NPDES Phase I Stormwater Outfall Monitoring Plan

Ada County Highway District
Boise, Idaho
8/11/2022

Stormwater Outfall Monitoring Plan

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List of Abbreviations

ACHD	Ada County Highway District
ac	acres
AV	Area Velocity
BC	Brown and Caldwell
BOD5	Biological Oxygen Demand – 5 day
CaCO3	Calcium Carbonate
CFR	Code of Federal Regulations
COC	Chain of Custody
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
DQI	Data Quality Indicator
DQO	Data Quality Objective
EPA	Environmental Protection Agency
ft	feet
GI	Green Infrastructure
GSI	Green Stormwater Infrastructure
HDPE	High Density Polyethylene
IDEQ	Idaho Department of Environmental Quality
IPDES	Idaho Pollutant Discharge Elimination System
in	inches
LDPE	Low Density Polyethylene
L	liter
MDL	Method Detection Limit
mL	Milliliter
MS4	Municipal Separate Storm Sewer System
NH3	Ammonia
NO2	Nitrite
NO3	Nitrate
NPDES	National Pollutant Discharge Elimination System
NWS	National Weather Service
PMEP	Project Monitoring and Evaluation Plan
PRDL	Project Required Detection Limit
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Program Plan
RPD	Relative Percent Difference
SWOMP	Stormwater Outfall Monitoring Plan
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TSS	Total Suspended Solids

WQL	Boise City Public Works Water Quality Laboratory

Executive Summary

The Environmental Protection Agency, Region 10 (EPA) issued the third cycle National Pollutant Discharge Elimination System (NPDES) Municipal Storm Separate Sewer System (MS4) Phase I Permit No. IDS-027561 (Permit) effective October 1, 2021, to Ada County Highway District (ACHD), Boise State University, City of Boise, City of Garden City, Drainage District #3, and the Idaho Transportation Department District #3, referred to as the “Permittees.” Starting July 1, 2021, the Idaho Department of Environmental Quality (IDEQ) acquired Permit authority through the Idaho Pollutant Discharge Elimination System (IPDES) Program. The Permit authorizes stormwater discharges from MS4 outfalls to waters of the United States in accordance with the conditions and requirements of the Permit. Under this permit, the Permittees are required to update the existing Stormwater Outfall Monitoring Plan to be consistent with the stormwater monitoring and evaluation program objectives as described in Permit Part 6.2.

This Stormwater Outfall Monitoring Plan (SWOMP) has been developed in line with the Quality Assurance Project Plan for NPDES Stormwater Permit Monitoring (QAPP) (ACHD, 2021). The SWOMP describes the overall approach to stormwater outfall monitoring and provides site and drainage area descriptive details for each monitoring station. The SWOMP also provides guidance for data collection efforts, including descriptions of meteorological and hydrological data collection procedures and use, as well as analytical data collection and sample handling procedures.

Certain Quality Assurance/Quality Control (QA/QC) procedures that have been identified using United States Environmental Protection Agency (EPA) guidance for QAPPs are also included in this plan. The QA/QC procedures are designed to ensure data collected meet specific data quality objectives developed specifically for Permit-required monitoring activities. This plan documents QC sampling procedures, storm event acceptance criteria, and data management details specific to the SWOMP.

Section 1

Introduction

1.1 Basis for Monitoring Plan

The Permit requires that the SWOMP be consistent with the stormwater monitoring and evaluation program objectives as described in Permit Part 6.2 and are the following:

- Broadly estimate reductions in annual pollutant loads of sediment, bacteria, phosphorus and temperature discharged to impaired receiving waters from the MS4s, occurring as a result of the implementation of SWMP activities;
- Characterize the quality of stormwater discharges from the MS4; and
- Identify and prioritize those portions of the MS4 where additional controls can be accomplished to reduce the volume of stormwater discharged and/or reduce pollutants in MS4 discharges to waters of the U.S.

1.2 SWOMP Objectives

The SWOMP is designed to address the minimum permit requirements for wet weather stormwater outfall monitoring as listed in Permit Part 6.2.1. The SWOMP serves as guidance for data acquisition, management, and reporting efforts undertaken by the Permittees.

This document outlines the SWOMP approach and includes specific QAPP elements recommended by the EPA. EPA-recommended QAPP elements are addressed as either program elements or monitoring plan elements.

Monitoring plan elements are described in full in this document, while program elements are addressed in the QAPP. Monitoring plan elements are those components that contain details specific to each individual monitoring plan. Program elements consist of the standardized monitoring components that all individual monitoring plans developed under the Permit reference. A list of program and monitoring plan elements is included in Table 1-1.

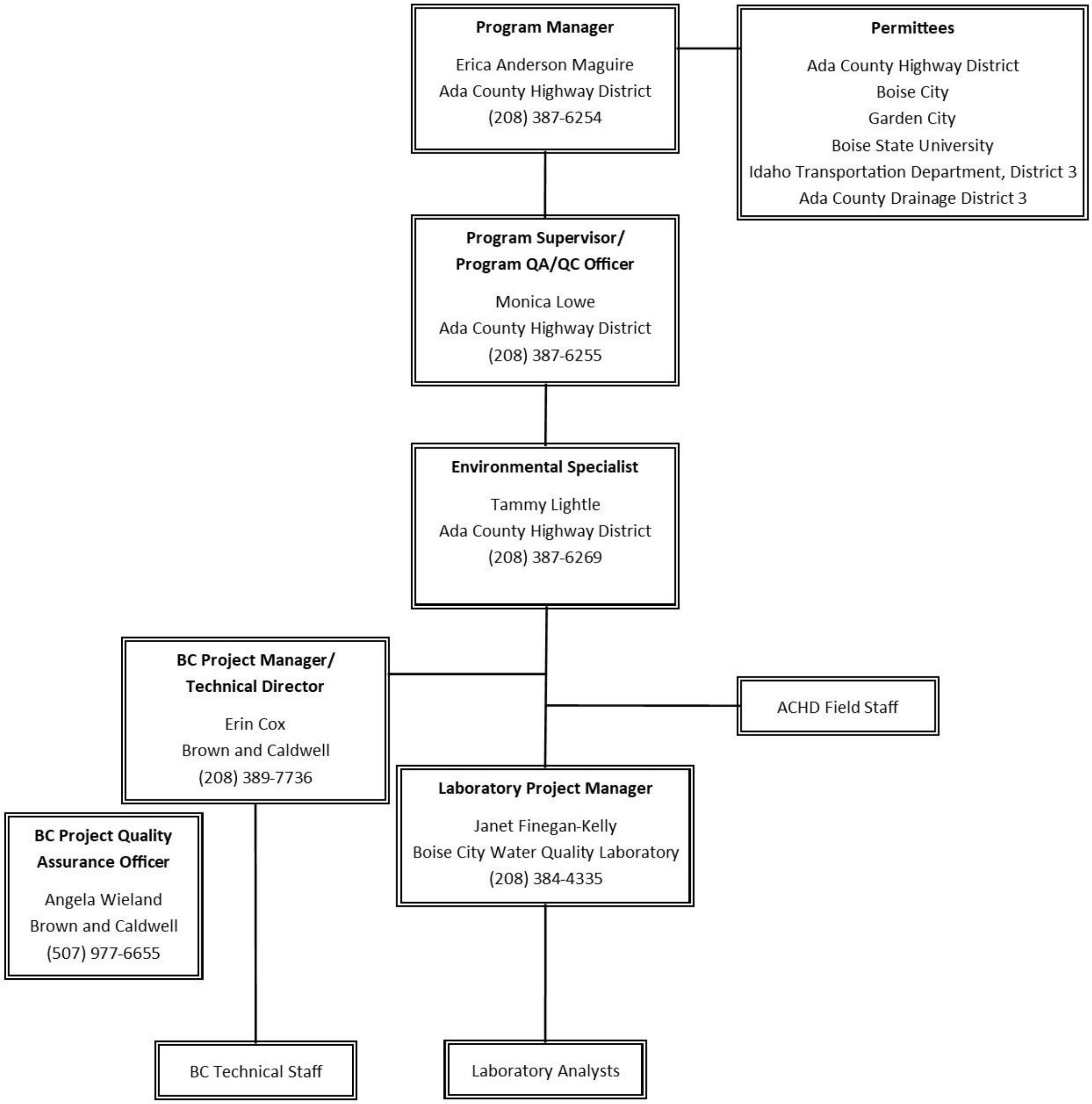
Table 1-1. QAPP Element Document Reference

EPA Recommended QAPP Elements	QAPP Element	SWOMP Element; Section
Group A: Project Management		
A1 – Title and Approval Sheet	X	
A2 – Table of Contents	X	
A3 – Distribution List	X	
A4a – Project Organization	X	
A4b – Task Organization		X; 1.3
A5 – Problem Definition/Background	X	
A6 – Project/Task Description		X; 1.2
A7a – Quality Objectives and Criteria for Measurement Data	X	

Table 1-1. QAPP Element Document Reference		
EPA Recommended QAPP Elements	QAPP Element	SWOMP Element; Section
A7b – Method Dependent Criteria for Measurement Data		X; 5.2
A8 – Special Training Needs/Certification	X	
A9 – Documents and Records	X	
Group B: Data Generation and Acquisition		
B1 – Sampling Process and Design		X; 2
B2 – Sampling Methods		X; 3, 4
B3 – Sample Handling and Custody		X; 4.6, 4.7
B4 – Analytical Methods		X; 4.2
B5a – Quality Control	X	
B5b – QA/QC Sampling Schedule		X; 5.1
B6 – Instrument/Equipment Testing, Inspection, and Maintenance		X; 3
B7 – Instrument/Equipment Calibration and Frequency		X; 3
B8 – Inspection/Acceptance of Supplies and Consumables	X	
B9 – Non-direct Measurements	X	
B10 – Data Management	X	
Group C: Assessment and Oversight		
C1 – Assessments and Response Actions	X	
C2 – Reports to Management	X	
Group D: Data Validation and Usability		
D1 – Data Review, Verification, and Validation	X	
D2 – Verification and Validation Methods	X	
D3 – Reconciliation and User Requirements	X	

1.3 Task Organization

ACHD is the lead agency for stormwater outfall monitoring under the Permit, and a consultant team assists with the monitoring program. Key roles and job functions are described in the QAPP. The stormwater outfall monitoring program organization chart is presented in Figure 1-1.



*Staff list subject to change. If changes occur, contact current staff member in corresponding role.

Figure 1-1. Stormwater Outfall Monitoring Organization Chart

Section 2

Sampling Process Design

The sampling process design consists of the collection of data at monitoring stations set up on representative drainages throughout the MS4 to present a picture of the impact of pollutant prevention efforts and the potential for pollutant loading reduction in the permit area. Data to be collected includes a combination of site-specific continuous rainfall data, continuous flow data from background sources, and stormwater discharges and water quality data. Section 2.1 provides an overview of the methods used to obtain this data and more detail is provided in sections 3 and 4. Drainage area characteristics integral to the sampling process design include land use, impervious ground cover percentage, canopy cover, vegetated area, stormwater controls, and stormwater infrastructure.

The process the permittees used for selecting monitoring sites is outlined below in Section 2.2. Detailed site description information is included in Section 2.3.

2.1 Data Collection Overview

Data collection at each monitoring station will be facilitated by a combination of automated sampling and measurement equipment and manual sampling, observation, and characterization activities. Automated sampling equipment includes a flowmeter with an area velocity (AV) sensor installed in the storm drain pipe. The flowmeter will record stormwater discharge, instantaneous and cumulative flow volumes, as well as background flows as applicable. Flow will be monitored continuously at sites that have consistent background flows.

The flowmeter is connected via a data cable to the automatic sampler. The automatic sampler and flowmeter are programmed to collect site specific, flow-weighted composite samples. Throughout a sampling event, the flowmeter triggers the sampler to initiate pumping at a pre-programmed volume interval to collect a representative composite sample of the stormwater discharge.

Each monitoring station is associated with a rain gauge to collect precipitation data to use in conjunction with sampling and flow data for analysis and quality assurance. Additionally, forecasts, weather, and hourly precipitation data for the weather station located at the Boise Airport are available from the National Weather Service (NWS) website.

Water quality data collection will be accomplished through a variety of sampling and analysis methods. Discrete grab samples will be collected for laboratory analysis and analysis of field parameters. Composite samples will be split at the laboratory for analysis. Discharges from three separate storm events will be sampled during each water year.

Monitoring equipment operation and maintenance descriptions are included in Section 3. Specific descriptions of sampling procedures are described in Section 4.

2.2 Site Selection

The Permit requirement for wet weather stormwater outfall monitoring is to continue the monitoring program that was implemented under the 2012 NPDES Phase I Permit. As such, four monitoring stations (Lucky, Whitewater, Main, Americana) will continue to be the sampling locations for this SWOMP. For more information on how these stations were selected, refer to the *Storm Water Outfall Monitoring Plan* (ACHD, 2014a).

A vicinity map (Figure 1) showing each monitored drainage area within the Phase I Permit area is included in the Figures section at the end of the document. Site maps showing land uses and associated impervious area percentages by land use are also included in the Figures section.

2.3 Site Descriptions

Table 2-1 provides a summary overview of the monitoring station locations and associated subwatersheds. A summary of each monitoring site and a description of the monitoring equipment is included in the sections to follow. Subwatershed area, monitoring station maps, and pictures are included in the Figures section at the end of the document.

