Stormwater Monitoring Plan for the City of Caldwell Municipal Separate Storm Sewer Permit (MS4)

Prepared by:
City of Caldwell
Stormwater Compliance Team
Engineering Department

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Caldwell MS4 Monitoring Plan Approvals

Prepared by City of Caldwell Stormwater Compliance Team

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Acronyms

BMP	Best Management Practice
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
IDEQ	Idaho Department of Environmental Quality
ITD	Idaho Transportation Department
MS4	Municipal Separate Storm Sewer System
IPDES	Idaho Pollutant Discharge Elimination System
NUA	Nampa Urbanized Area
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SDMH	Storm Drain Manhole

Section 1: Introduction

As part of its Idaho Pollutant Discharge Elimination System (IPDES) Municipal Separate Storm Sewer System (MS4) Permit (Permit) requirements, the City of Caldwell, hereafter referred to as "the City," is required to develop and implement a stormwater monitoring program.

Despite being located within the extents of the Nampa Urbanized Area (NUA), the Environmental Protection Agency, Region 10 (EPA) issued City of Caldwell its own MS4 permit (Permit Number IDS-028118) which the City does not share with other permittees. The Stormwater Monitoring Plan has been developed in conjunction with the Quality Assurance Plan (QAPP) to meet the specific stormwater monitoring requirements and objectives are defined in Part 4.2 and Part 6.2 of the NPDES MS4 Permit. This permit tasks the City of Caldwell with monitoring stormwater pollutant discharges and activities to Indian Creek, Mason Creek, and the Boise River.

The City of Caldwell will develop and oversee its own stormwater monitoring program. The City may also implement additional monitoring activities itself as questions and needs arise.

Conducting monitoring activities as described in this plan will allow The City to evaluate pollutant sources, characterize stormwater discharges, evaluate receiving water trends (when sufficient data have been collected), and identify effects of MS4 discharges on receiving waters. Additionally, the monitoring activities will provide the City with information to support incremental and long-term stormwater program adjustments.

Section 2: Stormwater Monitoring Objectives

The purpose of this monitoring plan is to address the minimum permit requirements for wet weather stormwater as described in Permit Part 6.2.5. The Permit states that the Permittees must attempt to quantify pollutant loadings from the MS4 and, no later than two years from the effective date of this Permit, develop a monitoring plan that includes the quality assurance requirements defined in Part 6.2.

The City must develop and implement a monitoring program to accomplish the following objectives:

- Estimate the pollutant loading currently discharged from the MS4
- Assess the effectiveness and adequacy of control measures implemented through this Permit (pollutant reduction activities)

The City examines the following pollutant parameters: temperature, E.coli, sediment, and total phosphorus from discharges into Indian Creek, Mason Creek, and the Boise River.

Watershed Descriptions

Each of these watersheds differ in type of upstream development, tributaries, and runoff control measures. Therefore, the method of selecting a sampling location for each watershed is different. We will examine the details of each watershed below. Each discussion pertains to the portion(s) of each

watershed within the City of Caldwell and its adjacent impact area. Note that other portions of Indian Creek, Mason Creek, and the Boise River pass through communities adjacent to the City of Caldwell.

2.1 Indian Creek

Tributary development type(s). Most of the locations that drain to Indian Creek are new and old commercial businesses, undeveloped pasture (along Chicago Ave), or are part of the City's downtown and/or historical districts (Blaine St & Cleveland Blvd). With the exception of new commercial developments, most of these other sites drain to Indian Creek with minimal to no control measures. Along Chicago Ave, pastures with livestock drain directly to the Creek. In the downtown and historic districts, minimal space for control infrastructure, siphon catch basins, and large trees can contribute to the nutrient load.

Typical upstream and on-stream control measures. Control measures upstream of Indian Creek are relatively minimal due to the era of the downtown and historic district development. Newer developments like the Creekside Subdivision (circa 1990) have onsite stormwater storage. The Wilson Drain, which is a significant tributary to Indian Creek, is predominantly bordered by commercial development – about half of which is new enough to have onsite stormwater storage and/or another control mechanism.

Tributary waterways. Many agricultural drains are tributary to Indian Creek. These waterways are typically composed of groundwater and runoff from gravity irrigation of row crops, so they contain high nutrient loads.

Table 2-1. Waterways Tributary to Indian Creek

Location	Diversion	Lat, Long
Kuna	Indian Creek diverges from the New York Canal at the Callopy Gates	(43.531291, -116.467131)
Caldwell	Midway Drain enters Indian Creek at Laster St.	(43.625116, -116.624077)
Caldwell	Moses Drain enters Indian Creek at Ustick Rd.	(43.633661, -116.637614)
Caldwell	East Caldwell Drain enters Indian Creek across a pasture.	(43.641113, -116.646010)
Caldwell	Wilson Drain (which is often similar to Indian Creek in flow volume) converges with Indian Creek at Stock Trail Rd.	(43.654989, -116.668381)
Caldwell	An unnamed drain at 17th Ave enters Indian Creek.	(43.660478, -116.676640)

Indian Creek joins with the Riverside Canal, and they share a channel for a short length at (43.673573, -116.697487) near the Caldwell Wastewater Treatment Plant. During irrigation season, all of the Indian Creek flow is consumed by Riverside Irrigation District, and is delivered to farms west of Caldwell via the

Riverside Canal. Outside of irrigation season, the Indian Creek flow is re-diverted to the Indian Creek channel at (43.673648, -116.702147) where it can shortly return to the Boise River.

Total Maximum Daily Loads (TMDLs). In 2015, DEQ established a TMDL on "Indian Creek – Sugar Ave to Boise River" for bacteria (E.coli) and sediment, and the entire lower Boise River basin was listed for phosphorus. Though no TMDL exists, this reach is also considered impaired for temperature.

