analytical staff regarding water samples and sample data submitted by DWQ. Ryan Parker is the database manager and will coordinate data management practices and storage. All data results from the laboratory will be reviewed and stored by the database manager. This includes chemistry data master logs, electronic lab sheets (from submitted samples), and analysis reports. Data from water samples take approximately 4-6 weeks from submittal to reporting.

Data Management

Data Review and Validation

UDWQ's Designated and/or Field Project Manager will be responsible for receiving the lab and field data sheets, checking for omissions in identification, decimal placement, dates, times, units reported, and comments. Water quality technical staff collecting data will be contacted immediately if there are data gaps or if scheduled sampling times were missed.

It is the water quality technical staff's responsibility to evaluate raw data generated by the contract laboratories for appropriate data summary, data quality, and accuracy. All data will be reviewed and reported in units specified at the detection level of the analysis methods used. To reduce data point loss, data that is reported as "less than" detection level will be considered in subsequent analyses by the Designated Project Manager at a value of 1/2 the detection level. Once data is generated, it will be compiled in a database file. During this data transfer, the information will be reviewed and verified in accordance with data quality objectives.

Data generated in the laboratory will be validated by performance checks such as duplicates and blanks. Data will be reported in the units that have been designated to each parameter in the Analytical Methods, Holding Times, Parameters, and Sample Collection Methods section tables. Scientific notation will be used, and significant figures will correlate with detection levels.

Data Management and Analysis

UDWQ staff proficient in water quality monitoring will organize and all lab reports and field data. DWQ Project Manager will be responsible for analyzing the data and prepare as necessary, annual reports. The findings of the annual report will be utilized to determine if the goals and objectives of the monitoring program are being met and what, if any, modifications to the sampling analysis plan are necessary.

Quality Control

QA/QC samples will be collected as part of UDWQ's monitoring run. It will consist of an Equipment Blank, Trip Blank and a replicate sample. A Trip Blank will only be collected when a VOC and/or an SVOC sample is collected at the beginning of the run by filling deionized water in the appropriate bottles.

The equipment blank for the portable samplers will be collected once per sample retrieval trip in the field to ensure no contamination from the equipment between samples. The equipment blank will have an assigned MLID 4991307 EQUIPMENT BLANK-Inland Port Stormwater Monitoring and will be treated identically to the samples collected in the field.

References

1. DWQ. 2014. A Great Salt Lake Water Quality Strategy. State of Utah, Department of Environmental Quality, Division of Water Quality (https://documents.deq.utah.gov/water-quality/standards-technical-services/gsl-website-docs/gsl-wq-strategy/DWQ-2019-000535.pdf)

2. EPA. 2006a. *Guidance on Systematic Planning Using the Data Quality Objectives Process.* EPA QA/G-4, EPA/240/B-06/001, U.S. Environmental Protection Agency, Office of Environmental Information, Washington DC.

Appendices

Appendix A: ***Lab Sheet***

Utah Division of Water Quality

Monitoring Run
Trip ID
Collector

Sequence Number
Agency
Project Code

Sampler Contact Information (name and phone number):

Monitoring Location ID: 1234571 Time:

Description: Date:

MM - DD - YY

Field Specific Conductance (µS/cm): . Sample Type

TEST REQUESTS:

Chlorophyll-a Temp: pH: Comments:

Site Notes

FIELD COMMENTS: Weather Conditions:
Field Conditions:

Sheen present?: ☐ Y ☐ N Trash near sampling site? ☐ Y ☐ N Algal mat at site? ☐ Y ☐ N

Wildlife/Livestock near sampling site? ☐ Y ☐ N Recent rain or other precip. in the past 48 hours? ☐ Y ☐ N

Anthropogenic disturbances present at site that may affect sample results? ☐ Y ☐ N
(i.e. construction; car-bodies on stream bank; swimming, etc.)
If yes to any above, explain here:

Were all lab samples collected at this site as indicated on lab sheet? ☐ Y ☐ N
If no, explain which samples were not collected and why:

Were all sonde parameters collected at site? ☐ Y ☐ N
If no, which ones were NOT collected and why:

Were any photos taken at site this visit? ☐ Y ☐ N

Appendix B: ***Chain of Custody Forms***

UTAH DEPARTMENT OF HEALTH

Utah Public Health
Chemical and Environmental Laboratory

4431 S 2700 W Taylorsville, UT 84129-8600

801 965 2400 Fax 801 969 3238

http://health.utah.gov/lab/chemistry

CHAIN OF CUSTODY

Test Requests

☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5

☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5

☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5

☐ **RUSH SAMPLES**

AUTHORIZED BY

○ State Drinking Water Compliance Samples
○ Private Investigative Samples

Date and Time Stamp

Please fill out this form using block letters and with a black or blue pen.
Do not attach this form to the sample.