Table 2-1. Monitoring Station Information

	Lucky (Site ID: 3)	Whitewater (Site ID: 11)	Main (Site ID: 12)	Americana (Site ID: 14)
Outfall ID	4n2e19_021	3n2e04_016	3n2e04_010	3n2e09_024
Location	5590 West Lucky Drive (northwest Boise)	East side of Whitewater Park Boulevard (west of downtown Boise)	303 West Main Street (west of downtown Boise)	1661 Shoreline Avenue (downtown Boise)
Station GPS Coordinates	43.6634612,-116.2583125	43.631432, -116.230644	43.621493, -116.228274	43.616150, -116.221257
Subwatershed Area	105 ac.	498 ac.	79 ac.	875 ac.
Percent Impervious Groundcover[1,2]	40	43	55	39
Land Uses (percentage)[1,3]	Right of Way (22%) Residential Med (78%)	Right of Way (36%) Commercial (4%) Residential Med (50%) Residential High (7%) Public and Schools (3%)	Right of Way (43%) Commercial (37%) Residential Med (14%) Residential High (5%) Public (1%)	Right of Way (30%) Commercial (13%) Residential (Hi/Med/Low) (39%) Parks and Open Space (14%) Public and Schools (4%)
Receiving Water	Eagle Drain	Crane Creek	Boise River	Boise River
Assessment Unit	N/A	ID17050114SW012-02	ID17050114SW011a_06	ID17050114SW011a_06
Distance from Station to Outfall	350 ft	140 ft	500 ft	108 ft
Rain Gauge Location	Cynthia Mann	Whitewater (at monitoring station)	Front	Front and East
Rain Gauge GPS Coordinates	43.664185, -116.256289	43.631432, -116.230644	43.619429, -116.216409	43.619429, -116.216409 43.626046, -116.187601
Rain Gauge Distance from Station	620 ft	0 ft	3,200 ft	1,730 ft and 9,600 ft

Table 2-1. Monitoring Station Information				
	Lucky (Site ID: 3)	Whitewater (Site ID: 11)	Main (Site ID: 12)	Americana (Site ID: 14)
Pipe Construction	30 in, circular, corrugated metal pipe	38 in, ellipsoid, corrugated metal pipe	30 in, circular, concrete pipe	48 in, circular, concrete pipe
Power Source	40 Ahr battery	Commercial power	40 Ahr battery	40 Ahr battery
Parking	Park next to sidewalk at 5590 West Lucky Drive	Park in pullout south of enclosure	Park in lot southwest of enclosure	Park in space northwest of enclosure in parking lot
Equipment Location	Below ground in manhole in yard	In enclosure	In enclosure	In enclosure
Sampling Considerations	Swing sampler needed for grabs through manhole	Swing sampler needed for grabs through manhole	Swing sampler needed for grabs through manhole	Swing sampler needed for grabs through manhole
Data Considerations	Consistent standing water in manhole and pipe	Background flow usually present	Surcharges when Boise River stage is high	Background flow present year-round, Surcharges when Boise River stage is high
Watershed BMP Summary	Catch basins, sand and grease traps	Catch basins, sand and grease traps, ditches	Catch basins	Catch basins, sand and grease traps, seepage beds, bioretention planters, permeable pavers, stormwater tree cells

[1]Source: ACHD, 2014b.

[2]Impervious cover includes roads and streets, rooftops, and parking lots.

[3]Land uses as delineated are defined as follows (ACHD, 2014c):

- Right of Way – Land reserved for transportation purposes managed by the Ada County Highway District. Not part of a recorded parcel by the Ada County Assessors office.
- High Density Residential – 8 residential units/acre or above. Multifamily units such as duplex, condos, apartments.
- Medium Density Residential – 3 -7 residential units/acre. Typical single family residential on 0.15 to 0.49 acre lots.
- Low Density Residential – Less than 3 residential units/acre. Single family residential on lots 0.50 acres and larger.
- Commercial – Includes commercial retail and office space.
- Industrial – Includes manufacturing, warehousing, distribution other non-retail uses.
- Parks and Open Space – Includes public parks and open/undeveloped spaces.
- Public and Schools – Includes public buildings/facilities and schools including associated grounds.

2.3.1 Lucky

The Lucky monitoring station is located at 5590 West Lucky Drive in northwest Boise (Figure 2). Access to the sampling location is through a manhole located in the front yard near the sidewalk on West Lucky Drive (Figure 3). The manhole is located within a drainage and utility easement and is an access point for the stormwater conveyance system that carries stormwater from the Jordan's Landing Subdivision into Eagle Drain. The Lucky site is influenced by infiltration into the storm drain system from groundwater and the Boise City Canal in the nearby vicinity but does not have consistent background flow. Historically, there are around 2 inches of standing water in the pipe at the AV sensor. Surcharge conditions have not been a factor at the monitoring station.

The Lucky monitoring station is the only site that was previously monitored under both the 2000 NPDES Phase I Permit and the 2012 NPDES Phase I Permit.

Lucky Flow Measurement and Configuration

The AV sensor and sampler intake tubing are installed just downstream (northwest) of the manhole in the stormwater conveyance pipe. Grab samples are collected at the inlet to the stormwater conveyance pipe on the downstream side of the vault just before the sampler intake tubing. The flowmeter and sampler are installed in the manhole vault and sit on a platform suspended by cables that are secured to the inside collar of the vault.

2.3.2 Whitewater

The Whitewater monitoring station is located on the east side of Whitewater Park Boulevard (Figure 4). The sampling location is accessed through a manhole located in the sidewalk (Figure 5). Background flows are frequently present at the monitoring station and may consist of infiltration from Crane Creek, Boise City Canal, groundwater, and possibly other irrigation sources. The Whitewater subwatershed discharges into Crane Creek which begins in the foothills and flows to the northwest and intersects with the Farmer’s Union Canal about 2,100 feet downstream from the monitoring station. During winter a temporary dike, which directs flows into a side channel of the Boise River, is installed at the intersection of the creek and the canal. Throughout irrigation season (typically early April through late September) the dike is removed and water flows to both the Farmers Union Canal and the side channel of the Boise River.

Upstream of the monitoring station, irrigation water from the Boise City Canal can overflow into the storm drain system via headgates that can be opened when irrigation flows are high. The Boise City Canal was developed in 1866 and is managed and operated by the Boise City Canal Company.

Whitewater Flow Measurement and Configuration

The flowmeter and sampler are installed in a locked enclosure that is mounted to a concrete pad. The sampler intake tubing and AV sensor are connected to the equipment in the enclosure via a conduit that extends through the concrete pad to the inside top of the pipe. Grab samples are collected in the manhole.

This station has commercial power, and the flowmeter is continuously measuring level and velocity and calculating flow. To calculate flow from velocity and level measurements in an ellipsoid pipe, the pipe dimensions (length and width) are programmed into the flowmeter. The flowmeter also records measurements from the rain gauge installed adjacent to the enclosure.

2.3.3 Main

The Main monitoring station is located at 303 West Main Street, west of the intersection of Main Street and Whitewater Park Boulevard (Figure 6). The sampling location is accessed through a manhole located in the sidewalk on the south side of Main Street (Figure 7). Background flows have not been recorded at this monitoring station to date, however, the pipe does surcharge during seasonal high river flows.

Main Flow Measurement and Configuration

The sampler intake tubing and AV sensor are installed just upstream (northeast) of the manhole vault. The flowmeter and sampler are installed in an enclosure next to the manhole. Grab samples are collected in the storm drain manhole located in the sidewalk.

2.3.4 Americana

The Americana monitoring station is located at the landscaped area on the west side of Americana Boulevard near the southeast corner of the parking lot for the office building located at 1661 Shoreline Avenue (Figure 8). The monitoring station is located on land owned by Riverwalk Partners, LLC with a dedicated storm drain easement. A license agreement was executed prior to the construction of the monitoring station between ACHD and Riverwalk Partners, LLC. The sampling location is accessed through a manhole located just west of the sidewalk that runs along the west side of Americana Boulevard (Figure 9).

Americana Flow Measurement and Configuration

Background flow is typically present at the Americana monitoring station. Background flow sources include groundwater infiltration, irrigation runoff, overflow from Hulls Gulch, return water from geothermal heating, intermittent discharges from the Boise Ice Company, and other sources to be investigated as monitoring progresses. The flowmeter's AV sensor and sampler intake tubing are installed just upstream (north) of the manhole in the stormwater conveyance pipe. Grab samples are also collected from the manhole.

Section 3

Monitoring Equipment

3.1 Monitoring Equipment Operation and Calibration

3.1.1 Flowmeters

Each monitoring station is equipped with a flowmeter. Depending on site configurations, an ISCO Signature flowmeter or a Hach AV9000 flow module is used. The flowmeters are used to record temperature, level, velocity, and flow. The flowmeter utilizes an AV sensor that is mounted to the invert of the pipe by means of a mounting band. The AV sensor includes both a depth sensor and an acoustic Doppler velocity sensor. The flowmeter calculates flow using the measured depth and velocity along with pre-programmed pipe geometry. During storm events the flowmeters are programmed to send a signal to an automatic sampler after a specified volume of runoff has passed the AV sensor.

3.1.1.1 Calibration and Maintenance

Routine maintenance of flowmeters, including level calibration, will be performed semi-annually according to the procedures listed in Appendix A. More frequent maintenance or calibration will be performed as warranted by equipment performance.

Calibration of the level requires only offsetting the initial depth of water. Typically, no field calibration of the velocity sensor is required. Additional checks on the accuracy of the velocity meter can, however, be conducted using a manual current meter to measure velocity. Depth can be checked by simple measurement and comparison to the recorded value. Readings showing deviations can be corrected using the flowmeter interface while in the field.

3.1.2 Automatic Samplers

Composite sampling is carried out at each of the monitoring stations using either ISCO 6712 samplers or Hach AS950 samplers. Sample aliquots are pumped from the stormwater conveyance to a 15-litercarboy by a peristaltic pump. The discharge tubing of the pump is routed into the sample container which is secured in the insulated base of the sampler with ice to maintain target sample temperature.

For each sampling event, the automatic sampler is programmed to collect samples based upon flow-paced signals received from the flowmeter via a control cable. The sampler collects one sample for each signal from the flowmeter. Sample aliquot volumes are programmed and calibrated to produce a flow-weighted composite sample of the storm event discharge consisting of a targeted 24 subsamples. A record of the sampler's operations (e.g., execution data and sample times) is stored on the hard drive of both the sampler and the flowmeter and may be downloaded to a portable computer at any time.

3.1.2.1 Calibration and Maintenance

Routine maintenance of the automatic samplers, including cleaning and calibration, will be performed semi-annually, or more frequently as warranted by equipment performance, according to the procedures listed in Appendix A.

The sampler is calibrated by comparing the collected sample volume (measured using a graduated cylinder) with the required volume that was programmed into the sampler program. The sampler microprocessor will adjust the pump run time to either increase or decrease the sample volume. This process is repeated until the sampler delivers a volume that is within ±10 percent of the requested sample volume.

3.1.3 Rain Gauges

ACHD currently maintains four rain gauge sites representative of the monitored drainage areas. The rain gauges are deployed to collect continuous precipitation data throughout the water year. The program utilizes tipping-bucket style rain gauges that measure rainfall depths in 0.01-inch increments. Each tipping-bucket is connected to either Hobo event data loggers or an ISCO Signature flowmeter via a cable. At sites equipped with Hobo data loggers, a primary and a back-up data logger are used to record tip measurements.

A vicinity map (Figure 1) showing the location of each rain gauge is included in the Figures section at the end of the document. Figure 10 includes pictures of the rain gauges, which are located in the following areas:

- **Cynthia Mann Rain Gauge:** Cynthia Mann Elementary School in northwest Boise.
- **East Rain Gauge:** At the intersection of West Eastway Drive and Rainier Lane in a Boise foothills neighborhood.
- **Whitewater Rain Gauge:** At the Whitewater monitoring station on Whitewater Boulevard.
- **Front Rain Gauge:** At an ACHD maintenance storage area at the intersection of South 17th Street and Front Street.

The data collected on the rain gauge data loggers will be downloaded to a portable laptop computer on a bi-monthly basis. Additionally, sampling personnel will download rain gauge data during station shutdown following monitored storm events. The data will be compared to the NWS rainfall data to identify geographic variations, revise estimates of runoff coefficients, and analyze and evaluate the stormwater quality data.

In addition to using rainfall totals as acceptance criteria for storm event qualification, other program data derived from rainfall records include storm event antecedent dry periods, total rainfall distribution during sampling events, and rainfall intensity during monitored storm events.

3.1.3.1 Calibration and Maintenance

The rain gauges and data loggers will be inspected and maintained biannually. Troubleshooting and any non-routine maintenance will be performed as necessary. Calibration is not typically required for the tipping bucket rain gauges. If needed, calibration procedures are outlined in the rain gauge equipment manual. Inspection, maintenance, and downloading procedures are listed in Appendix A.

3.1.4 Handheld Field Parameter Instruments

During grab sample collection, specific parameters will be measured directly in the field using a variety of handheld instruments to collect readings including pH, conductivity, dissolved oxygen, and temperature. Each sampling team will have a dedicated set of instruments and will record measurements as soon after sample collection as feasible. Field parameter instruments will be rinsed with distilled water between measurements. After the sampling event has ended, these instruments will be allowed to air-dry and will be kept indoors between sampling events.

Handheld Field Parameter Instruments include the following:

- In-Situ Multiparameter meter
- Horiba D-21 pH/temperature meter and Horiba D-51 pH/temperature meter
- Oakton 300 pH/DO/temperature meter
- YSI-85 DO/salinity/conductivity/temperature meter

Safety Monitoring Instruments:

- Hazardous vapor monitors including BW GasAlert Max XT II and Sperian PhD6

3.1.4.1 Calibration and Maintenance

Maintenance will be conducted per manufacturers' recommendations and the procedures listed in Appendix A, or more frequently as warranted by equipment performance. Instruments will be inspected and calibrated prior to each monitoring event. All calibration records will be kept in the ACHD Stormwater Lab for reference.

Section 4

Sampling Procedures

4.1 Analytical Sample Collection Frequency

The stormwater monitoring, including the collection of stormwater discharge samples for laboratory analysis, is conducted at a minimum frequency of three wet weather events per year at each of the four sites. Attempts will be made to separate sampling events by a minimum of 30 days to represent seasonal variability.