Other potential influences to water quality. In historic and downtown Caldwell, many stormwater conveyances have no treatment or flood control capacity. At approximately five locations, stormwater channels share with irrigation return flow before reaching Indian Creek. Pioneer Irrigation District operates these irrigation overflow sites.

Shared outfalls. On Indian Creek, the MS4 infrequently shares outfalls with irrigation overflows and return flows. As new development and funding allow, we attempt to separate these channels when feasible.

Recommended approach to stormwater sampling: Avoid outfalls shared with irrigation return flows. Select an outfall in historic or downtown Caldwell that is representative of the discharges from Indian Creek watershed within Caldwell City limits. In order to comply with our pollutant reduction proposal, we intend to continue sampling from the 12th Ave outfall IND-0545D. This outfall has many years of historic monitoring data and two microbial source-tracking studies. City staff have seen intermittent E.coli hits of human source; they need to continue sampling of this outfall and stormwatershed to determine whether the cause is a cross connection, surcharged sewer main, a failed septic drain field, or another source.

2.2 Mason Creek

Tributary development type(s). Mason Creek begins as a small diversion from the Ridenbaugh Canal (43.558492, -116.471529). Mason Creek acts as an irrigation water source and agricultural irrigation returns before reaching the City of Nampa. Through Nampa, Mason Creek flows through commercial, residential, and industrial development areas. Mason Creek reaches the eastern Caldwell city limits at the intersection of Midland Blvd and Linden Ave.

Typical upstream and on-stream control measures. Within Caldwell, most of the development tributary to Mason Creek is composed of new, residential communities. These planned developments are typically equipped with in-parallel sand-and-grease traps and a minimum of 25-year storm storage capacity. Some basins are equipped with overflows to surface water and some are not, depending on access. Therefore, most contributions to Mason Creek flow are groundwater or agricultural in nature.

Tributary waterways. Many agricultural drains are tributary to Mason Creek. These waterways are typically composed of groundwater and runoff from gravity irrigation of row crops, so they contain high nutrient loads.

Table 2-2. Waterways Tributary to Mason Creek

Location	Diversion	Lat, Long
Caldwell	Maddens Spur Drain enters Mason Creek east of Middleton Rd.	(43.659701, -116.608500)
Caldwell	Noble Drain enters Mason Creek near Marble Front Rd.	(43.673768, -116.629281)
Caldwell	Lower Fivemile Drain enters Mason Creek near Marble Front Rd.	(43.674147, -116.646615)
Caldwell	Solomon Drain enters Mason Creek SE of the intersection of Mason Rd and Lincoln Rd.	(43.675883, -116.646615)
Caldwell	"A" Drain enters Mason Creek at Polk Street.	(43.683623, -116.666046)
Caldwell	Lower Noble Drain enters Mason Creek near the NE corner of Canyon Hill geologic formation.	(43.691349, -116.672859)
Caldwell	Mason Creek enters the Boise River	(43.692699, -116.677851)

Total Maximum Daily Loads (TMDLs). In 2015, DEQ established a TMDL on Mason Creek for bacteria (E.coli) and sediment, and the entire lower Boise River basin was listed for phosphorus. Though no TMDL exists, this reach is also considered impaired for temperature and chlorpyrifos. (Chlorpyrifos is an organophosphate insecticide, acaricide and miticide used to control foliage and soil-borne insect pests.)

Other potential influences to water quality. Agricultural deliveries and returns are the greatest influence to Mason Creek water quality. Groundwater is a year-round contributor to most drains, including those tributary to Mason Creek. Stormwater is not a significant contributor to the flow or pollutants in Mason Creek due to the control mechanisms installed with each new development.

Shared outfalls. It is atypical to find shared outfalls (irrigation and storm) to Mason Creek. Most development tributary to Mason Creek or its tributaries is relatively new residential. Stormwater facilities may overflow directly to a drain, rather than a farmer's ditch. These control mechanisms are equipped with retention control mechanisms for a minimum of a 25-year storm event.

Recommended approach to stormwater sampling. Stormwater discharges to surface water are atypical in the Mason Creek watershed in Caldwell. We recommend continued monitoring of two stormwater retention basins—in the Delaware Park subdivision, tributary to the Noble Drain, and in Copper Creek subdivision, tributary to the Solomon Drain, which are representative of MS4 discharges to Mason Creek and its tributaries.

2.3 Boise River

Tributary development type(s). Caldwell's 1950's era residential neighborhood called Golden Gate Addition is tributary to the Boise River. Golden Gate Irrigation District serves this neighborhood gravity irrigation. The delivery, overflow, and drainage network is largely interconnected with the storm drain

network. Some locations intermittently see groundwater as shallow as three feet deep. In addition, Interstate 84 bisects this neighborhood and intermingles freeway runoff with the MS4.

Typical upstream and on-stream control measures. Upstream control measures are minimal, since this aged part of the City utilizes shared drainage infrastructure.

Tributary waterways. Both Indian Creek (outside of irrigation season) and Mason Creek are tributary to the Boise River.

Total Maximum Daily Loads (TMDLs). Boise River received a TMDL for bacteria (fecal coliform) and sediment in 2000. By 2015, a TMDL for total phosphorus was added. The "Boise River – Middleton to Indian Creek" is also known to be impaired for temperature.

Other potential influences to water quality. This neighborhood presents significant potential for high groundwater to leak into the stormwater drainage network. In addition, many conveyance channels transport commingled irrigation and stormwater drainage. EPA has authorized Darigold milk and butter manufacturing to discharge some of their process water to the Boise River by way of the City's MS4 network.

Shared outfalls. All seven outfalls to the Boise River allow the escape of commingled waters. The single outfall that is not commingled sources is commingled between Interstate 84 and the City's MS4.