System/Agency Name | Customer Number | Public Water System U T A H | Cost/Project Code

Sample Matrix
○ Drinking Water
○ Other Water
○ Soil/Sludge

First Name **REPORTING/CONTACT** | Last Name | Email

Address | City | State | Zip

Phone | Fax | Submitted By

☐ New Information Update Account

First Name **BILLING** ☐ **SAME AS REPORTING** | Last Name

Address | City | State | Zip

Phone | Fax | Submitted By

Sample Receipt Conditions

Documentation complete
○ Yes ○ No

Proper containers and in-date
○ Yes ○ No

Containers intact
○ Yes ○ No

Within holding time
○ Yes ○ No

Coolant
○ Yes ○ No

Temperature within-range
○ Yes ○ No ○ N/A

Acceptable pH
○ Yes ○ No ○ N/A

Acceptable mrem
○ Yes ○ No ○ N/A

○ Hand Delivered
○ Shipped Samples

#1 Site Description | Collector's Initials | Bottle | Qty | Temperature | pH

Site Description - Continued | Collection Date 2 0 | Collection Time

LAB NUMBER

#2 Site Description | Collector's Initials | Bottle | Qty | Temperature | pH

Site Description - Continued | Collection Date 2 0 | Collection Time

LAB NUMBER

#3 Site Description | Collector's Initials | Bottle | Qty | Temperature | pH

Site Description - Continued | Collection Date 2 0 | Collection Time

LAB NUMBER

#4 Site Description | Collector's Initials | Bottle | Qty | Temperature | pH

Site Description - Continued | Collection Date 2 0 | Collection Time

LAB NUMBER

#5 Site Description | Collector's Initials | Bottle | Qty | Temperature | pH

Site Description - Continued | Collection Date 2 0 | Collection Time

M M D D Y Y 24 Hour Clock

LAB NUMBER

Dispatched By:	Date	Time	Courier Company Name:	Invoice/Air bill #:			
Relinquished By:	Date	Time	Received by:	Date	Time		
Relinquished to USL:PH By:	Date	Time	Received at USL:PH by:	Date	Time		

Appendix C: ***Portable Sampler Field Form***

Utah DWQ, April 2020

Utah DWQ Portable Sampler
Installation, Inspection and Maintenance Form

Site Name:____ STORET:____
Latitude:____ Longitude:____
Site Description:____
Portable Sampler Make/Model/Serial Number:____
Portable Sampler Calibration Date:______________________ Installation/Deployment Date:___________________________
Installation Personnel:____
Notes from Installation:____

Date	Monitor Initials	Visual Inspection Performed (Y or N)	Visual Inspection Okay (Y or N)	Data Retrieval Performed (Y or N)	Battery Life Remaining	Memory Remaining	Maintenance Performed (Y or N)	Flow Measurement Performed (Y or N)	Equipment Condition, Comments, Describe Maintenance

U:\WQ\PERMITS\MONITORS\Portable Samplers\Portable Sampler Field Form.doc

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Appendix D: ***Quality Assurance Project Plan***

https://documents.deq.utah.gov/water-quality/monitoring-reporting/sop/DWQ-2019-001869.pdf

Appendix E: *Revisions*

9/21/2020 Updated Table 3 by removing monitoring location 4991430, Lee Creek at I-80 Crossing and added MLID 4991426, Lee Creek 0.6 mi north of frontage road and 1.23 mi west of I-80 xing (Downstream of UIP). New site captures runoff from frontage road and is now behind a locked gate and safter location with DWQ access per agreement with Rio Tinto.

1/27/2021 Updated Table 1 by extending for one year as deployment of portable samplers was not completed until fall of 2020 due to logistical challenges.

Changed qualifying storm event frequency from at least 72 hours to 4 weeks from the previously measurable storm event (p. 7) to minimize the influence of previous storm events on sample results.

Updated Table 3 by removing monitoring locations 4991650 (Kersey Creek AB Magna WWTP), 4991297 (West Branch Brighton Canal at T1N, R2W, Sec. 28 NE corner), 4991305 (West Branch Brighton Canal at North Temple Frontage Rd xing), and 4991295 (North Point Consolidated Canal below confluence with West Branch Brighton Canal (Upstream of UIP)) and replaced with 4991340 (Goggin Drain at USGS Gauging Sta No 10172630), 4991299 (Storm Drain Channel at 7200 W and 1300 N), 4991302 (Storm Drain Channel at 6500 W 1100 N), and 4991303 (Storm Drain Channel at 6000 W 600 N). The replacement of upstream sites with downstream sites will more effectively capture both localized (storm drain channels) and area-wide (Lee Cr, North Point Canal, and Googin Drain) water quality trends and more effectively utilize resources.

4/15/2021 *Sampling Design* section, including Table 3 updated with descriptions of monitoring sites including contributing area within the UIP, and land uses. Table 4 updated with allowable hold times of when samples must be analyzed per parameter.

6/8/2021 *Sampling Design* section, including Table 3 updated with descriptions of three new monitoring sites (4991297, 4991305, and 4991313) including contributing area and land uses. These three sites replace monitoring sites on Lee Creek, North Point Consolidated Canal, and Goggin Drain which were not as representative of storm water quality.

Removed grab sampling and related field analysis protocols from study. With exclusive use of storm drain channels for monitoring purposes, grab samples and attendant field measurements are not representative of critical first flush storm water conditions and do not effectively further study goals and objectives.
Increased sampling frequency from once every 4 weeks to once every 2 weeks to better capture the episodic and variable nature of precipitation events. Extended sampling season across all months (April-October) when non=freezing precipitation occurs.