4.2 Stormwater Parameter Analysis

The analytical methods planned for use in stormwater outfall monitoring are presented in Table 4-1 below. The NPDES Permit requires that sample collection, preservation, and analysis be conducted according to sufficiently sensitive methods/test procedures approved under 40 Code of Federal Regulations (CFR) Part 136, 40 CFR subchapters N or O, or an alternative method that has been approved by EPA. As such, the methods identified below are the selected and preferred options. However, sample, laboratory, or instrument conditions may require the substitution of an alternate Part 136 method. Field parameter measurements provide pH, temperature, conductivity, and dissolved oxygen (DO) data. Additional water quality data is provided by laboratory analyses of both grab and composite samples. Table 4-1 identifies the components to be collected by grab sampling and as flow-weighted composite samples, along with the analytical methods to be used.

Table 4-1. Analytical Methods for Stormwater Constituents in Wet Weather Samples

Constituent	Analytical Method	Sample Collection Type
Ammonia (NH_3)	SM 4500-NH3 D	C
5-Day Biological Oxygen Demand (BOD5)	SM 5210 B	C
Chemical Oxygen Demand (COD)	HH 8000	C
Nitrite plus Nitrate (NO_2+NO_3)	EPA 353.2	C
Total Kjeldahl Nitrogen (TKN)	EPA 351.2, 10-107-06-2-M	C
Total Dissolved Solids (TDS)	SM 2540 C	C
Total Suspended Solids (TSS)	SM 2540 D	C
Turbidity	EPA 180.1	C
Dissolved Orthophosphate	EPA 365.1	C
Total Phosphorus	EPA 200.7	C
E. coli	IDEXX Colilert	G
Mercury – Total	EPA 245.2	C
Arsenic – Total	EPA 200.8	C
Cadmium – Total and Dissolved	EPA 200.8	C
Calcium – Total	EPA 200.7	C
Lead – Total and Dissolved	EPA 200.8	C
Magnesium – Total	EPA 200.7	C

Table 4-1. Analytical Methods for Stormwater Constituents in Wet Weather Samples		
Constituent	Analytical Method	Sample Collection Type
Hardness (as Calcium Carbonate [$CaCO_3$])	EPA 200.7	C
Copper – Dissolved	EPA 200.8	C
Zinc – Dissolved	EPA 200.8	C
Conductivity	EPA 120.1	G,f
DO	In-Situ Method 1002-8-2009	G,f
Temperature	EPA 170.1	G,f*
pH	EPA 150.2	G,f
Flow/Discharge Volume	Non Specific	f

C – Constituent analysis will be conducted using a composite sample.

G – Constituent analysis will be conducted using a grab sample.

f – Analysis will be conducted in the field.

f - Temperature is recorded during field parameter measurement and is recorded continuously by the AV sensor.*

4.3 Weather Forecast and Storm Selection

The Environmental Specialist (or designee) will obtain up-to-date information on a storm's anticipated physical characteristics from the NWS. Information obtained for each forecast will include the probability of precipitation, the expected amount of precipitation, and the expected arrival time of the storm. Weather forecasts and information will ordinarily be obtained via the Internet and supplemented as needed by telephone conversations with the NWS meteorologist on duty. The Environmental Specialist will review weather forecasts daily and compare them with the established storm selection criteria to determine the likelihood of initiating stormwater sampling.

The EPA's definition of a representative storm event (EPA, 1983) states that the storm precipitation total must be greater than 0.10 inch and that the storm be preceded by a minimum of 72 hours from the previously measurable (greater than 0.10 inch) event.

With the Permit requirements and EPA guidance considered, ACHD will use the following criteria to assist in decision making for selecting forecasted storms to target under typical conditions:

- 70 percent or greater probability of precipitation forecasted
- Quantitative precipitation forecast predicted precipitation of greater than 0.10 inch in a 12-hour period
- Event separated by a minimum of 72 hours of dry weather from the previous measurable storm event (rainfall greater than 0.10 inch)
- At least 30-day separation from the previous sampling event

Criteria for snow conditions include the following:

- Forecasted precipitation in the form of snowfall will be evaluated in the context of the greater weather forecast to determine the likelihood of runoff occurring at the outfall.
- Though snowmelt is considered stormwater runoff, sampling events will not be initiated for collection of discharge from snowmelt alone when criteria for a representative storm are not forecasted to be met.

These criteria represent the general approach to storm event targeting used for this program. Ultimately, the Environmental Specialist will use these criteria in conjunction with additional forecast information, sampling program and staffing requirements, and other factors to make the decision to target a particular storm.

The Environmental Specialist will communicate the sampling status to the consultant Field Coordinator daily by means of the Sampling Event Communication Form (included in Appendix B). The Sampling Event Communication Form will also be sent to laboratory project personnel and ACHD field sampling staff.

If storm selection criteria appear to be met, the Environmental Specialist will confer with the consultant Field Coordinator. If both parties agree, the consultant Field Coordinator will initiate storm event preparation by advising the sampling team of the upcoming sampling event. At this time, all necessary sample containers will be prepared and organized by site.

4.4 Monitoring Station Set-up

Prior to a sampling event, the Environmental Specialist or the consultant Field Coordinator will be responsible for readying the flowmeters and automatic samplers at the monitoring stations following the procedures listed on the Setup/Shutdown Form (Appendix B). Whenever possible, setup will be conducted by two trained staff. The Environmental Specialist (or designee) will be responsible for calibrating the handheld field parameter equipment, ensuring that adequate sampling supplies are available, and notifying the laboratory of the possible sampling event

Monitoring station set-up activities include the following:

- flushing the polyethylene sampler intake line and silicone discharge tubing with a dilute hydrochloric acid solution
- checking the condition of sampler harness and platform (if applicable), and sampler humidity indicator
- inspecting electrical and tubing connections for tightness
- installing recharged batteries
- freeing sampler tubing of twists, pinches, or cracks and replacing if needed
- loading bottles and ice into automatic samplers
- programming the samplers and flowmeters
- initiating the sampling program
- recording set-up information on field data sheets

4.4.1 Flowmeter Programming

Sampler Enable Condition

The flowmeter will be programmed to enable the sampler based on the water level in the pipe. The level condition will be programmed after a review of the previous 72 hours of level readings. Once runoff begins and water level increases, the sampler will enable and total flow will be computed toward the trigger volume, described below. Using the sampler enable condition allows for the sampler program to be initiated without the flowmeter triggering sample collection until storm runoff begins.

Runoff Coefficients and Trigger Volumes

To collect a flow-weighted composite sample throughout a storm, estimates will be calculated for the runoff volume expected at each station. The expected runoff volume will be divided by the planned number of sample aliquots, and the resulting value is used as the trigger volume for programming the flowmeter. The trigger volume is the amount of flow that will be measured before the automatic sampler is triggered to collect a subsample. Therefore, the number of samples collected over the course of a storm is a result of the runoff volume expected for the total storm as forecasted at the time of station set-up.

Calculating the total estimated runoff is a function of the weighted rainfall amount expected and the site-specific runoff coefficient. Precipitation amounts are weighted by multiplying the predicted rainfall amount by the probability of precipitation as forecasted by the NWS. The site-specific runoff coefficients are derived from the percentage of impervious ground cover in the subwatershed and empirical values from observed storm data.

Historical data suggests that multiple variables factor into the actual volume of runoff measured at each monitoring station. These variables include the size, duration, and intensity of a storm, along with irregularities within the drainage area including soil moisture, temperature, snow cover, and irrigation influences. Recorded runoff volumes from each station will be used to continually refine runoff coefficients over the course of the program.

4.5 Sample Collection

4.5.1 Sampling Teams

Sampling team assignments will be decided once the decision is made to target a storm for a sampling event. At least two teams will be formed, each consisting of two persons, a sample team leader and a sample technician. One sample team leader will serve as the site safety officer during sampling events. Each team will be responsible for collecting samples at their assigned stations.

When storm event runoff begins, the consultant Field Coordinator will confer with the Environmental Specialist and mobilize sampling teams. All sampling personnel will meet at the ACHD Stormwater Lab for a briefing on field conditions, QA/QC samples to be targeted, and safety reminders and concerns. Sampling teams will be responsible for the following:

- Collecting field parameter measurements
- Collecting laboratory analytical grab samples
- Verifying operation of the automated sampling equipment
- Collecting sample duplicates and/or preparing field blanks, as required
- Returning grab sampling equipment to ACHD
- Arranging transportation of samples for submittal to Boise City Public Works Water Quality Laboratory (WQL)

4.5.2 Grab Sample Collection

Grab sample collection at each monitoring station will be accomplished by the sample team leader. The sample team leader will fill grab sample bottles for each analysis from a point near the center of the flow at each monitoring station in accordance with the applicable procedures listed in Appendix A. Immediately following sample collection, the sample technician will record the collection date, time, and sample identification on the sample containers and on a Grab Sample Data Form (Appendix B). Additional sampling information recorded on the Grab Sample Data Form includes field parameter measurements and the corresponding meter used, status of the automated sampler, and other comments and observations.

Field parameters including temperature, pH, conductivity, and DO will be measured in the field using handheld instruments to avoid changes that may occur between the time when the sample is collected and the time of the analysis. Measurements from these field tests will be recorded on the Grab Sample Data Form included in Appendix B.

4.5.3 Composite Sample Collection

Collecting flow-weighted samples throughout a storm event is facilitated using automated sampling equipment. Each monitoring station is equipped with an automatic sampler. During station setup, samplers are programmed for a site- and event-specific trigger volume. At each monitoring station, the automatic sampler is linked to the flowmeter via a data cable. When the flowmeter records the trigger volume amount, the integrated peristaltic pump on the automatic sampler engages and draws a sample through the tubing installed in the invert of the storm drain pipe. The sample aliquot is pumped into the composite sample bottle secured in the base of the automatic sampler.

The sampler program will end automatically after the last programmed subsample has been collected (typical target of 24 subsamples). Immediately following collection of the sample container, the sample team will record the collection date, time, and sample identification on the sample bottle and the Composite Sample Collection Form (Appendix B).

Variability between expected runoff amounts and measured runoff amounts are common. To increase the probability of collecting a representative sample, a conservative approach to programming the sampler is used. The minimum volume required by WQL to run the analyses identified in Table 4.1 is 8 liters. In order to collect a representative composite sample, the sampler is programmed to collect 24 aliquots at 620 mL per aliquot. This approach will provide 13 subsamples to achieve the minimum volume, with a conservative estimate of forecasted rainfall. This will also provide additional capacity to collect up to 11 more aliquots in the event the intensity and duration of the storm is more than expected.

4.6 Sample Handling Procedures

The required types of containers and holding times for the stormwater outfall monitoring component are dependent upon the components to be analyzed. Table 4-2 includes container types and holding times for each parameter group.

Preservation techniques in the field are limited to cooling samples to a target sample temperature of less than 6°C, but above freezing. Five to ten pounds of food-grade ice will be placed in the coolers of the automatic samplers during station setup. Sufficient ice will also be placed in coolers used for grab and composite sample transport to maintain the samples at a maximum temperature of 6°C. Composite samples will be collected for the majority of analytical parameters in stormwater samples. Composite samples will be collected in a 15-liter Nalgene LDPE carboy.

No chemical preservation measures are required in the sample collection process. WQL will add chemical preservatives after the composite samples are split as necessary for analysis, i.e. metals analysis. In the 15-liter carboy, composite samples have a holding time of 48 hours. Analysis of composite samples will include the parameters listed in Table 4-2.

Parameters to be measured in the field include DO, conductivity, pH, and temperature. Parameters will be measured on-site using portable handheld meters immediately following sample collection. Field parameter samples will be collected and measured in a 1-liter (L) glass jar.

Special Handling Considerations

4.6.1 E. coli

Due to the variable nature of storm event timing, *E. coli* grab samples are sometimes analyzed outside of sample holding times required by the standard method (eight hours). WQL has committed to providing *E. coli* analysis within the holding time for samples submitted during normal business hours (Monday–Friday), and within 12–16 hours if samples are submitted after hours. *E. coli* samples analyzed within the 8–16 hour timeframe will be qualified as estimated in the context of the program-established data quality objectives discussed in Section 5.2. If analysis is not initiated within 16 hours of collection, results will be rejected.

4.6.2 Dissolved Metals

Current regulations under the EPA Method Rule Update issued on May 18, 2012, require that samples collected for the analysis of dissolved metals including dissolved orthophosphate be filtered within 15 minutes of collection of a grab sample or the last subsample of a composite sample. Dissolved metals are a constituent of the composite sample for the stormwater outfall monitoring program.

WQL has committed to splitting composites and filtering dissolved metals samples at the time of submission to the laboratory when they are submitted during normal business hours, and within 24 hours when samples are submitted after hours. Samples filtered within the 24-hour timeframe will not be qualified as estimates in the context of the program-established data quality objectives discussed in Section 5.2. If filtration is not accomplished within 24 hours of collection, results will be rejected.

Table 4-2. Sample Handling Requirements

Constituent	Container	Holding Time
Composite Samples		
Ammonia (NH3) 5-Day Biological Oxygen Demand (BOD5) Chemical Oxygen Demand (COD) Nitrite plus Nitrate (NO_2+NO_3) Total Kjeldahl Nitrogen (TKN) Total Dissolved Solids (TDS) Total Suspended Solids (TSS) Turbidity Total Phosphorus Mercury -Total Arsenic – Total Cadmium – Total Calcium - Total Lead – Total Magnesium - Total Hardness (as $CaCO_3$)	15-liter LDPE carboy	48 hours (in carboy)
Dissolved Orthophosphate Cadmium – Dissolved Copper – Dissolved Lead – Dissolved Zinc - Dissolved		24 hours (in carboy)
Grab Samples		
E. coli	500 mL sterilized HDPE	8 hours
Field Parameters		
Dissolved Oxygen	1 L glass	Field analysis; 15 minutes
Temperature		
pH		
Conductivity		

LDPE – Low Density Polyethylene

4.7 Chain-of-Custody Procedures

Standard chain of custody (COC) forms, shown in Appendix B, will be completed prior to submittal of samples to the laboratory. Information recorded on the COC includes the following:

- Sample collection team member names
- Sample identification
- Sample type (grab or composite)
- Analyses requested
- Sample start and end times
- Sample start and end dates

A sample is "in custody" if it is either in actual physical possession of authorized personnel or in a secured area that is restricted to authorized personnel. Such areas include laboratory refrigerators, the ACHD Stormwater Lab, ACHD vehicles, and consultant vehicles. Automatic samplers at monitoring stations are installed in locked enclosures or in manholes. Where samplers are installed in manholes, the sample container base will be locked to secure access to the sample. All transfers of custody will be recorded by signature, date, and time by both the individual relinquishing custody and the one receiving custody. This information is placed in the designated area on the bottom of the COC form.