Recommended approach to stormwater sampling. Due to the frequent commingling of waters in this stormwatershed, we do not recommend sampling at a Boise River outfall. We will focus on selecting a sampling location without the influence of groundwater, irrigation overflow, or runoff from Interstate 84. Such location must be tributary to the Boise River and avoid further influence of Darigold discharges.

Section 3: Stormwater Monitoring

According to the Permit, the stormwater discharge monitoring program must include the following:

- **Representative Sampling** – Samples, measurements, and/or assessments conducted in compliance with this Permit must be representative of the nature of the monitored discharge or activity. Staff will select sampling locations and methods with the intent to collect samples that are representative of MS4 discharges to the waters of the U.S. (WOTUS). The sample contents may also act as an indication of the effectiveness of structural control mechanisms and BMPs toward targeted pollutant reduction.
- **Monitoring Procedures** – Sample collection, preservation, and analysis must be conducted according to sufficiently sensitive methods/test procedures approved under 40 CFR Part 136. Where an approved 40 CFR Part 136 method does not exist, and other test procedures have not been specified, any standard, scientifically defensible method may be used.
- **Quantify Pollutant Loadings** – For monitoring activities associated with this monitoring plan, the Permittees must identify the location, sample type, parameters, and frequency of samples, as well as develop a Quality Assurance Project Plan (Permit Part 6.2.6), and submit all data collected in the annual report submitted to EPA.

3.1 Monitoring Parameters

The City must meet the monitoring requirements listed in Parts 4.2 and 6.2 of the Permit, which at a minimum includes monitoring E.coli, sediment, and temperature loadings from the MS4 to Indian Creek, Mason Creek, and the Boise River.

To accomplish this, grab samples will be collected from a vetted sampling location, which carries flow tributary to each of the drainages. Each grab sample is indicative of the stormwater quality exiting the City's MS4. Following the storm event, staff may be able to use precipitation data from any of the City's three WeatherLink stations to characterize the storm magnitude, and flow volume by extension.

Staff will collect samples only during storm and snowmelt events where safe conditions exist. Staff shall attempt to sample quarterly, but may reschedule a sampling event due to a wetter season if weather does not cooperate. The analytical methods for use in stormwater monitoring are listed in the table below. These methods will be conducted in accordance with 40 CFR Part 136. In specific conditions there may be required substitution of an alternative Part 136 method by the testing laboratory or instrument. Monitoring activities are further described in Section 3.3.2.

Table 3-1. Monitoring Parameters, Frequency, and Type

Parameter	Monitoring Frequency	Analytical Method	Sample Type
Total Suspended Solids	Quarterly, or 4 times per year	SM 2540 D or USGS I-3765	Grab
E. coli	Quarterly, or 4 times per year	IDEXX Colilert or SM 9223	Grab
Total Phosphorus	Quarterly, or 4 times per year	EPA 200.7 or EPA 365.4	Grab
Total Nitrogen	Quarterly, or 4 times per year	SM4500 N (TKN) EPA 353.2 (NO_2+NO_3)	Grab
Temperature	Quarterly, or 4 times per year		Field Measurement
Flow depth in pipe	Quarterly, or 4 times per year		Field Measurement

Total Suspended Solids – Excess sediment in rivers and streams can exacerbate ecological issues, including habitat deterioration and food chain disruptions. Sources of sediment in the Boise River and its tributaries are often high in sediment during irrigation season due to runoff from gravity-irrigated croplands. On an intermittent basis, stormwater runoff may also cause entry of sediment into local surface waters.

E. coli - *E. coli* are a type of bacteria found in the gut of healthy people and animals. Although many strains of *E. coli* are harmless, some can make people sick. E.coli presence can indicate fecal contamination from a human or animal source. Potential sources of E.coli in stormwater runoff can be

caused by homeless defecation, a failed septic system, deficient sewer service or main, illicit connection, bird/pet/livestock waste, irrigation return flows, or something else.

Total Phosphorus – High phosphorus levels can cause excessive growth of algae and other aquatic plants. This decreases the amount of dissolved oxygen and negatively affects the survival of aquatic life. Local phosphorus sources include contaminated groundwater, agricultural runoff, discharges from wastewater treatment facilities and stormwater runoff. Over-application of fertilizer and natural decay of vegetation are the primary sources within agricultural and stormwater runoff.

Total Nitrogen – Nitrogen is an element and necessary component of foods and fertilizers. It is a nutrient vital to plant growth. One form of nitrogen, nitrate is produced by plants and other organic matter that return nitrate to the soil as they decompose. Subsurface sewage disposal systems, animal feedlot waste material, and nitrogen-based fertilizers also release nitrate to the environment.

Temperature – Per EPA's website (https://www.epa.gov/caddis-vol2/temperature), anthropogenically induced temperature fluctuations cause unintended physical, chemical, and biological impacts to the waterbody. "Temperatures in streams and rivers are influenced by many atmospheric and hydrologic processes affecting the movement of heat. In turn, temperature plays a fundamental role in shaping the structure and function of aquatic systems. ... Temperature should be listed as a candidate cause when potential or observed human source and activities, site observations or observed effects support portions of the source-to-impairment pathways. The more the thermal regime departs from the natural regime, the more likely it is to cause undesirable biological effects."

3.2 Site Locations and Monitoring Descriptions

Stormwater compliance staff selected sites from which the sampling team could collect representative samples of discharges to Indian Creek, Mason Creek, and the Boise River. At each of these locations, we propose quarterly monitoring of discharges for total suspended solids (TSS), total phosphorus, E.coli, and temperature. Staff selected each site with the intent to avoid extraneous influences, such as agricultural runoff/overflow, groundwater, artesian flow, or stormwater from other jurisdictions, such as Idaho Transportation Department's Interstate 84.

In addition, City stormwater staff will continue investigative E.coli monitoring and tracing at our 12th Ave & Indian Creek outfall, as described in our pollutant reduction activities.

3.2.1 Permit Required Monitoring

City of Caldwell stormwater staff will conduct the following stormwater discharge monitoring activities to satisfy Permit requirements to quantify pollutant loadings from the MS4 into Indian Creek, Mason Creek, and the Boise River. In this section, we will examine each the challenges associated with and the reasons for selection of sampling sites from each drainage.

Indian Creek Site – 12th Ave & Indian Creek (Outfall IND-0545D)

A significant portion of the land that drains to Indian Creek is historic residential, which sometimes includes unknown, miscellaneous, or abandoned irrigation and storm drainage infrastructure in back yards or at other atypical locations.

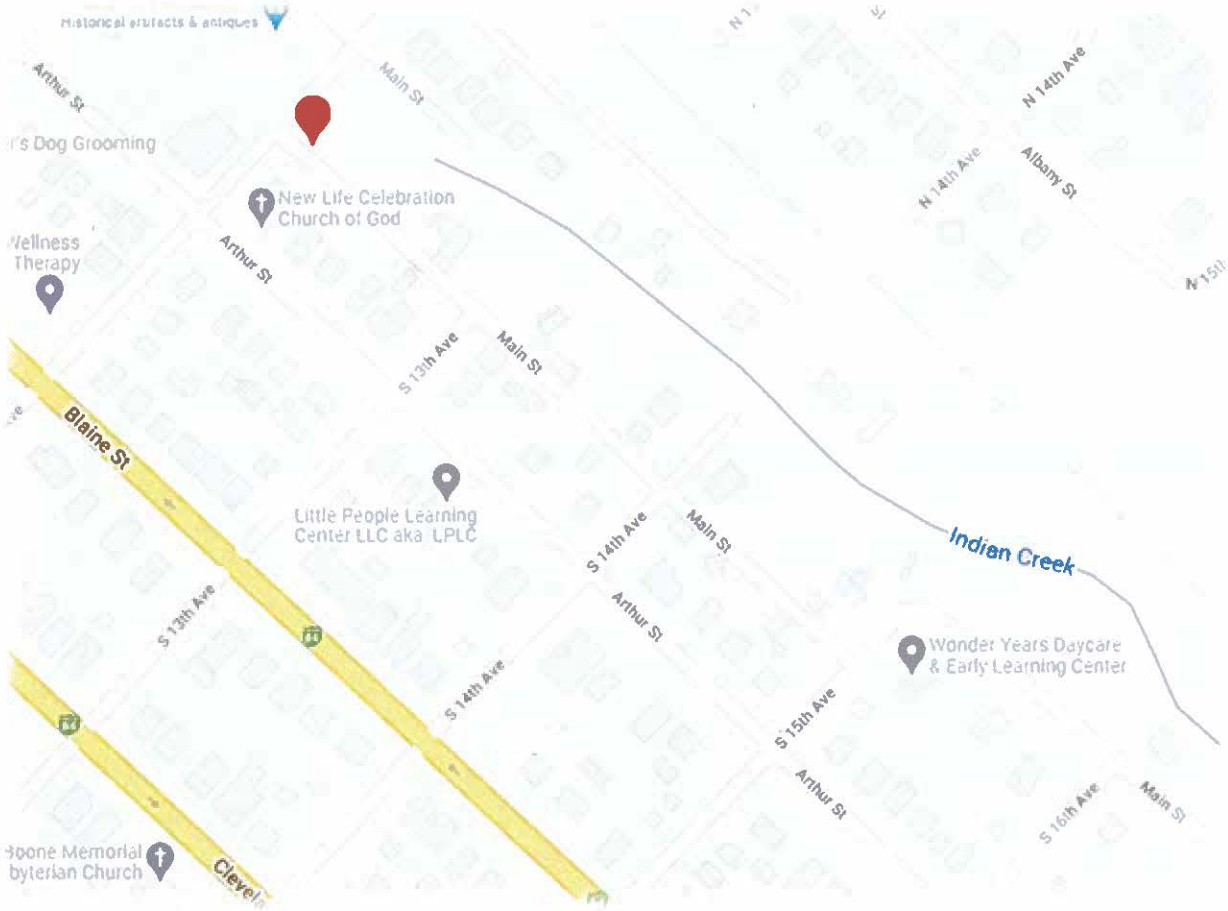
The aged drainage infrastructure in this storm drainage network includes many siphons. We suspect that the siphons in the Dorman Addition neighborhood were installed circa early 1900's, near the same time that the homes were constructed.

With sufficient slope, siphons are a functional mechanism of transporting water across a roadway intersection. Construction of siphons eliminates the need for a valley gutter across a busy roadway, and it reduces the quantity of pipe required to achieve drainage to the outfall. In addition, siphons greatly reduce the potential for a cross connection because the flow is intermittently visible and the siphon pipe is much shallower than a typical sewer main or service. When considering stormwater quality, siphons may be a less desirable mechanism due to inhibited ability to drain *completely*. Water left inside the pipe at the end of a storm is unable to exit the siphon until the next storm. This can present an opportunity for bacteria to proliferate.

For this proposal, we opt to continue monitoring the IND-0545D outfall at the 12th Ave Bridge over Indian Creek, more precisely located at 43.663084, -116.683243. This site already has a long monitoring history, but sampling staff have not yet been able to pin down the intermittent E.coli source. Thus far, we have even performed two rounds of microbial source tracking in collaboration with EPA's Port Orchard, WA laboratory.

We also like the IND-0545D outfall because there is no known commingling of storm runoff with groundwater, irrigation, or other influences. The site is readily accessible with vehicle in the public right of way.