The transferal of grab samples collected during a storm event between the sampling team leader who collected the sample and the field coordinator or designee who will deliver the samples to the lab must be recorded on the COC form. The field coordinator will record his/her signature with the date and time the samples were received on the associated COC form.

Samples may be stored overnight (in coolers with ice) at the ACHD Stormwater Lab or vehicles while awaiting submittal to the laboratory. The COC forms must be reviewed and signed by at least one of the persons who collected the samples listed on the COC form. The COC forms will be delivered to the laboratory with the samples.

If samples are submitted to the laboratory during business hours, samples are relinquished to laboratory personnel in person for immediate receipt with signature, date, and time. ACHD has after-hour access to the laboratory to accommodate sample submittal. When sample delivery occurs after hours, grab samples are placed in a locked refrigerator and composite samples are stored in coolers or sample bases and packed with ice. The team delivering the samples will notify a laboratory representative that the samples have been dropped off and the time the earliest samples were collected. A signed COC form is left in the locked laboratory for morning receipt by laboratory personnel.

Analytical samples will be named using the date of the event, followed by the station number, followed by WG or WC for "Wet Grab" or "Wet Composite," respectively. For example, a composite sample collected at Whitewater on October 15, 2021, would be labeled 211015-11-WC.

Sample collection times for QC samples will be recorded as 12:00 on the COC form to maintain duplicates as laboratory blind samples. The actual collection time will be recorded on the field form. The QAPP includes detail on the approach to data validation as it pertains to holding times and laboratory qualifiers for QC samples.

4.8 Monitoring Station Shut Down

Post-sampling activities include downloading data from flowmeters, samplers, and rain gauges according to the applicable procedures listed in Appendix A; removing/replacing batteries where necessary; and reviewing the overall condition of the equipment. Equipment shutdown will be conducted by ACHD personnel and may occur as late as two weeks after sample collection to accommodate hydrologic data collection.

WQL will analyze the samples for the components of concern identified in Table 4-1. Quality assessment activities, to be performed by the Program QA/QC Officer, will include review of field notes and COC documents, as well as validation of data packages received from the laboratory. QA/QC procedures are discussed in further detail in Section 5.

Section 5

Quality Assurance/Quality Control

5.1 QC Sampling Schedule

The QC sampling schedule developed for the SWOMP consists of a combination of field QC samples and laboratory QC samples. Field QC sample types are described in the QAPP. Field QC sampling intervals will follow the schedule detailed in Table 5-1. Laboratory QC sample results are included in each analytical report.

Table 5-1. Field QC Sample Collection

QC Sample Method[1]	Sampling Frequency	Percent of Total Data Represented[4]
Grab sample duplicate and field blank	1 set per event	20%
Composite sample duplicate[2]	1 composite per year	7%
Composite sample field blank	1 composite per year	7 %
Composite sample equipment blank[3]	1 composite per year	7%
Composite sample rinsate blank[3]	1 composite per year	7%

[1]Grab QC samples will be analyzed for grab sample constituents. Composite QC samples will be analyzed for composite sample constituents.

[2]The composite sample duplicate will be collected at the earliest opportunity, and is contingent upon sample volumes.

[3]Blanks will be collected during monitoring station maintenance events and will be analyzed for composite sampling constituents.

[4]Percentages are calculated based on 5 sites (4 outfall monitoring sites and 1 subwatershed monitoring site)

Random number generation was used to develop a QC sample schedule for each water year. The schedule establishes the targeted QC site for each event, as well as an alternate QC site with the goal of collecting one set of QC samples for each event. Each site is assigned a number and a random number generator equation is run for each event. If the selected site cannot be sampled for any given event, the predetermined alternate site will be used. The full QC schedule is included in Appendix C.

ACHD may choose to conduct additional QA/QC to address data discrepancies, potential sample contamination, or other QA/QC issues. These events will be handled on an as-needed basis, depending on the issue(s) involved.

5.2 Data Quality Objectives (DQO)

The DQO for ACHD stormwater monitoring can be summarized by the following statement:

Monitoring efforts will provide data of sufficient quality and quantity in accordance with permit requirements to characterize the quality of stormwater discharges from the MS4 and evaluate overall effectiveness of stormwater management practices.

5.2.1 Data Quality Indicators (DQIs)

DQIs have been established to set measurable qualitative and quantitative goals for data acceptance that meet the program DQO described above. Each DQI is described below. DQIs are the basis for addressing field and laboratory analytical instrument performance, as well as sample collection and handling procedures. QA/QC samples provide input for several of the DQIs. QA/QC sample collection procedures are included in Section 2.1 of the QAPP.

DQIs are described fully in Section 1.8.1 of the QAPP. A brief description of each DQI is included in the list below.

- **Project Required Detection Limits (PRDL):** Achieving appropriate reported constituent concentration results at values that allow for comparison to baseline data and water quality standards.
- **Accuracy:** The accuracy of the data is a measure of the extent to which a measured value represents the true value.
- **Precision:** Precision is a measurement of the reproducibility of the analytical data.
- **Bias:** Bias is minimized by using standard data collection and analytical methods and protocols, as well as standard sample preservation, transport, and storage procedures.
- **Representativeness:** Representativeness is a measure of the degree to which data accurately and precisely indicate environmental conditions.
- **Comparability:** The comparability of a data set is the extent to which data accurately and precisely indicate environmental conditions.
- **Completeness:** Completeness is a comparison between the amount of usable data collected versus the total amount of data collected.
- **Sufficiency:** Data set sufficiency is the amount of data required to perform the level or type of analysis necessary for each monitoring element.

Analysis-specific data quality indicators include PRDLs and precision evaluated as relative percent difference (RPD). The target values for these indicators are listed in Table 5-2 below.

Table 5-2. Data Quality Indicator Targets				
Constituent	Analytical Method	PRDL[1,2]	Units	Precision[3,4] (RPD)
Temperature	EPA 170.1	0.01	ºC	NA
pH	EPA 150.2	0.01	S.U.	NA
Dissolved Oxygen	In-Situ Method 1002-8-2009	0.01	mg/L	NA
Conductivity	EPA 120.1	0.1	µS/cm	NA
Ammonia (NH_3)	SM 4500 NH3 D	0.0350	mg/L	20%
5-Day Biological Oxygen Demand (BOD5)	SM 5210 B	2.00	mg/L	20%
Chemical Oxygen Demand (COD)	HH 8000	7.00	mg/L	20%
Nitrite plus Nitrate (NO_2+NO_3)	EPA 353.2	0.0500	mg/L	20%
Total Kjeldahl Nitrogen (TKN)	EPA 351.2, 10-107-06-2-M	0.100	mg/L	20%
Total Dissolved Solids (TDS)	SM 2540 C	25.0	mg/L	20%
Total Suspended Solids (TSS)	SM 2540 D	0.900	mg/L	20%
Turbidity	EPA 180.1	0.3	NTU	20%
Orthophosphate, as P	EPA 365.1	2.00E-3	mg/L	20%
Total Phosphorus	EPA 200.7	6.00E-3	mg/L	20%
E. coli	IDEXX Colilert	1.0	MPN/100mL	40%[5]
Mercury – Total	EPA 245.2	0.0100	µg/L	20%
Arsenic – Total	EPA 200.8	0.040	µg/L	20%
Cadmium – Total	EPA 200.8	0.025	µg/L	20%
Calcium – Total	EPA 200.7	0.0460	mg/L	20%
Lead – Total	EPA 200.8	0.050	µg/L	20%
Magnesium – Total	EPA 200.7	39.5	µg/L	20%
Hardness (as $CaCO_3$)	EPA 200.7	0.115	mg/L	20%
Cadmium – Dissolved	EPA 200.8	0.025	µg/L	20%
Copper – Dissolved	EPA 200.8	0.15	µg/L	20%
Lead – Dissolved	EPA 200.8	0.050	µg/L	20%
Zinc – Dissolved	EPA 200.8	0.78	µg/L	20%
Flow/Discharge Volume	Non Specific	0.001	cfs	NA
Precipitation	Non Specific	0.01	in	NA

[1]Field instrument resolution values are listed in lieu of a PRDL for field parameter measurements.

[2]PRDL is defined as the effective method detection limit (MDL) as reported by the analytical laboratory.

[3]Precision calculations based on field duplicate samples.

[4]In cases where one value is reported at the MDL and the other value is less than five times the MDL, the samples will be considered within acceptable precision limits.

[5]E. coli is evaluated using the RPD of logarithmic parent and duplicate values. The acceptable RPD between the two values is also higher than other constituents. These changes are in place to accommodate the inherent variability in E.Coli samples.

Anticipated issues with optimal performance for DQIs include high potential for holding time exceedances with *E. coli* as well as meeting the method-required filtration window for dissolved orthophosphate in composite samples. These issues will be monitored closely from the outset of the stormwater outfall monitoring program to track and understand the impact these deviations may have on DQIs.

5.2.2 Storm Event Acceptance Criteria

Acceptance criteria for a representative storm are derived from Permit requirements for representative sampling as listed in Section 6.2.4 and target volume and duration goals established for this program. Storm data used to evaluate acceptance, including antecedent dry period, precipitation amount, and flow volumes, will be measured based on data records at the site-specific rain gauges and flowmeters.

The acceptance criteria for composite samples are based on the total amount of runoff represented by the composite sample. Ideally, upon completion of the sampler program, a flow-weighted composite sample is collected that represents the entire duration of the storm. However, in some cases, high rainfall amounts result in the automatic sampler program finishing before capturing the entire storm. When this situation occurs, the full composite bottle is removed from the sampler, a second bottle is installed, and the sampler program is restarted. During the bottle change, there can be an unavoidable gap in collection time of the flow-weighted composite sample because of logistical constraints in reaching each monitoring station at the exact time the first sample bottle is full. All sample bottles filled at a particular station will be composited at the WQL. This composite sample is flow-weighted for the portion of the storm event that was sampled.

The percentage of the storm event that is represented by the composite sample can be determined from a review of the storm hydrograph at each location. The sample will be considered valid and unqualified when the composite sample represents at least 75 percent of the total hydrograph with the first hour of runoff included, or the sample represents the first six hours of the discharge. If the composite sample represents between 50 and 75 percent of the measured flow volume associated with the storm, then the sample will be qualified, and data will be considered an estimate based on the DQIs outlined earlier in this section. If the composite sample represents less than 50 percent of the total hydrograph, then it will be rejected. Another storm may be targeted to replace it if possible.

On a limited number of historic occasions, an automatic sampler has triggered before the beginning of storm event runoff. In the event of this occurrence, the extraneous aliquots will be considered not to have compromised the entire composite sample if it represents less than 10 percent of the total composite sample volume (typically one to two subsamples). In the event of this occurrence, the composite sample will be qualified based on the DQIs outlined earlier in this section. If the composite sample is determined to be comprised of 10 percent or more non-stormwater subsamples, the entire composite sample will be rejected.

Section 6

Data Management and Reporting

All data collected as part of the SWOMP will be stored in electronic format for secure storage and timely and accurate retrieval for data interpretation, graphing, and reporting. Data collected as part of the sampling program will include rainfall data, runoff volumes, runoff coefficients, field analytical data, laboratory analytical data, QA/QC results, and some qualitative observations. Specific management and reporting procedures are provided below.

6.1 Data Acquisition Requirements (Non-Direct Measurements)

Weather forecasts and hourly precipitation totals will be typically obtained from the NWS Boise airport station website. Additional forecasts or weather reports may be retrieved from local media, community, or commercial weather services. When obtaining weather forecasts for storm events, the Environmental Specialist will typically call the NWS Boise airport station for additional details if it appears that an approaching storm may meet the sampling criteria. Pertinent details of these conversations will be recorded on the Sampling Event Communication Form (Appendix B).

6.2 Data Management System

Seveno DataSight (DataSight) data management software is used for handling data collected from stormwater monitoring programs. DataSight provides a safe and secure platform for storing, viewing, validating, and analyzing data. Program data will be imported into the database according to established procedures listed in Appendix A. The database will assist with implementation of the QAPP and the individual monitoring plans guiding each monitoring program.

The DataSight database is configured in three tiers or “levels” under which data is stored and related. The database structure and level dependencies for the stormwater outfall monitoring program are illustrated in Figure 6-1 below.