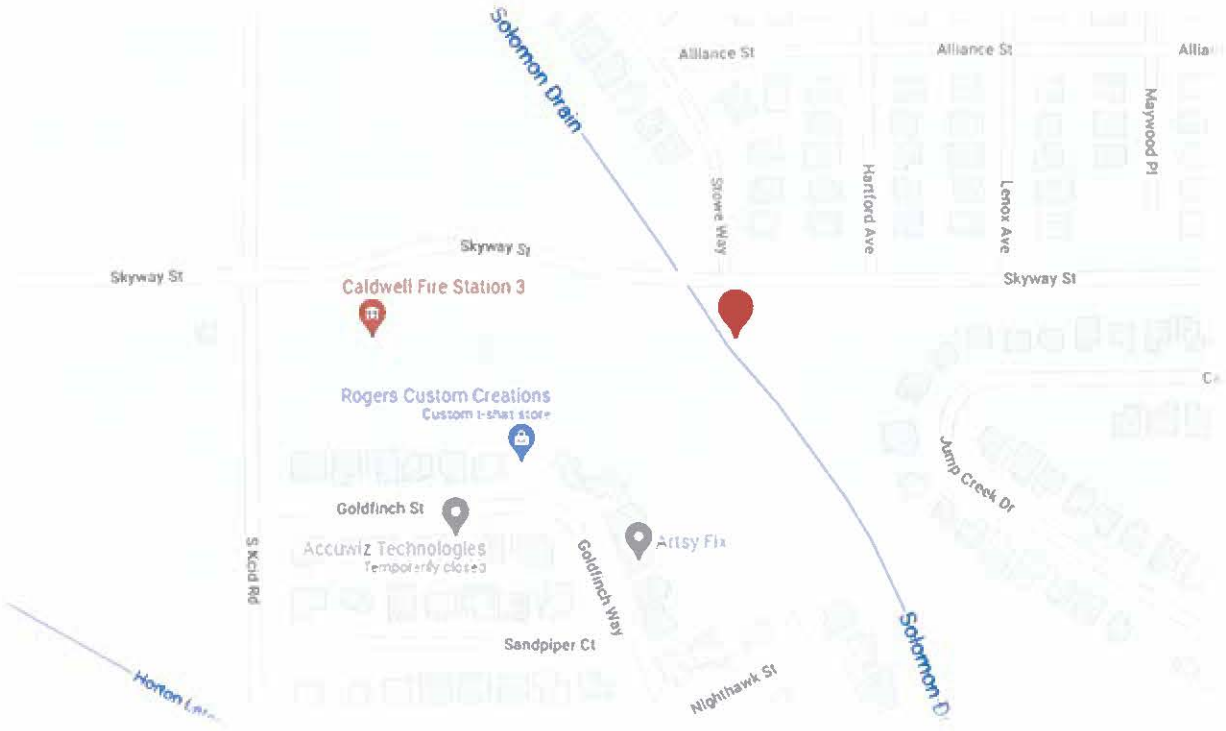
Map A. Indian Creek Monitoring Site at 12th Ave Bridge (courtesy of Google Maps)



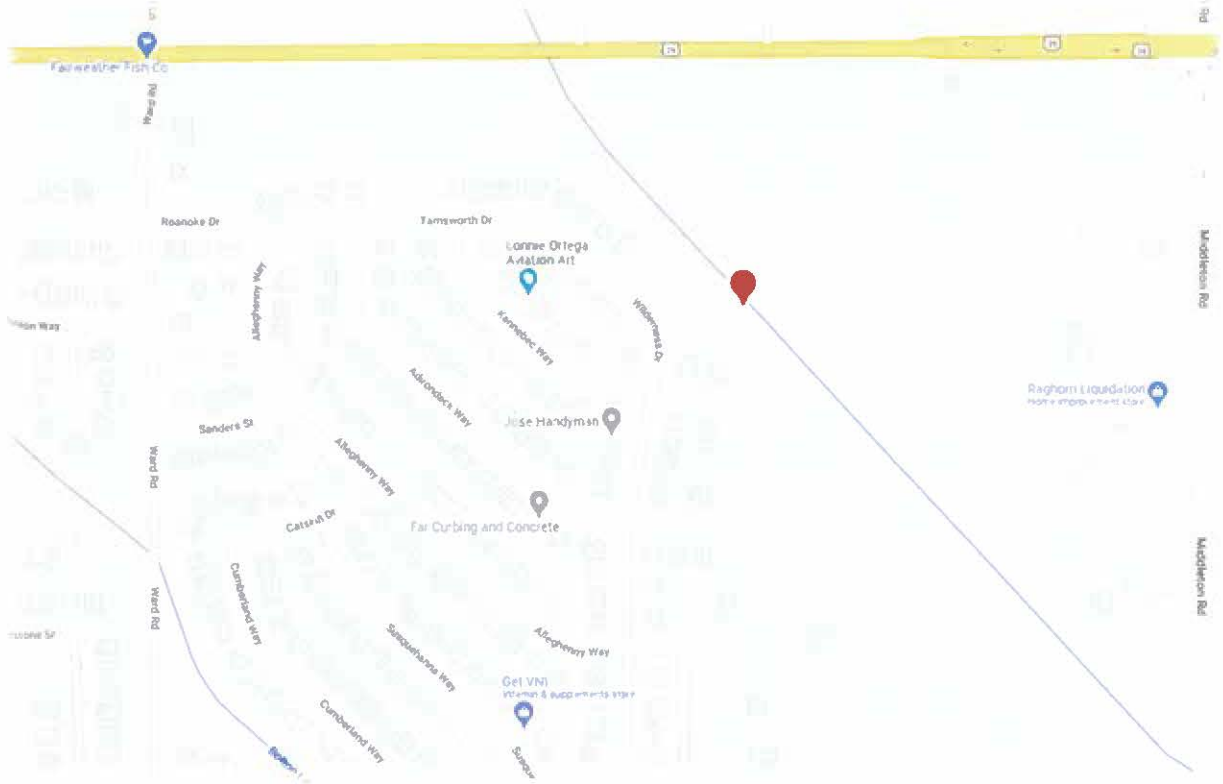
Mason Creek Site(s) – Noble Drain at Outfall NOB-0214B and Solomon Drain at Outfall SOL-0165A
Both the Noble Drain and the Solomon Drain are tributaries of Mason Creek. The primary use of each of these facilities is to receive and deliver agricultural flows during irrigation season. The Solomon Drain carries seepage all year to keep Caldwell groundwater from inconveniently rising in elevation. The Mason Creek developed drainage is composed of relatively new residential construction; it is standard for control mechanisms on developed properties to carry a minimum 25-year event capacity. Therefore, it is unlikely for these outfalls to discharge during a climate-typical storm event.