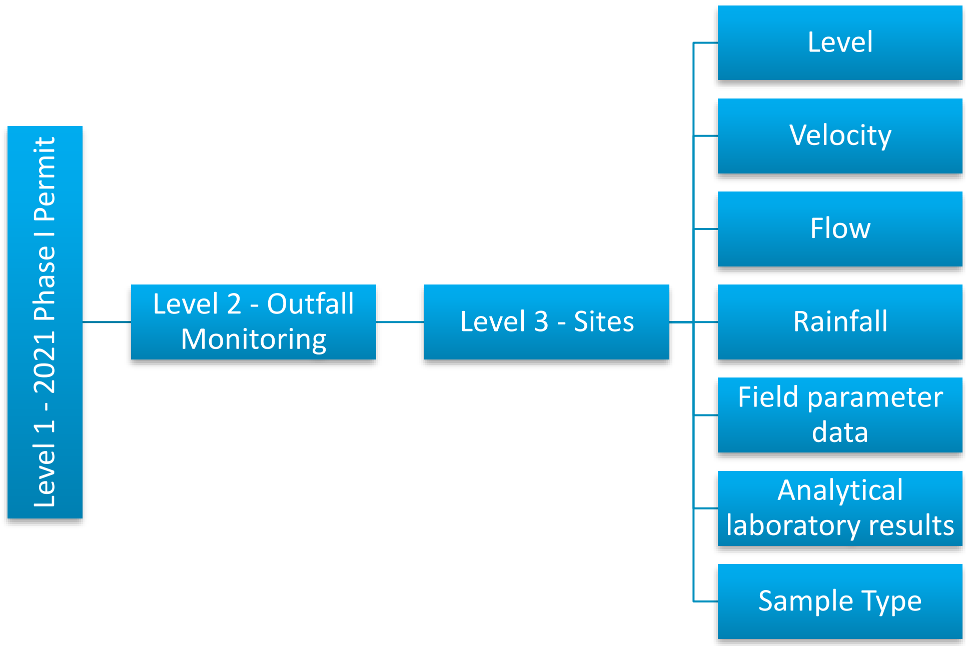


Figure 6-1: Database Levels Setup

6.3 Data Reporting

6.3.1 Storm Event Reporting

Following each sampling event, a storm event report summarizing the results of all sampling conducted will be prepared by the consultant. The report will also provide a specific summary of the storm characteristics and monitoring activities at each of the targeted stations and will include the following level 2 data and control documents:

- Storm Event Information
  - date and time span of the storm
  - antecedent dry period
  - a qualitative description of the forecast and storm
  - composite sample volumes
  - trigger volumes
- Water Quality Data
  - field parameter measurements
  - laboratory analytical data
  - QC sample results
  - storm event pollutant loading estimates from each site (described below)

- Flow Data
  - storm event flow totals
- Rain Data
  - storm event precipitation totals
- Control Documents
  - laboratory analytical report
  - data validation checklist

Additionally, each storm event report will include the following report elements:

- Project status summary table
- Discussion of QA/QC analysis
  - storm acceptance criteria
  - results of the data validation review for the event
- Narrative summary of notes from the current event and recommendations for the next event
- Event hydrograph for each monitoring station

Storm Event Pollutant Loading Estimates

Pollutant loading estimates for each event will be calculated using the following formula when complete runoff volume measurements are available.

$$L = 6.24E^{-5} * F * C$$

Where:

L = Event Load (pounds)

F = Event Runoff (cubic feet)

C = Pollutant Concentration (mg/L)

6.24 E^{-5} = Unit conversion factor

When runoff volume must be estimated due to incomplete flow measurements, the Simple Method approved by the EPA for simple pollutant loading estimations for urban stormwater will be used. The following is the equation that will be used to estimate the event pollutant loads if measured flow volumes are not available or are incomplete.

Simple Method

$$L = 0.226 * R * C * A$$

Where:

L = Event Load

R = Event Runoff (inches)

C = Pollutant Concentration (mg/L)

A = Area (acres)

0.226 = Unit conversion factor

Runoff Calculation

$$R = P * Pj * Rv$$

Where:

R = Event Runoff (inches)

P = Event Rainfall (inches)

Pj = Fraction of annual rainfall events that produce runoff (0.9)

Rv = Runoff Coefficient

The site-specific runoff coefficient (Rv), as presented in the EPA formula, is equal to the percent of impervious surface in the drainage area represented as a decimal. However, this does not account for impervious areas in areas without curb and gutter, canopy cover and interception, or stormwater controls in the drainage area. Therefore, the runoff coefficient variable in the equation will be refined as understanding of the drainage area is expanded.

6.3.2 Stormwater Outfall Monitoring Annual Reporting

A Stormwater Outfall Monitoring summary will be attached to the MS4 Annual Report Form (NPDES Phase I Permit Appendix B) submitted to IDEQ annually. This summary will include the results from each storm event and any monitoring, assessment, or evaluation efforts conducted during the reporting period (October 1 – September 30).

6.3.3 Stormwater Outfall Monitoring Final Report

As required by Permit Part 6.4.3, a final report summarizing all monitoring data collected during the permit term will be submitted as an attachment to the Permit Renewal Application (April 3, 2026). The report will be based upon the storm event reports and will include a comprehensive evaluation of all the data collected. If data have been qualified as part of the QA/QC process, this will be noted in the appropriate table(s). The data evaluation will include the following:

- A statistical summary for analytical parameters with five or more data points
- A yearly comparison of the median concentrations for each monitoring site
- An estimate of event mean concentrations for each parameter sampled for each storm event
- Event Mean Concentration trend analyses demonstrating pollutant loading over time
- A discussion of data quality including qualified data points and deviations from program plans
- A discussion of pollutant reduction efforts and results
- A discussion and analysis of sampling analytical performance against DQOs including discussion of any planned changes to the current plan based on QA/QC issues, site conditions, or program conditions

6.3.4 Evaluation and Assessment

Evaluation and assessment of the stormwater outfall monitoring data will follow the general guidance identified in the QAPP. For the SWOMP, pollutant loads will be estimated based on measured flow and concentrations throughout the system. Data will be compiled with the objective to obtain sufficient data points for statistical and trend analyses to evaluate the effectiveness of stormwater management efforts at reducing pollutant loads from the MS4.

Section 7

References

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Figures

Monitoring Area

Lucky

Whitewater

Main

Americana

Rain Gauges

Figure 1

Vicinity Map
Phase I NPDES Outfall Sampling Stations

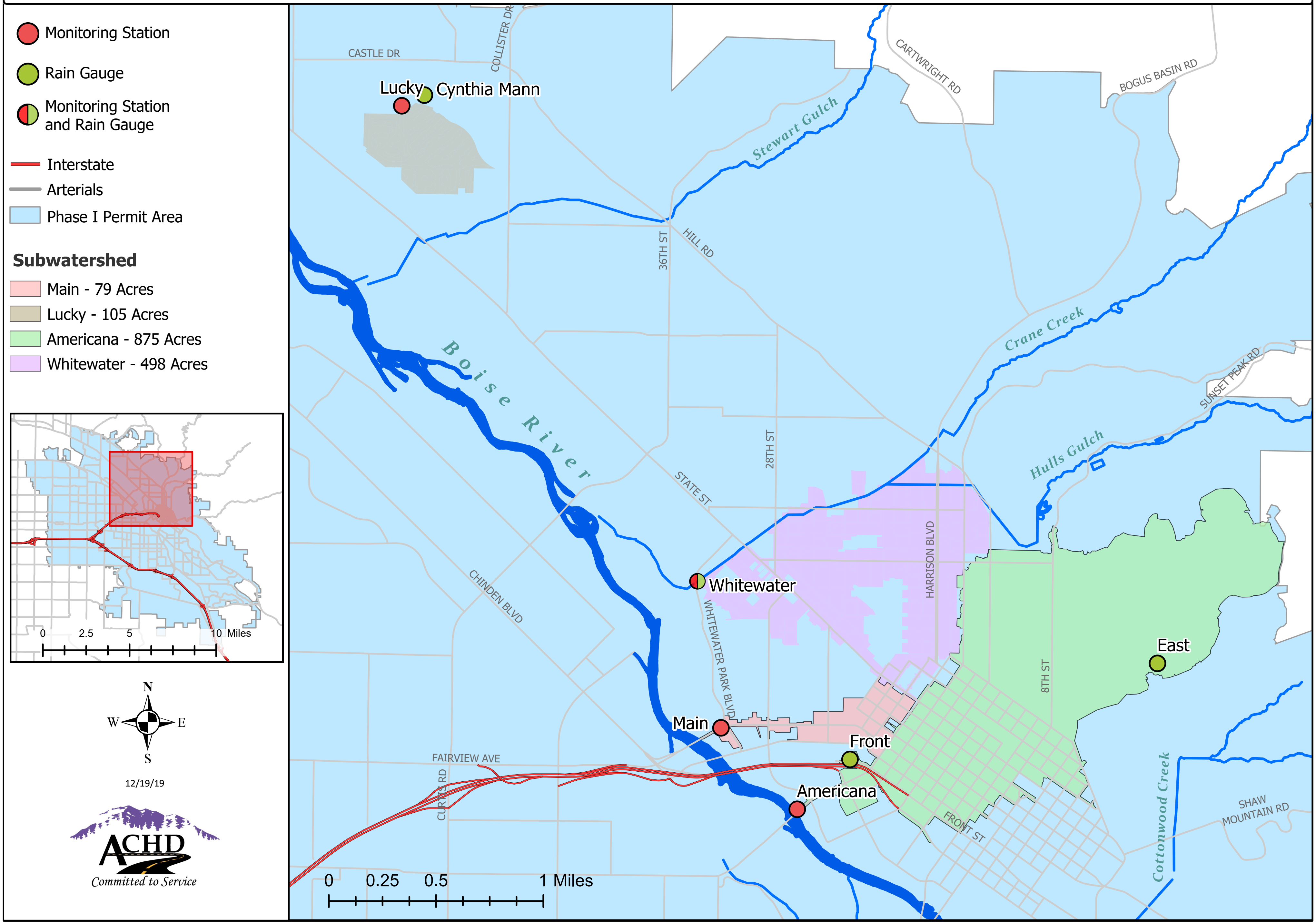
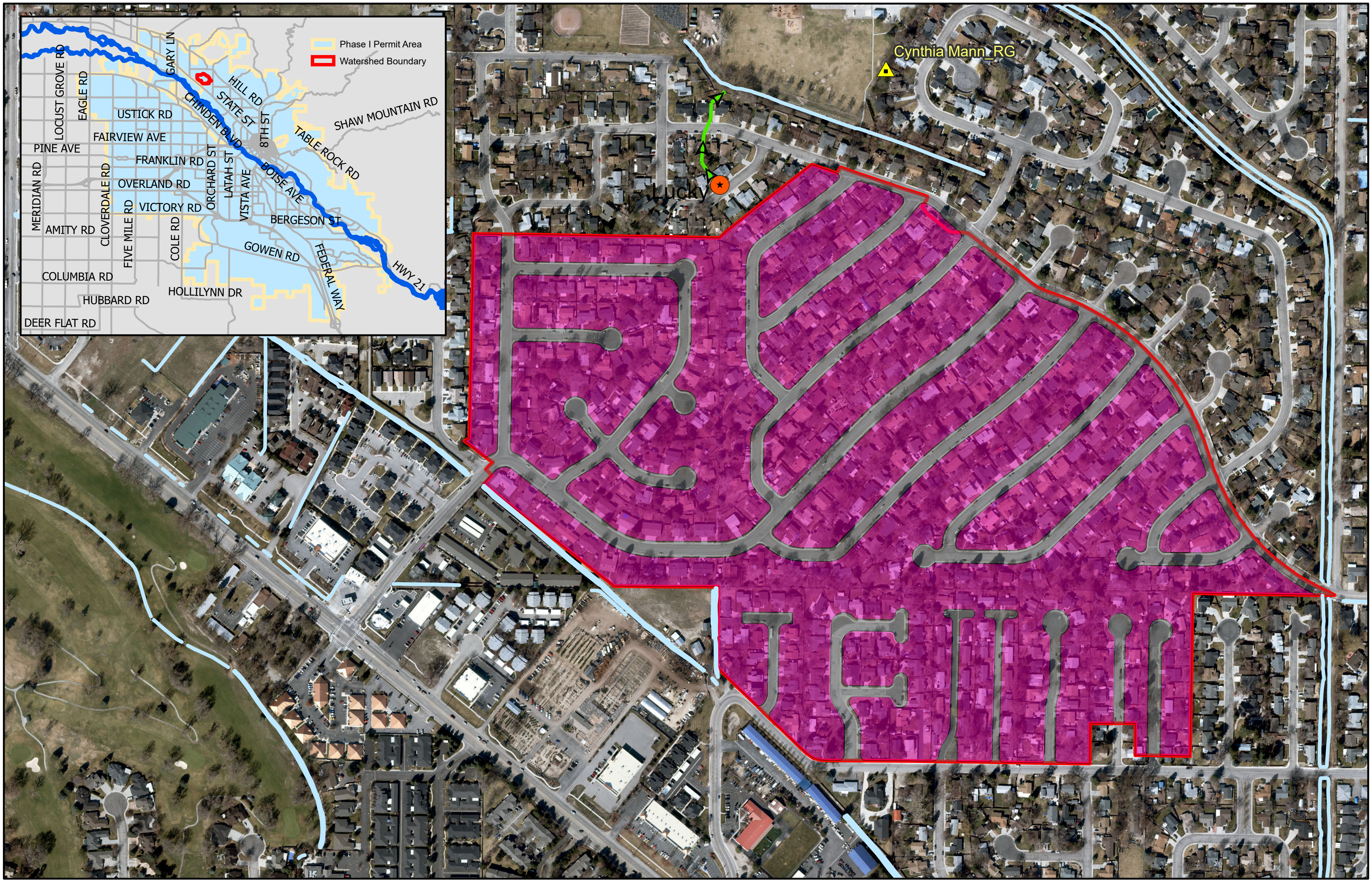


Figure 2



Lucky Monitoring Station
105 Acres
40% Impervious

Land Use Percentages (percent impervious in parentheses)

- Right of Way - 22% (83%)
- Residential Medium - 78% (23%)

source: 2013 Urban Tree Canopy Analysis, modified in 2014 based on 2013 aerial photography

- Outfall Sampling Stations
- Rain Gauges
- Canals/Waterways
- Watershed Boundary
- Outfall Conveyance

Date: 7/15/2021

0 390 780 Feet

ACHD Committed to Service

File Location: \\APPWSUS\ACHDFiles\Groups\DVS\STORMWATER\Maps\Phase I Monitoring\Lucky

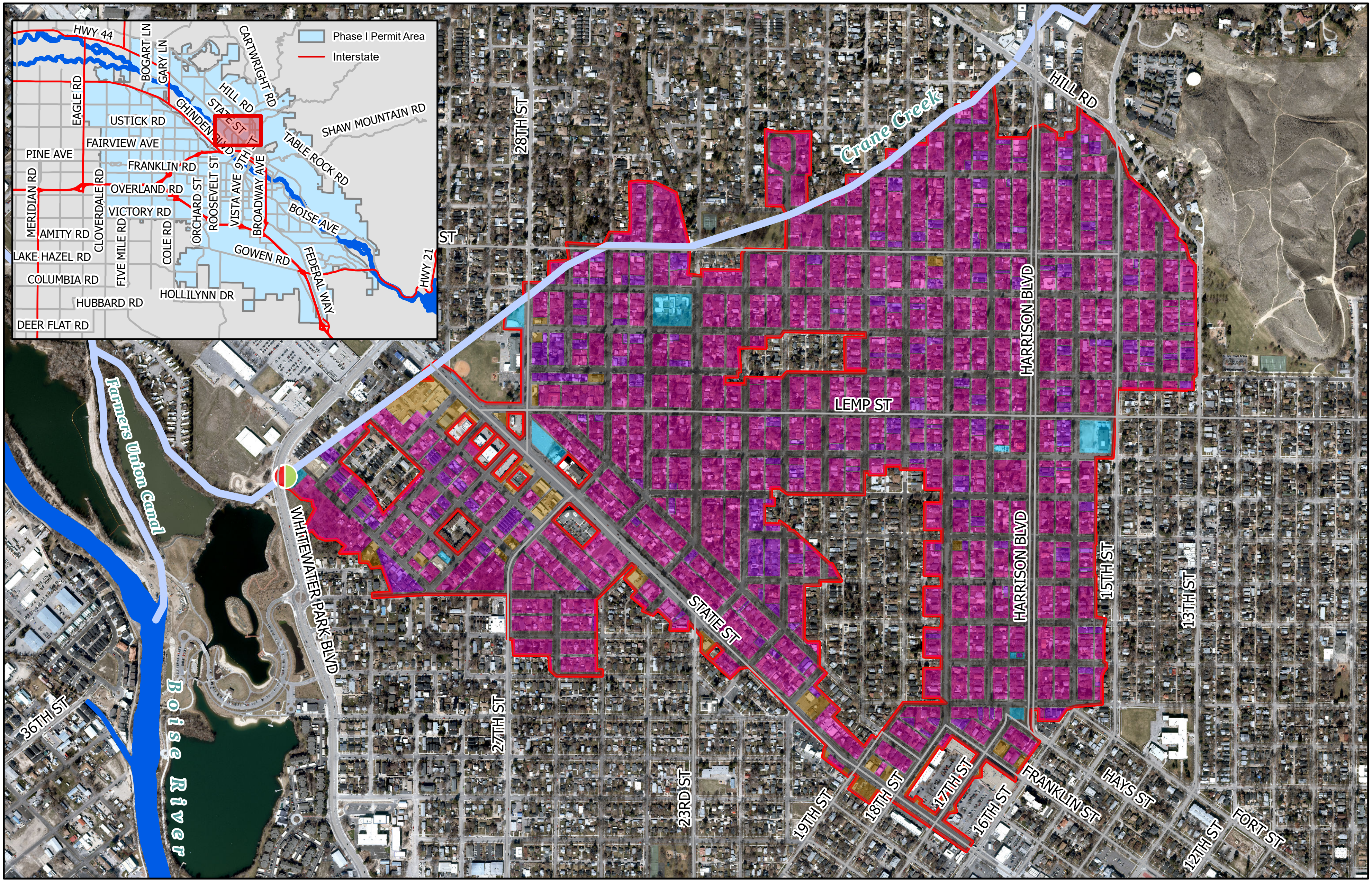
Figure 3

Lucky Monitoring Station

Station setting looking northwest – equipment in manhole

Inside manhole

Figure 4



File Location: \\APPWSUS\ACHDFiles\Groups\DVS\STORMWATER\Maps\Phase I Monitoring\Whitewater

Whitewater Monitoring Station
498 Acres
43% Impervious

Land Use Percentages (percent impervious in parentheses)

- Right of Way - 36% (70%)
- Commercial - 4% (41%)
- Residential Medium - 50% (25%)
- Residential High - 7% (31%)
- Public and Schools - 3% (51%)
- Monitoring Station and Rain Gauge
- Waterways
- Watershed Boundary

source: 2013 Urban Tree Canopy Analysis, modified in 2014 based on 2013 aerial photography

Date: 7/7/2021

0 750 1,500 Feet

ACHD Committed to Service

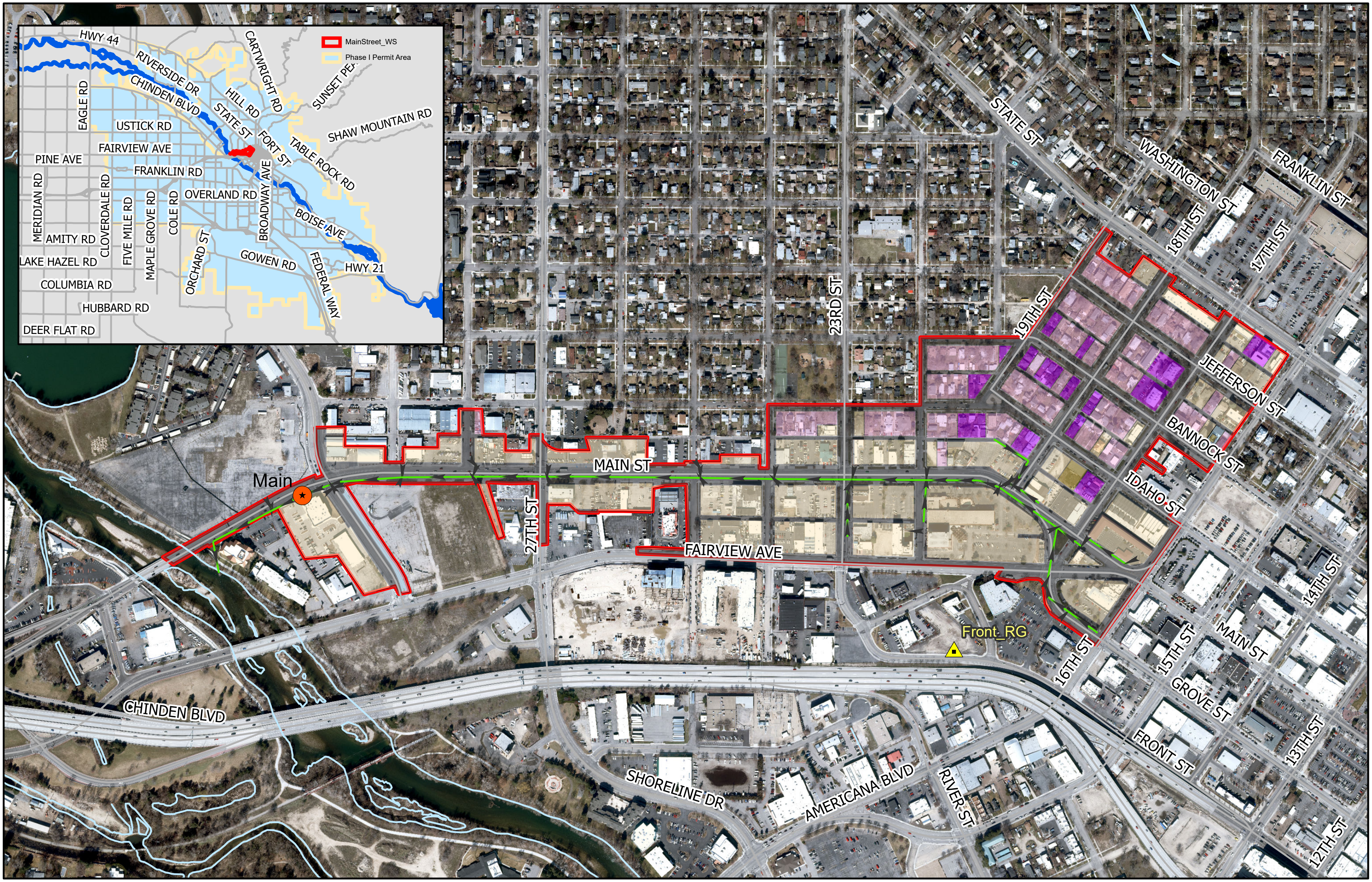
Figure 5

Whitewater Monitoring Station

Station setting looking north

Inside cabinet

Figure 6



Main Monitoring Station

79 Acres

55% Impervious

Land Use Percentages (percent impervious in parentheses)

- Right of Way - 43% (66%)
- Commercial - 37% (55%)
- Residential Medium - 14% (30%)
- Residential High - 5% (39%)
- Public - 1% (0%)

source: 2013 Urban Tree Canopy Analysis, modified in 2014 based on 2013 aerial photography

- Outfall Sampling Stations
- Rain Gauges
- Canals/Waterways
- Watershed Boundary
- Outfall Conveyance

Date: 7/15/2021

0 500 1,000 Feet

File Location: \\APPWSUS\ACHDFiles\Groups\DVS\STORMWATER\Maps\Phase I Monitoring\Main