We propose a (1) Noble Drain sampling site located at 43.661335, -116.617651, from a stormwater pond in the Delaware Park subdivision, and a (2) Solomon Drain sampling site located at 43.655451, -116.629855, from a stormwater pond in the Copper Creek subdivision. Each of these ponds have capacity for a 25-year storm event, and they are equipped with an allowable discharge before the pond fills.

Map B. Mason Creek Monitoring Site on Solomon Drain (courtesy of Google Maps)



Map C. Mason Creek Monitoring Site on Noble Drain (courtesy of Google Maps)



Although there are many sites similar to these in the Mason Creek watershed, staff regularly monitored these two during the previous permit term, so we have an observation record. Each of these sites are readily accessible and HOA-maintained. We are not aware of any commingling of storm runoff with groundwater at these sites, but there is certainly a high potential for runoff to be influenced by irrigation overspray or residents overwatering. There is also significant potential for runoff to be influenced by any chemicals or nutrients applied to the storm pond for landscape maintenance.

Boise River Site – SDMH tributary to BOI-0007A

One of the most notable sampling site selection challenges associated with the City's drainage to the Boise River is the minimal selection of outfalls. City of Caldwell only discharges to the Boise River via the following seven outfalls:

1. BOI-0006A at 43.682438, -116.685535
2. BOI-0006B at 43.682430, -116.685537
3. BOI-0007A at 43.680701, -116.689103
4. BOI-0007B at 43.680612, -116.689637
5. BOI-0007C at 43.677830, -116.698250
6. BOI-0007D at 43.677775, -116.699349
7. BOI-0007E at 43.677565, -116.699759

Different drainage types share the same drainage conveyances, which results in commingled flow. At many locations, irrigation overflows commingle with storm drainage infrastructure. From Luby Park on Illinois Ave down Madison Ave, artesian overflow and shallow groundwater also flow through the storm drain system to reach the Boise River. All seven of the outfalls discharge commingled flow, which is not representative of stormwater runoff.

1. BOI-0006A runoff is influenced by artesian well overflow and shallow groundwater.
2. BOI-0006B runoff is influenced by artesian well overflow and shallow groundwater.
3. BOI-0007A runoff is influenced by Interstate 84 storm runoff.
4. BOI-0007B runoff is influenced by Interstate 84 storm runoff.
5. BOI-0007C runoff is influenced by Centennial Way interchange storm runoff.
6. BOI-0007D runoff is influenced by Darigold effluent, and irrigation overflow from the Golden Gate Addition neighborhood.
7. BOI-0007E runoff is influenced by irrigation overflow from the (south) Golden Gate Addition neighborhood.

The Boise River site sampled in the previous permit term was also a SDMH upstream of the Boise River. The exact location was 43.669898, -116.678370 in an island at the intersection of Interstate 84 and 10th Ave. Previous sampling staff selected this location due to submerged downstream SDMH's during high River flows. Current staff recognize that this sampling point collects stormwater runoff from the cul-de-sac at S Indiana Ave, but it is also highly influenced by Interstate 84 and the EB onramp.

For the present permit term, we selected a SDMH in the (north) Golden Gate Addition neighborhood, which is tributary to Outfall BOI-0007A, upstream of Interstate 84. The SDMH in question is located at 43.677607, -116.686327 in front of 921 N 1st Ave. It receives stormwater runoff from 1st Ave, W and E Ithaca, Joliet St, and W and E Kearney up to N 3rd Ave.

Map D. Boise River Monitoring Site on 1st Avenue (courtesy of Google Maps)