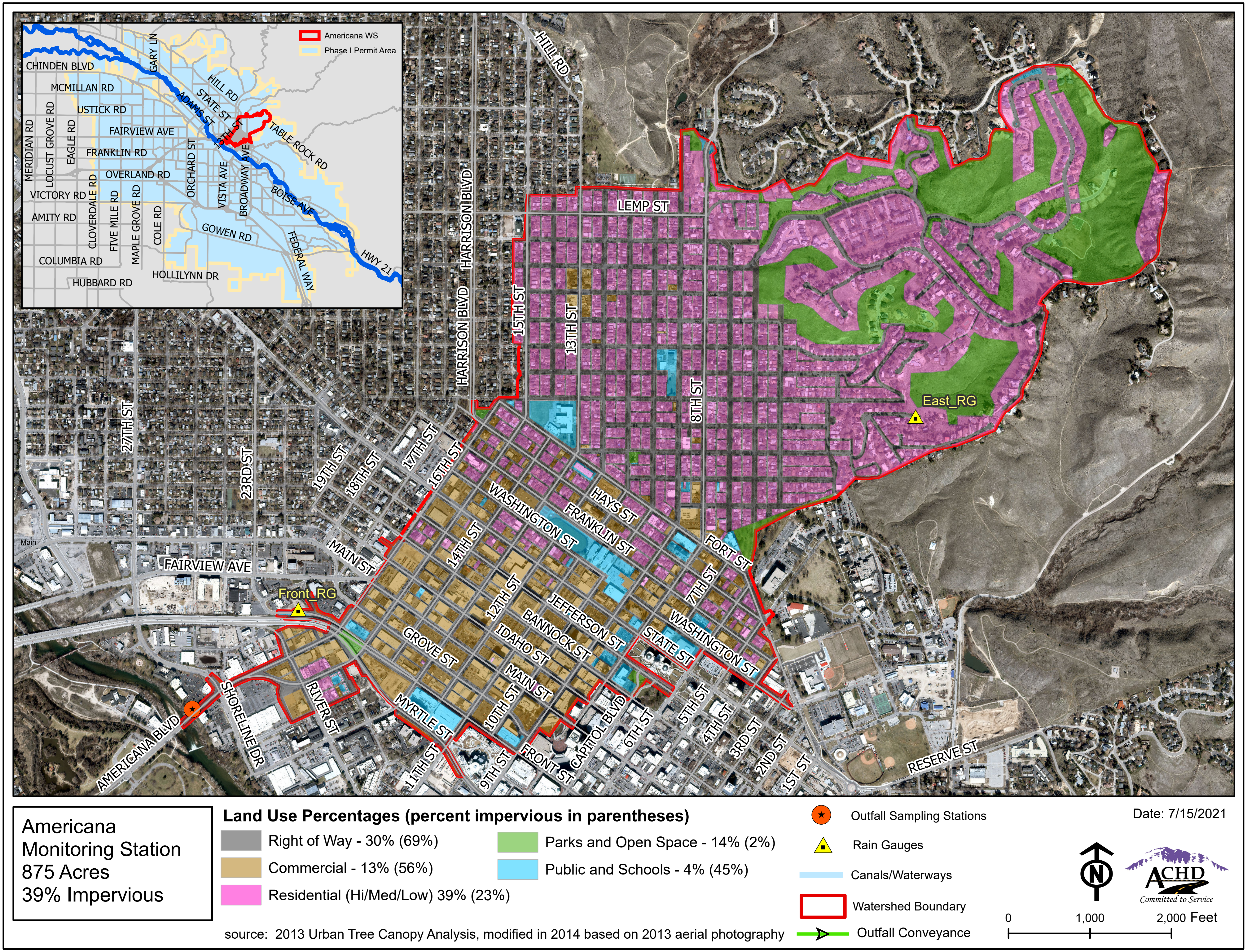
Figure 7

Main Monitoring Station

Station setting looking northwest

Inside cabinet

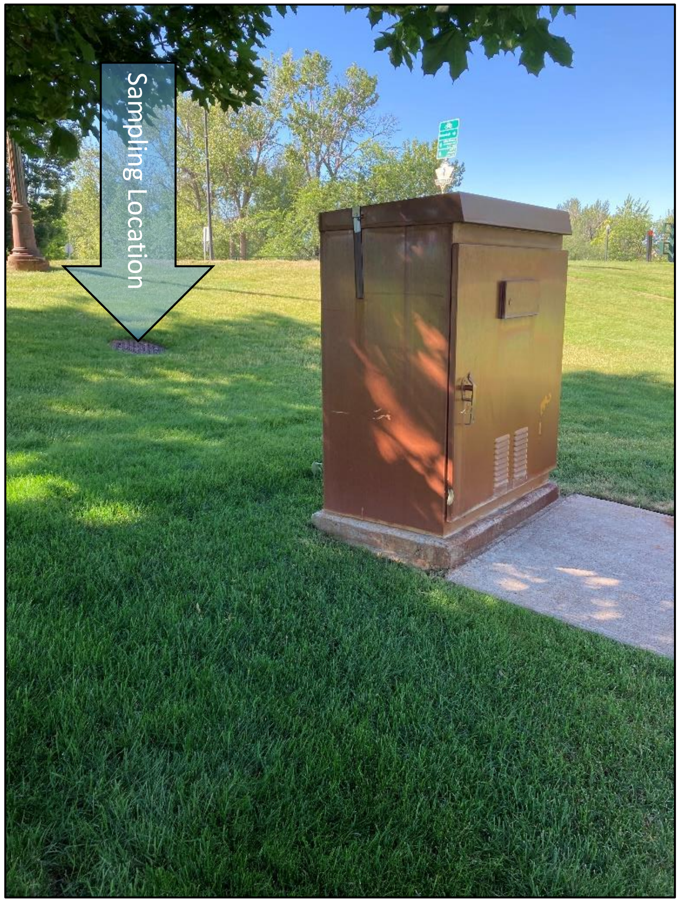
Figure 8



Americana WS
Phase I Permit Area
CHINDEN BLVD
MCMILLAN RD
USTICK RD
FAIRVIEW AVE
FRANKLIN RD
OVERLAND RD
VICTORY RD
AMITY RD
COLUMBIA RD
HUBBARD RD
HOLLILYNN DR
GOWEN RD
MERIDIAN RD
LOCUST GROVE RD
EAGLE RD
CLOVERDALE RD
FIVE MILE RD
MAPLE GROVE RD
COLE RD
ORCHARD ST
VISTA AVE
BROADWAY AVE
FEDERAL WAY
BOISE AVE
HWY 21
TABLE ROCK RD
GARY LN
HILL RD
STATE ST
ADAMS ST
15TH ST
HILL RD
LEMP ST
HARRISON BLVD
15TH ST
13TH ST
8TH ST
East_RG
27TH ST
23RD ST
19TH ST
18TH ST
17TH ST
16TH ST
WASHINGTON ST
FRANKLIN ST
HAYS ST
FORT ST
MAIN ST
FAIRVIEW AVE
Main
14TH ST
Front_RG
12TH ST
JEFFERSON ST
BANNOCK ST
IDAHO ST
7TH ST
STATE ST
WASHINGTON ST
GROVE ST
MAIN ST
10TH ST
MYRTLE ST
SHORELINE DR
RIVER ST
AMERICANA BLVD
11TH ST
9TH ST
FRONT ST
CAPITOL BLVD
6TH ST
5TH ST
4TH ST
3RD ST
2ND ST
1ST ST
RESERVE ST
Americana Monitoring Station
875 Acres
39% Impervious
Land Use Percentages (percent impervious in parentheses)
Right of Way - 30% (69%)
Commercial - 13% (56%)
Residential (Hi/Med/Low) 39% (23%)
Parks and Open Space - 14% (2%)
Public and Schools - 4% (45%)
source: 2013 Urban Tree Canopy Analysis, modified in 2014 based on 2013 aerial photography
Outfall Sampling Stations
Rain Gauges
Canals/Waterways
Watershed Boundary
Outfall Conveyance
Date: 7/15/2021
N
ACHD
Committed to Service
0
1,000
2,000 Feet
File Location:

Figure 9

Americana Monitoring Station



Station setting looking southwest

Inside cabinet

Figure 10

Phase I Rain Gauges

Cynthia Mann Rain Gauge

Front Rain Gauge

East Rain Gauge

Whitewater Rain Gauge

Appendix A: Standard Operating Procedure and Procedure Guidance Documents

The following Standard Operating Procedure (SOP) and Procedure Guidance (PG) documents will be referenced as needed to assist with implementation of the Stormwater Outfall Monitoring Plan. The SOPs and PGs listed below are readily accessible by ACHD and consultant personnel for use in the field or in the office to complete tasks associated with the acquisition and management of data under the ACHD Stormwater Outfall Monitoring Program.

SOP 110: Discrete grab sample collection

SOP 111: Low flow grab sample collection

SOP 112: Large volume grab sample

SOP 312a: YSI Model 85 dissolved oxygen and conductivity meter operation, calibration, and maintenance

SOP 312b: YSI Pro 2030 dissolved oxygen meter operation, calibration, and maintenance

SOP 313: Horiba pH meter operation, calibration, and maintenance

SOP 314: Gas detector operation

SOP 322: In-Situ multiparameter sonde calibration and maintenance

SOP 323: In-Situ multiparameter sonde operation

PG 210: Hach 950 flowmeter download using Insight software

PG 211: HOBO equipment download using HoboWare

PG 212: ISCO equipment data access and download

PG 214: Hach AS950 data download

PG 315: Hach equipment semi-annual maintenance

PG 319: Rain gauge inspection and maintenance

PG 324: ISCO equipment semi-annual maintenance

PG 512: Exporting data from Flowlink Pro

PG 530: Exporting data from HoboWare

PG 531: Importing and exporting from FSData

PG 532: Transferring from Flowlink LE to Flowlink Pro

PG 533: Importing data into DataSight

PG 534: QAQC Procedures in DataSight

PG 537: Exporting data from InSight to CSV file

Appendix B: Communication and Field Forms

Grab Sample Data Form

Composite Sample Collection Form

Set Up/Shut Down Form – ISCO

Set Up/Shut Down Form - HACH

Chain-of-Custody Form

Sampling Event Communication Form

Grab Sample Data Form

STATION: ________________________________

Personnel: ____________________________ **Date/Time On-Site:** ___________________________

Flow Meter Current Status						
Time	Level (in)	Flow (cfs)	Velocity (fps)	Battery (V)	Flow Start (date/time)	Rainfall (in)

Grab Information				
	Sample ID	Date	Time	Labeled?
Site *E.Coli*	-WG			☐
Field Duplicate *E.Coli*	-101			☐
Field Blank *E.Coli*	-001			☐

*Note: time on bottle for QC samples is 1200

Field Parameters					
Meter number	Time	Temp (C)	D.O. (mg/L)	pH (S.U.)	SpCond (uS/cm)

Sampler Current Status	
First Subsample Date/Time	
Last Subsample Date/Time	
# of Subsamples taken	

Comments:

Revised 210924 TL

Composite Sample Collection

STATION: ______________________________ **Bottle** _____ **of** ______

Personnel: ______________________________ **Date/Time On-Site:** ___________________________

☐ Halt Sampler program	
☐ Put lid on sample bottle; label sample bottle	
Sample ID:	-WC
Approx Sample Volume (mL):	
Clarity (ex. Clear, Cloudy, Silty):	
Color (ex. Clear, Gray, Tan, Brown, Black):	
QA/QC Sample ID:	-103 (Time: 1200)

Subsample Information

Trigger #	Date/Time	Sampler Message/ Subsample Result	Trigger #	Date/Time	Sampler Message/ Subsample Result
1			13		
2			14		
3			15		
4			16		
5			17		
6			18		
7			19		
8			20		
9			21		
10			22		
11			23		
12			24		

Comments:

If sampling is complete:
- ☐ Power off sampler
- ☐ Verify flowmeter is running
- ☐ Add ice to sample transport cooler
- ☐ Complete COC form; arrange transport to lab

If continuing sampling (sample bottle change-out):
- ☐ Keep flowmeter running
- ☐ Install new 15L bottle; add ice
- ☐ Restart program from beginning

Date/Time Restarted: ________________
- ☐ Verify running

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5”	400 mL	**3.0”**	3500 mL	**5.5”**	7250 mL	**8.0”**	11000 mL	**10.5”**	14750 mL
1.0”	800 mL	**3.5”**	4250 mL	**6.0”**	8000 mL	**8.5”**	11750 mL	**11.0”**	15500 mL
1.5”	1400 mL	**4.0”**	5000 mL	**6.5”**	8750 mL	**9.0”**	12500 mL	**11.5”**	16250 mL
2.0”	2000 mL	**4.5”**	5750 mL	**7.0”**	9500 mL	**9.5”**	13250 mL	**After 12”**	1” = 1500 mL
2.5”	2750 mL	**5.0”**	6500 mL	**7.5”**	10250 mL	**10.0”**	14000 mL	**Lab min**	8,000 mL

Set Up/ Shut Down Form – ISCO

STATION: ______________________________

SET UP

Personnel: ____________________________

Date/Time
On-Site: ______________________________

Time	Level (in)	Flow (cfs)	Velocity (fps)	Battery (V)

Downloaded to:	
Enable Condition:	
Flow Pulse Interval:	

On-Site	**Flowlink** (Refer to Flowlink Instructions, if needed)
☐ Replace flowmeter battery, install sampler battery ☐ Perform decon. cycle ☐ Install 15L sample bottle, with ice ☐ Leave bottle lid at site, in a clean re-sealable plastic bag ☐ Set Sampler program parameters ☐ Check date/time on Sampler ☐ Verify all cable and tubing connections ☐ Verify Sampler Program is running	☐ Direct or Remote; Date/time ____________________ ☐ Retrieve data and review recent flow history ☐ Change Wireless Power Control to Storm Event ☐ Change Data Storage Rates to 1 minute for Level, Velocity, Total Flow, and Flow Rate ☐ Enable Sampler: On Trigger, and set Sampler Enable equation ☐ Set Sampler Pacing to Flow Paced, and set trigger volume

Comments:

SHUT DOWN

Personnel: ____________________________

Date/Time
On-Site: ______________________________

Time	Level (in)	Flow (cfs)	Velocity (fps)	Battery (V)

Downloaded to:	

On-Site	**Flowlink** (Refer to Flowlink Instructions, if needed)
☐ Replace flowmeter battery ☐ Remove battery from sampler	☐ Direct or Remote; Date/time ____________________ ☐ Retrieve data ☐ Change Wireless Power Control to Dry Weather ☐ Change Data Storage Rates to 15 minutes for Level, Velocity, Total Flow, and Flow Rate ☐ Enable Sampler: Never

Comments:

Set Up/ Shut Down Form – HACH

STATION: ______________________________

SET UP

Personnel: ___________________________

Date/Time On-Site: _____________________________

Time	Level (in)	Flow (cfs)	Velocity (fps)	Battery (V)

Downloaded to:	
Velocity Cutoff:	
Trigger Volume:	

- ☐ Download flowmeter, if program is running
- ☐ Install batteries on flowmeter and sampler
- ☐ Perform decon. cycle
- ☐ Install 15L sample bottle, with ice
- ☐ Leave bottle lid at site, in a clean re-sealable plastic bag
- ☐ Verify all cable and tubing connections
- ☐ Check date and time on flowmeter and sampler
- ☐ Set flowmeter program and sampler program parameters
- ☐ Set logging interval to 1 minute
- ☐ Start flowmeter program and sampler program
- ☐ Verify running

Comments:

SHUT DOWN

Personnel: ______________________

Date/Time On-Site: _______________________

Time	Level (in)	Flow (cfs)	Velocity (fps)	Total (cf)	Battery (V)

Downloaded to:	

If flow monitoring is complete:	**If continuing to monitor flow:**
☐ Halt program on flowmeter ☐ Download flowmeter data ☐ Remove flowmeter battery	☐ Replace flowmeter battery ☐ Reset logging interval to 15 minutes ☐ Change velocity cutoff to 0.02 fps ☐ Start program ☐ Verify running

Comments:

Ada County Highway District

Attn: Tammy Lightle
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63058181
Project: Stormwater-PI
Sampler(s):

							Matrix	Type																	
Lab#	**Begin Date**	**End Date**	**Begin Time**	**End Time**	**Sample Identification**	**Sampler Initials**	Water	Grab	Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - EPA 351.2	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.8	Diss. Cd Cu, Pb, Zn - EPA 200.8	Total Hg - EPA 245.2	E. Coli - IDEXX Collilert	Turbidity - EPA 180.1	Hardness - EPA 200.7	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers

Relinquished by (sign)	**Date & Time Transferred**	**Received by (sign)**	**Comments/Special Instructions:**

SAMPLING EVENT COMMUNICATION FORM

Date: 5/12/2022	Time: 7:51 AM	Initials: TL
Is there a targeted sampling event during the next 36 hours? (Or, if it is Friday, is a targeted event expected before 5:00 PM Monday?)		No

Past 72 hr Precip	0.10”
Date and time of expected event	
Expected amount of precipitation	
Percent chance of precipitation	
Percent chance of >0.10” over 12 hours	

NWS Update

Targeted Station & Samples

Lucky	Whitewater	Main	Americana	AS_6	State (Phase II)
☒ Grab	☐ Grab	☒ Grab	☐ Grab	☒ Grab	☐ Grab
☒ Composite	☒ Composite	☒ Composite	☒ Composite	☒ Composite	☐ Composite

Type of Forecasted Precipitation

☐ Light Rain ☐ Rain ☐ Rain on Snow
☐ Scattered Showers ☐ Thunder Showers ☐ Snowmelt
☐ Other:

Reasons for Not Targeting a Forecasted Storm and/or Stations

☐ Holiday
☒ Waiting on Antecedent Dry Period – Expires: 5/12 10:46 AM
☐ Equipment Concerns:
☐ Other:

Text Forecast

NWS Forecast for: Boise ID
Issued by: National Weather Service Boise, ID
Last Update: 4:55 am MDT May 12, 2022

Today: Partly sunny, with a high near 62. Light and variable wind.
Tonight: Showers likely, mainly after midnight. Mostly cloudy, with a low around 44. Southwest wind around 5 mph becoming calm in the evening. Chance of precipitation is 60%.
Friday: A 20 percent chance of showers before noon. Mostly cloudy, with a high near 63. Calm wind becoming west northwest 5 to 7 mph in the afternoon.
Friday Night: A 50 percent chance of showers after midnight. Mostly cloudy, with a low around 48. North northwest wind around 5 mph becoming calm in the evening.
Saturday: A 50 percent chance of showers, mainly before noon. Cloudy, with a high near 69. Calm wind.
Saturday Night: Partly cloudy, with a low around 49.
Sunday: Mostly sunny, with a high near 82.
Sunday Night: A 20 percent chance of showers and thunderstorms before midnight. Partly cloudy, with a low around 53.
Monday: Mostly sunny, with a high near 78.
Monday Night: Partly cloudy, with a low around 52.
Tuesday: Mostly sunny, with a high near 76.