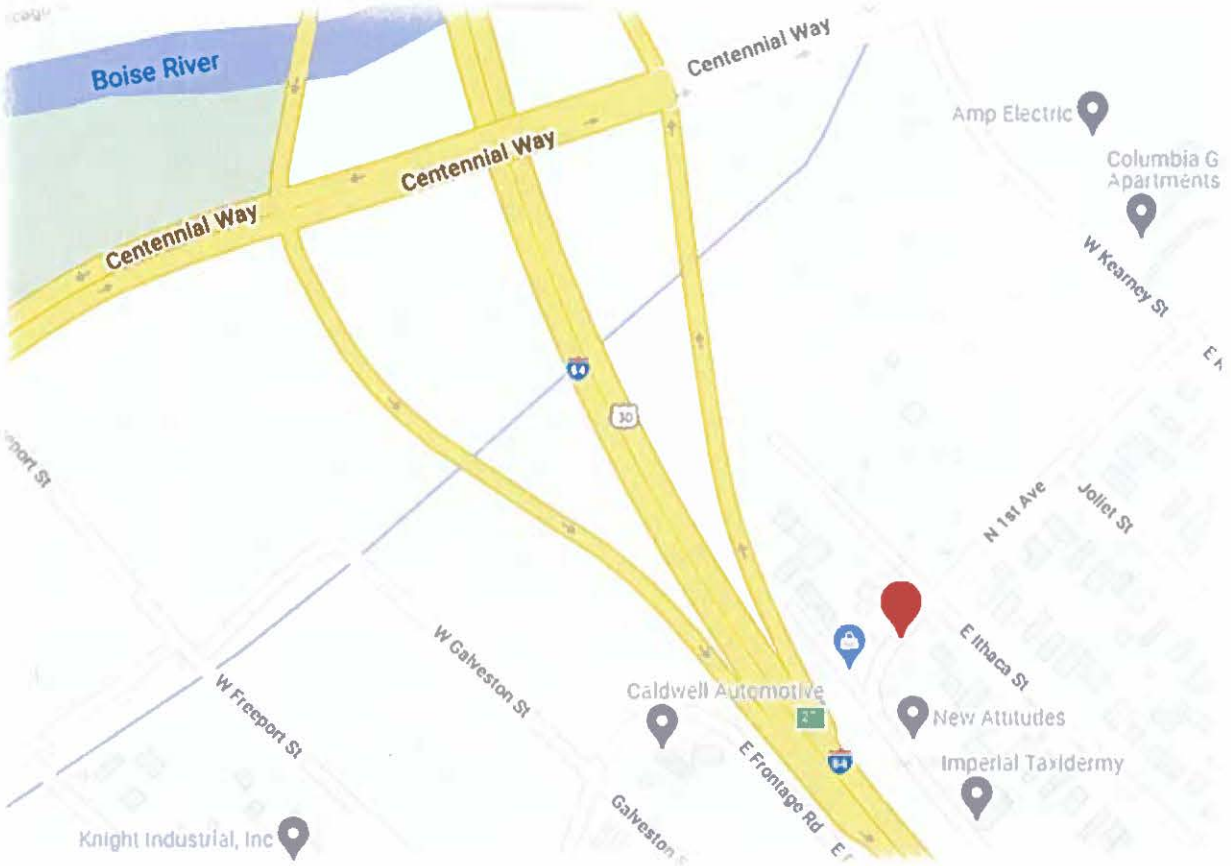


Table 3-2. Monitoring Location Information

Outfall ID	Site Name	Latitude, Longitude	Parameters	Receiving Water	Pipe Dia. (in)	Land Use
IND-0545D	12th Ave at Indian Creek	43.663084, -116.683243	TP, TKN, TSS, Ec, T	Indian Creek	15"	1900's Historic Residential
NOB-0214B	Noble Drain at Tamsworth Way Storm Pond	43.661335, -116.617651	TP, TKN, TSS, Ec, T	Mason Creek	12"	1990's Modern Residential
SOL-0165A	Solomon Drain at Skyway Street Pond	43.655451, -116.629855	TP, TKN, TSS, Ec, T	Mason Creek	12"	2010's Modern Residential
BOI-0007A	SDMH Upstream of BOI-0007A	43.669898, -116.678370	TP, TKN, TSS, Ec, T	Boise River	18"	1950's Residential and Commercial

TP = Total Phosphorus, TSS = Total Suspended Solids, EC = E.coli, Temp = Temperature, TKN = Total Kjeldahl Nitrogen

3.2.2 Pollutant Reduction Activities

City of Caldwell staff will conduct two pollutant reduction activities in addition to the Permit-required monitoring. Please see our Pollutant Reduction Activity proposal for further information on each of these. This document is available upon request.

3.3 Sample Collection Methods

3.3.1 Grab Samples

During each selected measurable storm event, staff will collect grab sample quantity sufficient to analyze each sample for total suspended solids, total phosphorus, E.coli, temperature, total Kjeldahl nitrogen, and approximate volumetric flow rate.

Grab samples will be collected directly into the appropriate laboratory-supplied sample container. Sampling staff will then cap, label, and store each container in a cooler on ice. Suspended sediment, total phosphorus, and *E. coli* samples will then be taken to Analytical Laboratories Inc. in Boise, Idaho.

Detailed grab sample collection procedures and analytical procedures are outlined in the City of Caldwell's Quality Assurance Project Plan (QAPP). Key features of that plan include:

- Establishment of data quality objectives
- Written standard operating procedures for field and laboratory tasks
- Routine instrument calibration and equipment maintenance
- Field quality assurance/quality control (QA/QC) samples for monitoring data quality
- Sample Chain-of-Custody procedures and forms
- Use of standard analytical procedures
- Data management and validation

3.3.2 QA/QC Procedures

Stormwater samples must be collected with precision and care. It is imperative that sampling staff avoid influencing the sample via negligent handling. The following best practices shall be utilized when collecting a sample:

Eligible Storm Event. A storm event is eligible for sampling when precipitation is forecasted to meet or exceed 0.10 inches.

Sampling Time. Whenever feasible, staff must strive to collect samples within the first 30 minutes of discharge. Samples may not be taken more than 120 minutes past the start of runoff discharge.

Sterile Bottles. Samples shall be collected ***directly*** into a laboratory-supplied collection container. Containers may not be reused or recycled by sampling staff.

Collection Care. Sampling staff must should strive to minimize the length of time that each sample bottle is open to the air, when the bottle and cap are exposed to potential

contaminants. Staff should discard any bottle (and sample) after the bottle threads, sample or cap interior come in contact with skin or bodily fluids. Sample staff should discard any bottle that has been otherwise contaminated or improperly stored open for more than 30 minutes.

Holding Environment. Samples shall be held and transported inside a clean cooler on ice, until they may be submitted to the contract laboratory.

Holding Time. Sample holding times shall be respected, regardless of whether this eliminates the suitability of a storm event for sampling.

Sample Type	Holding Time
Temperature	Instantaneous
E.coli	8 hours
Total Suspended Solids	7 days
Total Phosphorus	48 hours
Total Kjeldahl Nitrogen	28 days

Staff Safety. Supervisory sampling staff reserve the authority not to sample a specific event due to safety concerns, such as site access, public activity, physical assistance (buddy system) availability, disease/illness, or hazardous weather like excess wind, lightning, or snow.