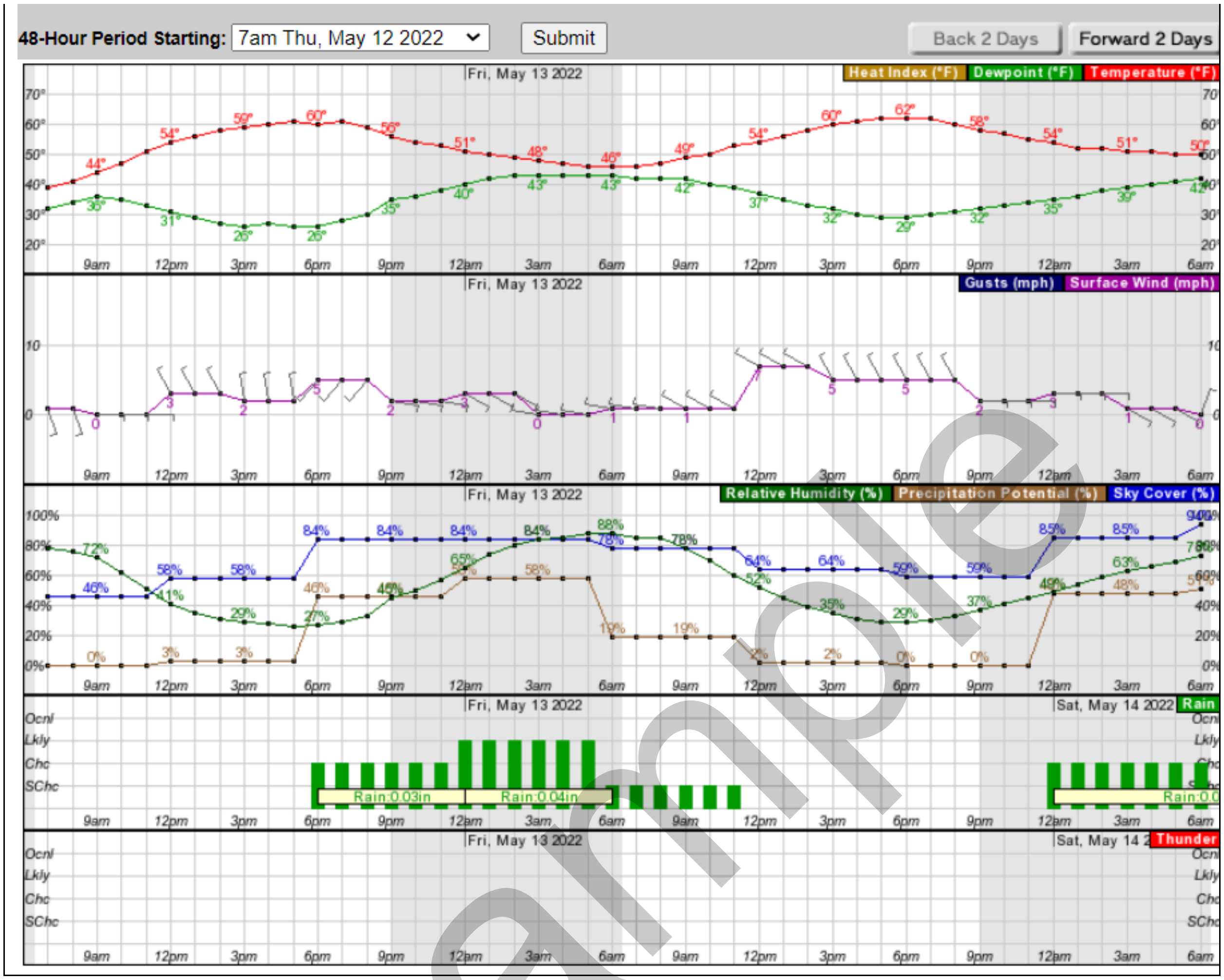
Tuesday Night: Partly cloudy, with a low around 47.
Wednesday: Partly sunny, with a high near 69.

Forecast Discussion
Area Forecast Discussion
National Weather Service Boise ID
342 AM MDT Thu May 12 2022

.SHORT TERM...Today through Saturday night...Zonal flow will continue mostly dry and mild conditions to the region through Thursday morning. **Precipitation ahead of a weaker upper level trough will move into** southeast Oregon on Thursday afternoon, and then into the **southwest Idaho on Thursday evening**. Isolated thunderstorms are expected in northwest Baker and Harney Counties in Oregon as this system pushes in on Thursday afternoon. Snow showers are expected above 5500 feet MSL, with snow amounts totaling 1-3 inches for higher elevations. Showers will linger in southwest Idaho through early Friday morning, but areas south of the Owyhee Mountains are expected to stay dry through this event. **Another push of moisture ahead of a weak shortwave trough will move into** Baker County, OR, the West Central Mountains, and **Upper Treasure Valley on Friday evening, bringing light rain and snow showers to the northern half of our region.** Snow levels will elevate to 6500-7500 feet MSL overnight on Friday, bringing snow mainly to the high peaks. Thunderstorms are also possible on Saturday afternoon in the northern reaches of our CWA with this second system. A ridge will build into the region on Saturday night, bringing dry and mostly clear conditions overnight. Temperatures will remain 5-10 degrees below normal through Friday night, but ridging from our southwest will warm temperatures to near normal on Saturday.

.LONG TERM...Much warmer Sunday after passage of a warm front Saturday night. Pacific cold front late Sunday and Sunday evening will bring showers and (possibly strong) thunderstorms mainly to northern areas, gusty winds, and cooler temps. Clearing and cooler Monday morning but a second, weaker cold front will bring another chance of showers and thunderstorms to Baker County and the mountains in Idaho later Monday and Monday evening. Partly cloudy, windy, and cool Tuesday under strong westerly flow aloft, with a slight chance of rain and high-mountain snow showers in the Idaho central mountains. Next Pacific cold front Wednesday with showers and thunderstorms (mainly north), gusty winds, and further cooling, then showery in all areas Thursday with snow in the mountains and even cooler temps as the upper trough passes through.

Hourly Forecast


48-Hour Period Starting:
7am Thu, May 12 2022
Submit
Back 2 Days
Forward 2 Days
Fri, May 13 2022
Heat Index (°F)
Dewpoint (°F)
Temperature (°F)
Gusts (mph)
Surface Wind (mph)
Relative Humidity (%)
Precipitation Potential (%)
Sky Cover (%)
Sat, May 14 2022
Rain
Rain:0.03in
Rain:0.04in
Thunder
Ocnl
Lkly
Chc
SChc
9am
12pm
3pm
6pm
9pm
12am
3am
6am

Appendix C: Full QA/QC Sampling Schedule

Phase I QC Sample[1,2] Schedule for WY22

Site Name	Assigned #
Lucky	1
Whitewater	2
Main	3
Americana	4
AS_6	5

Wet Grab Sample Schedule						
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Plan	Main	Main	Lucky	Main	Lucky	Lucky
Alt 1	AS_6	Americana	AS_6	AS_6	Whitewater	AS_6
Alt 2	Whitewater	Lucky	Whitewater	Whitewater	Main	Americana
Alt 3	Americana	AS_6	Americana	Lucky	Americana	Whitewater

Composite Duplicate Schedule[3]	
Plan	AS_6
Alt 1	Americana
Alt 2	Lucky
Alt 3	Whitewater

Composite Field Blank Schedule	
Plan	Main
Alt 1	Whitewater
Alt 2	Lucky
Alt 3	AS_6

Equipment Blank Schedule[4]	
Collect in Fall 2021, for WY22	
Plan	Main
Alt 1	Whitewater
Alt 2	Lucky
Alt 3	Americana

Rinsate Blank Schedule[4]	
Collect in Fall 2021, for WY22	
Plan	Main
Alt 1	Whitewater
Alt 2	AS_6
Alt 3	Americana

Notes:

[1] Grab QC samples will be analyzed for grab sample constituents. Composite QC samples will be analyzed for composite sample constituents.

[2] The first site listed is the planned QC site. The next three sites are the alternate sites and are prioritized in the order listed.

[3] The composite sample duplicate will be collected at the earliest opportunity and is contingent upon sample volumes.

[4] Blanks will be collected during monitoring station maintenance events and will be analyzed for composite sampling constituents.

Phase I QC Sample[1,2] Schedule for WY23

Site Name	Assigned #
Lucky	1
Whitewater	2
Main	3
Americana	4
AS_6	5

Wet Grab Sample Schedule						
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Plan	Lucky	Main	AS_6	Lucky	Lucky	Main
Alt 1	Americana	Lucky	Whitewater	AS_6	Main	AS_6
Alt 2	Whitewater	AS_6	Main	Whitewater	AS_6	Lucky
Alt 3	AS_6	Americana	Lucky	Main	Whitewater	Whitewater

Composite Duplicate Schedule[3]	
Plan	Whitewater
Alt 1	Main
Alt 2	AS_6
Alt 3	Americana

Composite Field Blank Schedule	
Plan	AS_6
Alt 1	Main
Alt 2	Lucky
Alt 3	Americana

Equipment Blank Schedule[4]	
Collect in Fall 2022, for WY23	
Plan	AS_6
Alt 1	Americana
Alt 2	Main
Alt 3	Lucky

Rinsate Blank Schedule[4]	
Collect in Fall 2022, for WY23	
Plan	AS_6
Alt 1	Lucky
Alt 2	Americana
Alt 3	Main

Notes:

[1] Grab QC samples will be analyzed for grab sample constituents. Composite QC samples will be analyzed for composite sample constituents.

[2] The first site listed is the planned QC site. The next three sites are the alternate sites and are prioritized in the order listed.

[3] The composite sample duplicate will be collected at the earliest opportunity and is contingent upon sample volumes.

[4] Blanks will be collected during monitoring station maintenance events and will be analyzed for composite sampling constituents.

Phase I QC Sample[1,2] Schedule for WY24

Site Name	Assigned #
Lucky	1
Whitewater	2
Main	3
Americana	4
AS_6	5

Wet Grab Sample Schedule						
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Plan	AS_6	Americana	Lucky	Main	Whitewater	Main
Alt 1	Lucky	AS_6	Main	Whitewater	Main	Americana
Alt 2	Americana	Whitewater	Whitewater	Lucky	AS_6	Lucky
Alt 3	Main	Main	Americana	AS_6	Americana	AS_6

Composite Duplicate Schedule[3]	
Plan	Americana
Alt 1	Main
Alt 2	Whitewater
Alt 3	Lucky

Composite Field Blank Schedule	
Plan	Lucky
Alt 1	AS_6
Alt 2	Americana
Alt 3	Main

Equipment Blank Schedule[4]	
Collect in Fall 2023, for WY24	
Plan	Main
Alt 1	Whitewater
Alt 2	AS_6
Alt 3	Americana

Rinsate Blank Schedule[4]	
Collect in Fall 2023, for WY24	
Plan	Americana
Alt 1	Whitewater
Alt 2	AS_6
Alt 3	Main

Notes:
[1] Grab QC samples will be analyzed for grab sample constituents. Composite QC samples will be analyzed for composite sample constituents.
[2] The first site listed is the planned QC site. The next three sites are the alternate sites and are prioritized in the order listed.
[3] The composite sample duplicate will be collected at the earliest opportunity and is contingent upon sample volumes.
[4] Blanks will be collected during monitoring station maintenance events and will be analyzed for composite sampling constituents.

Phase I QC Sample[1,2] Schedule for WY25

Site Name	Assigned #
Lucky	1
Whitewater	2
Main	3
Americana	4
AS_6	5

Wet Grab Sample Schedule						
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Plan	Americana	AS_6	Whitewater	Main	AS_6	AS_6
Alt 1	Main	Main	Main	Lucky	Whitewater	Americana
Alt 2	AS_6	Americana	Lucky	Whitewater	Lucky	Lucky
Alt 3	Whitewater	Whitewater	Americana	Americana	Main	Whitewater

Composite Duplicate Schedule[3]	
Plan	Lucky
Alt 1	Whitewater
Alt 2	Americana
Alt 3	AS_6

Composite Field Blank Schedule	
Plan	AS_6
Alt 1	Main
Alt 2	Americana
Alt 3	Lucky

Equipment Blank Schedule[4]	
Collect in Fall 2024, for WY25	
Plan	AS_6
Alt 1	Lucky
Alt 2	Americana
Alt 3	Whitewater

Rinsate Blank Schedule[4]	
Collect in Fall 2024, for WY25	
Plan	Americana
Alt 1	Lucky
Alt 2	Main
Alt 3	Whitewater

Notes:
[1] Grab QC samples will be analyzed for grab sample constituents. Composite QC samples will be analyzed for composite sample constituents.
[2] The first site listed is the planned QC site. The next three sites are the alternate sites and are prioritized in the order listed.
[3] The composite sample duplicate will be collected at the earliest opportunity and is contingent upon sample volumes.
[4] Blanks will be collected during monitoring station maintenance events and will be analyzed for composite sampling constituents.

Phase I QC Sample[1,2] Schedule for WY26

Site Name	Assigned #
Lucky	1
Whitewater	2
Main	3
Americana	4
AS_6	5

Wet Grab Sample Schedule						
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Plan	Whitewater	Main	Lucky	Lucky	Main	AS_6
Alt 1	AS_6	AS_6	Americana	Americana	Lucky	Whitewater
Alt 2	Americana	Lucky	AS_6	Whitewater	Americana	Main
Alt 3	Main	Americana	Main	Main	Whitewater	Lucky

Composite Duplicate Schedule[3]	
Plan	AS_6
Alt 1	Whitewater
Alt 2	Lucky
Alt 3	Main

Composite Field Blank Schedule	
Plan	Whitewater
Alt 1	Main
Alt 2	AS_6
Alt 3	Americana

Equipment Blank Schedule[4]	
Collect in Fall 2025, for WY26	
Plan	AS_6
Alt 1	Lucky
Alt 2	Main
Alt 3	Americana

Rinsate Blank Schedule[4]	
Collect in Fall 2025, for WY26	
Plan	Lucky
Alt 1	Whitewater
Alt 2	Americana
Alt 3	Main

Notes:
[1] Grab QC samples will be analyzed for grab sample constituents. Composite QC samples will be analyzed for composite sample constituents.
[2] The first site listed is the planned QC site. The next three sites are the alternate sites and are prioritized in the order listed.
[3] The composite sample duplicate will be collected at the earliest opportunity and is contingent upon sample volumes.
[4] Blanks will be collected during monitoring station maintenance events and will be analyzed for composite sampling constituents.