Field Duplicates. A field duplicate is a second sample collected at the same time and in the same manner as the first sample. Field duplicate pairs provide information about the repeatability of sampling and analysis. Due to the sensitivity of the test, monitoring staff should strongly consider taking field duplicates at sampling events following high E.coli results (>126 CFU).

Laboratory. Samples shall be transported to Analytical Laboratories Inc. in Boise, Idaho with a complete Chain of Custody record. Professional ALI scientists and technicians complete sample testing using EPA and industry standard methods.

Sample Type	Method
Temperature	scientific thermometer
E.coli	IDEXX Colilert or SM 9223
Total Suspended Solids	USGS I-3765
Total Phosphorus	EPA 200.7 or EPA 365.4
Total Kjeldahl Nitrogen	SM4500 N
Nitrogen, Nitrate + Nitrite	EPA 353.2

For more details on QA/QC procedures and calibration methods, see the City of Caldwell's QAPP.

Section 4: Monitoring Documentation, Recordkeeping, and Schedule

At present, all laboratory reports and storm sampling photographs are stored electronically. Original paper chain of custody (COC) documents as well as original lab reports are stored in paper format. Originals shall continue be stored for the duration of the permit term. When the permit term ends, the reports and COC's will be stored electronically in the City of Caldwell Laserfiche or other secure location on the City servers. In the long term, stormwater compliance staff shall prioritize electronic recordkeeping over paper recordkeeping.

All records remain available to Idaho DEQ, EPA, or the public upon request, or in some cases, a public records request. Per permit requirements, many planning documents will continue to be available on the Stormwater page of the City's website. Stormwater compliance staff will continue to utilize Idaho DEQ's e-permitting website for report submittals.

Stormwater compliance staff shall reconvene quarterly sampling of measurable storm events upon Idaho DEQ approval of this sampling plan, for the duration of the permit term.

Section 5: Appendices

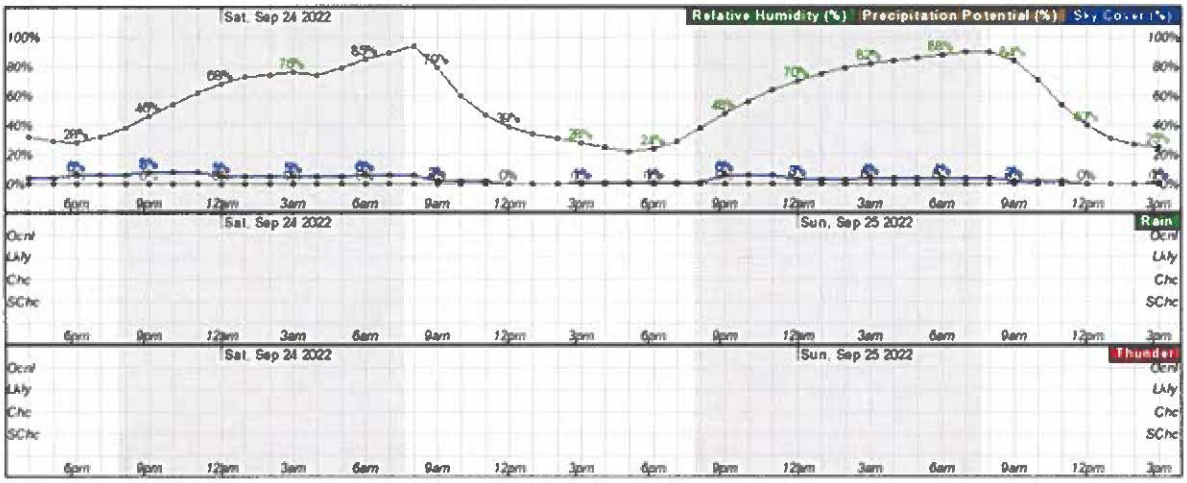
Weather Communication Form

Personnel:	Date/Time:
Targeted Stormwater Event in next 36 Hrs?	NO
Past 72-Hr Precipitation	0.21"
Date/time of expected event	
% chance /Expected amount of precipitation	
Air Quality Index	
Reasoning for Not Sampling: ☐ Antecedent Dry Period not met ☐ No Personnel ☐ Holiday ☐ other:	Forecasted Precipitation type: ☐ Light rain/Drizzle ☐ Rain ☐ Thunder Showers ☐ Snow

SITES TARGETED

Outfall ID	Site Name	Yes	NO	Comments
IND-0545D	12th Ave at Indian Creek Outfall		X	
NOB-0214B	Noble Drain at Tamsworth Way Storm Pond Outfall		X	
SOL-0165A	Solomon Drain at Skyway Street Pond Outfall		X	
BOI-0007A	SDMH Upstream of BOI-0007A Outfall		X	

NWS Forecast



Friday, September 23 at 10pm
Temperature: 60 °F Dewpoint: 44 °F Heat Index: N/A Surface Wind: SE 0mph
Sky Cover (%): 8% Precipitation Potential (%): 0% Relative Humidity (%): 54%
Rain: <10% Thunder: <10%

Grab Sample Data Form

Site Name: _____

Personnel: _____ **Date/Time On-Site:** _____

Site Description: _____

72-HR Antecedent Dry Period Met? (circle one) **YES / NO**

Velocity: _____ ft. /s **Temperature:** _____C

Grab Information				
	Sample ID	Date	Time	Labeled?
Total Suspended Solids (TSS)				☐
Total Kjeldahl Nitrogen (TKN) *preserve w/ H_2SO_4				☐
E.Coli				☐
Total Phosphorus (TP)				☐

Grab Information – Field QC Samples				
Source site:	Sample ID	Date	Time	Labeled?
Field Duplicate - E.Coli				☐
Field Blank – E.Coli				☐

*Time on bottle for QC Samples is 1200 for lab processing

Comments:

Time Off- Site: