City of Bozeman and Montana State University

Stormwater Management Plan

Graphic: Stormwater treatment unit installation

Graphic: Surcharging storm sewer utility structure

2017 - 2021 MS4 General Permit Term

Updated February 24, 2021

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1.1 Introduction

This Stormwater Management Plan (SWMP) describes the City of Bozeman (City) and Montana State University's (University), collectively known as the MS4, structural and administrative Best Management Practices (BMPs) engineered, implemented, maintained, and enforced to meet the following objectives:

- Protect public safety;
- Improve water quality; and
- Comply with environmental regulations.

This SWMP is an iterative and evolving document with updates occurring annually. The MS4 tracks updates in SWMP Section 9.0. SWMP Section 1.0 details the following components necessary to administer the MS4's Program, including:

- Background Information (1.2)
- City Program Framework (1.3)
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1.2 Background Information

The MS4 is an incorporated town located in Gallatin County, Montana, and has a population of 61,953 as of 2016 (*City population 45,250, University population 16,703*). The MS4's primary land-use type is residential and commercial, with isolated industrial areas. Other notable geographical details include:

- Elevation: 4820 ft.
- Climate: Cold continental, with warm and dry summers, cold and dry winters
- Average Temperature: 44.6 ˚F
- Average Precipitation: 18.4 inches (*University rain gauge*)

The MS4 is located at the headwaters of the Upper Missouri Watershed and possesses relatively pristine surface water quality that supports several beneficial uses, including aquatic life, drinking water, agriculture, and recreation. Numerous waterways originate within and pass through the MS4.

The MS4's most notable waterway is Bozeman Creek (aka Sourdough Creek), which originates in the Gallatin Mountains south of its jurisdictional boundary. Flowing north, Bozeman Creek enters the MS4 at its southeastern border and continues until its confluence with the E. Gallatin River. The Montana Department of Environmental Quality (MDEQ) determined that Bozeman Creek has various impairments from natural and anthropogenic sources when developing its 2013 Lower Gallatin Planning Area Total Maximum Daily Load Report (TMDL).

The second most notable waterway is Mandeville Creek, a small spring feed watercourse that originates south of Bozeman. Flowing north, Mandeville Creek enters the MS4 at its south-central boundary and continues until its confluence with the E. Gallatin River. The MDEQ determined that Mandeville Creek also has various impairments from natural and anthropogenic sources when developing its TMDL.

Numerous perennial and intermittent spring creeks flow through the MS4 in a web of channels, irrigation ditches, and pipes. The MDEQ has not completed an assessment of these waterways.

The MS4's water resources represent a significant community value and are the backbone of its tourism, recreation, and neighboring agricultural industries. A growing threat to these invaluable resources is stormwater runoff, which occurs when rainfall and snowmelt flow over developed surfaces, such as yards, roadways, parking lots, and rooftops. Stormwater picks up pollutants before entering storm sewers, such as drains, pipes, and ditches, and eventually discharges into the MS4's waterways. Stormwater runoff can result in property damage, public health threats, and environmental degradation if not proactively managed. Specific pollutants of concern include:

- Sediment: Sourced from barren ground, construction sites, road sand, unpaved roads and trails, gravel parking lots, windblown dust, and vehicle grime, resulting in suffocated aquatic habitat and alterations to stream channel morphology.
- Nitrogen and Phosphorous: Sourced from improper lawn fertilizer application, grass clippings, and yard debris, resulting in oxygen-depleting algae blooms.
- E.coli: Sourced from substandard septic systems and pet waste, resulting in toxic conditions for the public and wildlife.
- Floatables: Sourced from littering, overfilled garbage cans, and unsecured loads, resulting in clogged infrastructure, impaired aesthetic value, and endangered wildlife.
- Oil, Grease, Metals, and Detergents: Sourced from improper vehicle maintenance, car spills, and car washing, resulting in toxic conditions for humans and wildlife.
- Temperature: Sourced from extensive and continuous impervious areas, resulting in harmful impacts to coldwater fisheries.

To counter stormwater runoff's impact, the United States Congress established the National Pollutant Discharge Elimination System (NPDES) as a part of the Clean Water Act (CWA) in 1972 to preserve and restore the health of the United States' Waters. The U.S. Environmental Protection Agency (EPA) is the lead organization tasked with the implementation and oversight of the CWA. In Montana, the MDEQ has primacy, allowing for further state-scale interpretation, enactment, and enforcement.

The NDPES program regulates water pollution through a series of permits focused on point sources, such as industrial facilities, wastewater plants, and stormwater discharges. The driving permit behind the development and implementation of this SWMP is the MDEQ's Phase 2 General Permit for Stormwater Discharges Associated with Small Municipal Separate Storm Sewer Systems (MS4 Permit), which requires the City and University to implement a variety of programs to mitigate polluted discharges to waterways.

The MDEQ designates the City as a traditional permittee and the University as a non-traditional permittee. Both parties are co-permittees because their storm sewers are connected, and they work together on various administrative programs. The MDEQ requires the MS4 to complete the following:

- Prepare and submit individual Notices of Intent (NOI).
- Receive authorizations to discharge from MDEQ by January 1, 2017.
- Prepare and submit individual Annual Reports.
- Develop, implement, and update this SWMP throughout the MS4 Permit term.

Also, the MDEQ requires the MS4 to administer a program that works to accomplish the following:

- Educate the public (SWMP Section 3.0)
- Engage citizens through involvement and participation (SWMP Section 3.0)
- Detect and eliminate illicit discharges and connections (SWMP Section 4.0)
- Regulate construction sites (SWMP Section 5.0)

- Regulate stormwater facilities constructed with new and re-development (SWMP Section 6.0)
- Mitigate polluted discharges from municipal facilities and operations (SWMP Section 7.0)
- Collect and analyze water quality and stormwater runoff data (SWMP Section 8.0)

The following sections of this SWMP outline the MS4's work within each of these programs.

1.3 City Program Framework

On June 25, 2012, the City adopted Ordinance 1831, creating a Stormwater Utility, providing revenue collection for the operation and maintenance of the City's stormwater system. Funding was initially allocated to inventory, map, and assess the condition of the City's storm sewer. This effort was in response to findings identified during a 2011 MDEQ MS4 Permit audit, which included one violation, 16 program deficiencies, and 23 improvement recommendations.

On March 3, 2014, the City presented the results of their inventory, mapping, and assessment effort to City Commissioners. The City inventoried over ten thousand individual assets, many of which were clogged, cracked, buried, or in disrepair. Also, a program administration review identified significant shortfalls. Commissioners directed the City to develop options for addressing known issues.

On April 21, 2014, the City presented three levels of service, differing primarily on the timeline required to address issues and the annual funding level. Commissioners decided to implement a program that included a funding level of $1.2 million annually for operations, treatment, and deferred maintenance.

On February 23, 2015, the City adopted a new level of service and a rate model to collect service fees based on individual property's impact on the stormwater system.

On December 1, 2015, the City implemented the final piece of the new rate model allowing a fully funded and functional Stormwater Utility for the first time in its history. The City's utility rate model includes the following components:

- Flat Charge: Charged evenly across the service area. Properties with a water meter receive a flat monthly charge per meter. Properties that have impervious area, but do not have a water meter also receive a flat charge. The funding pays for deferred maintenance projects.
- Variable Charge: Charged proportional to the amount of impervious area individual properties have. Impervious area does not allow water to soak into the ground during rain events creating stormwater runoff. Larger areas result in more impact on public storm sewers and waterways.
- Utility Credit: Properties that have installed quantity and quality-based stormwater infrastructure controls receive a billing credit as these properties impact the stormwater system less than those without stormwater infrastructure.

The City's utility rate model includes the following funding allocations:

- Approximately $450,000 annually for deferred maintenance, which includes costs associated with the replacement and cleaning of storm sewer assets.
- Approximately $550,000 annually for operations and maintenance, which includes expenses related to personnel, reoccurring system maintenance, supplies, and equipment.
- Approximately $200,000 annually for system enhancements, which includes costs associated with stormwater treatment projects to remove pollutants before discharging to waterways.

The Stormwater, Building, Strategic Services, and Finance Divisions work collaboratively to update the rate model regularly as new development occurs. The workflow includes:

1. Developers submit site plans to the Building Division through electronic permit software.
2. Staff reviews and uploads site plans to a shared group folder on the City's internal drive.

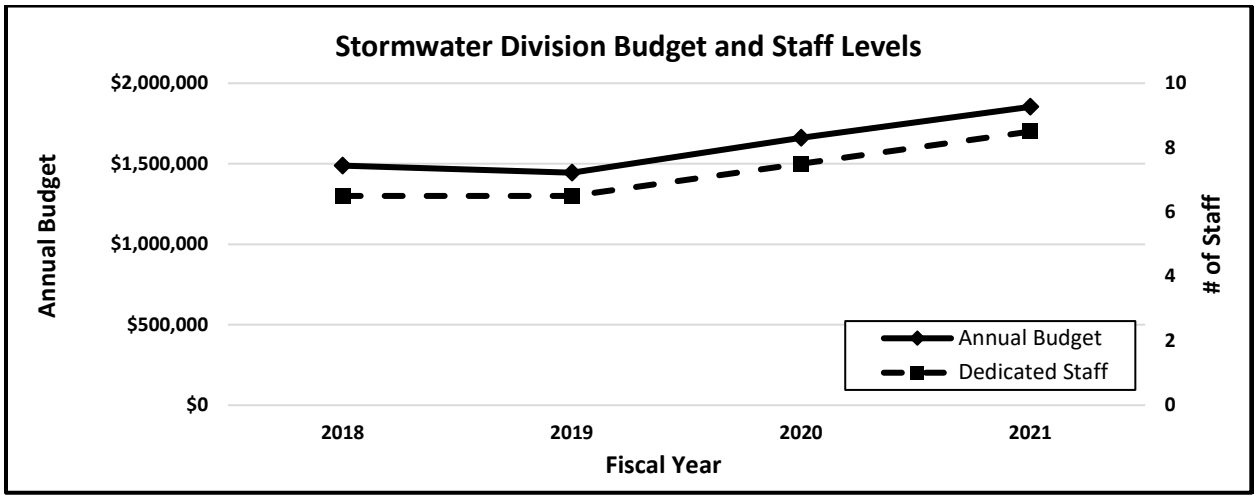
3. Strategic Services Staff checks the folder regularly, imports site plans into GIS, digitizes impervious area, and updates the polygon's Equivalent Residential Unity (ERU) attribute.
4. Finance sends water meter notice to Staff when a project is nearing completion.
5. Stormwater Staff review impervious area data based on the address information provided by Finance and calculates an ERU total, including percentage credit, if applicable.
6. Stormwater Staff provides Finance Staff with an ERU value and credit value.
7. Finance Staff updates software and generates a bill for customers.

Table 1.3.1 shows impervious area additions per year (single-family units and public roads excluded):

Table 1.3.1: Impervious Area Additions

Calendar Year	Impervious Area (Acres)	Site Plans
2017	75	86
2018	73	100
2019	68	98
2020	66	97
2021	-	-

Budget creation and approval occurs annually to allocate collected funds, including the following details:



Graphic 1.3.2: Stormwater Division Budget and Staff Levels Graph

- Fiscal Year 2018 Budget (July 1, 2017 - June 30, 2018)
  - Percent Allocation: 100%
  - Resource Justification: Budget approval process completed June 26, 2017.
  - Program Effectiveness: See SWMP Sections 2.0 - 8.0.
  - Resource Variation: Proposed addition of one FTE (Stormwater Specialist), approved.
  - Success Determination: See SWMP Sections 2.0 - 8.0.
  - Staff: 6.5 FTEs

Table 1.3.3: FY18 Budget Totals

Fiscal Year	Budget
Salaries and Benefits	$451,548
Operating	$161,466
Capital	$650,000
Debt Service	$225,346
Transfers	$0.00
Total Budget:	$1,488,360

- Fiscal Year 2019 Budget (July 1, 2018 - June 30, 2019)
  - Percent Allocation: 100%
  - Resource Justification: Budget approval process completed June 25, 2018.
  - Program Effectiveness: See SWMP Sections 2.0 - 8.0.
  - Resource Variation: Proposed addition of one FTE (Project Manager), approved.
  - Success Determination: See SWMP Sections 2.0 - 8.0.
  - Staff: 6.5 FTEs

Table 1.3.4: FY19 Budget Totals

Fiscal Year	Budget
Salaries and Benefits	$408,583
Operating	$240,373
Capital	$635,000
Debt Service	$160,346
Transfers	$0.00
Total Budget:	$1,444,302

- Fiscal Year 2020 Budget (July 1, 2019 - June 30, 2020)
  - Percent Allocation: 100%
  - Resource Justification: Public budget approval process completed June 24, 2019.
  - Program Effectiveness: See SWMP Sections 2.0 - 8.0.
  - Resource Variation: 4% rate increase to pay for new FTE and inflation.
  - Success Determination: See SWMP Sections 2.0 - 8.0.
  - Staff: 7.5 FTEs

Table 1.3.5: FY20 Budget Totals

Fiscal Year	Budget
Salaries and Benefits	$580,938
Operating	$268,372
Capital	$650,000
Debt Service	$161,211
Transfers	$0.00
Total Budget:	$1,660,521

- Fiscal Year 2021 Budget (July 1, 2020 - June 30, 2021)
  - Percent Allocation: 100% dedicated to stormwater programs and projects.
  - Resource Justification: Public budget approval process completed in June 2020. Staff gave a public presentation regarding past, current, and future work, and answered questions.
  - Program Effectiveness: See performance measures in SWMP Sections 2.0 - 8.0.
  - Resource Variation: 4% rate increase to pay for inflation, increased capital needs/cost, and to fund a new position. No significant changes have occurred from the FY20 budget cycle.
  - Success Determination: The City was successful in receiving requested resources. See SWMP Sections 2.0 - 8.0 for more information regarding ongoing and planned programs and projects.
  - Staff: 8.5 FTEs

Table 1.3.6: FY21 Budget Totals	
Fiscal Year	**Budget**
Salaries and Benefits	$640,866
Operating	$317,907
Capital	$700,000
Debt Service	$194,735
Transfers	$0.00
Total Budget:	$1,853,508

1.4 University Program Framework

In the current permit cycle, the University has managed six projects of an acre or larger, which have influenced stormwater quantity and quality. Those projects are:

- American Indian Hall: Over One Acre, Active, 2021 Planned Completion
- Romney Oval Renovation Project: Over One Acre, Active, 2021 Planned Completion
- Romney Hall Renovation project: Under One Acre, Active, 2021 Planned Completion
- Norm Asbjornson Hall Construction: Over One Acre Project, Complete 2020
- Hyalite Hall: Over One Acre Project, Complete 2020
- Montana Hall Elevator and Renovation project: Under One Acre, Complete 2020
- Lambert Field Renovations: Over One Acre, Complete 2019
- Rendezvous Dining Hall Construction: Over One Acre, Complete 2019
- College and 11th Treatment Unit: Under One Acre, Complete 2019

In 2020, the University has devoted approximately 640 hours to stormwater maintenance, management, and improvements and tracks work activities and labor using a work order system. Under the general guidance of the Engineering and Utilities Manager, the Environmental Service Manager coordinates and ensures MS4 Permit compliance.

1. Current Staff:
   - Engineering and Utility Manager: Directional and political support (*40 hours per year*)
   - Director - Facilities Services: Overall program coordination. Administers and supports environmental compliance programs; manages support personnel; identifies and advocates for infrastructure projects; conducts sampling, training, inspections, permit reviews, data collection, and reporting; manages reoccurring infrastructure maintenance, structural inspections, repairs, and replacements *(300 hours/year)*
   - Support Staff and Contracted Services: Groundskeepers, laborers, plumbers, and street sweeping (300 hours/year)

The following representatives make up the University's stormwater management team. Regular communication occurs, allowing for the exchange of necessary information:

1. Megan Sterl, Engineering and Utility Manager
   - Program Administration
2. EJ Hook, Director, Facilities Services *(Primary SWMP Coordinator)*
   - Public Education Program (SWMP Section 3.0)
   - Illicit Discharge Detection and Elimination Program (SWMP Section 4.0)
   - Construction Site Management Program (SWMP Section 5.0)
   - Post Construction Program (SWMP Section 6.0)
   - Good Housekeeping Program (SWMP Section 7.0)

Current funding is not a line item but included in the general campus maintenance operations budget for Facilities Services. As allowable and necessary funds from Facilities Services General Operating budget are allocated to specific stormwater improvement projects.

- Fiscal Year 2018 Approved Budget (July 1, 2017 - June 30, 2018)
  - Percent Allocation: 100%
  - Resource Justification: Budget approval process completed June 29, 2017
  - Program Effectiveness: See SWMP Sections 2.0 - 8.0.
  - Resource Allocation Variation: $25,000 for College and 11th improvement project design
  - Success Determination: See SWMP Sections 2.0 - 8.0.
  - Staff: 0.3 FTEs

Table 1.4.1: FY18 Budget Totals

Fiscal Year	Budget
Operating	$124,000
Capital	-
Total Budget:	$124,000

- Fiscal Year 2019 Approved Budget (July 1, 2018 - June 30, 2019)
  - Percent Allocation: 100%
  - Resource Justification: Budget approval process completed June 29, 2018
  - Program Effectiveness: See SWMP Sections 2.0 - 8.0.
  - Resource Allocation Variation: $150,000 for College and 11th improvement project installation
  - Success Determination: See SWMP Sections 2.0 - 8.0.
  - Staff: 0.3 FTEs

Table 1.4.2: FY19 Budget Totals

Fiscal Year	Budget
Operating	$124,000
Capital	$150,000
Total Budget:	$274,000

- Fiscal Year 2020 Approved Budget (July 1, 2019 - June 30, 2020)
  - Percent Allocation: 100%
  - Resource Justification: Budget approval process completed June 29, 2019
  - Program Effectiveness: See SWMP Sections 2.0 - 8.0.
  - Resource Allocation Variation: None
  - Success Determination: See SWMP Sections 2.0 - 8.0.
  - Staff: 0.3 FTEs

Table 1.4.3: FY20 Budget Totals

Fiscal Year	Budget
Operating	$126,500
Capital	-
Total Budget:	$126,500

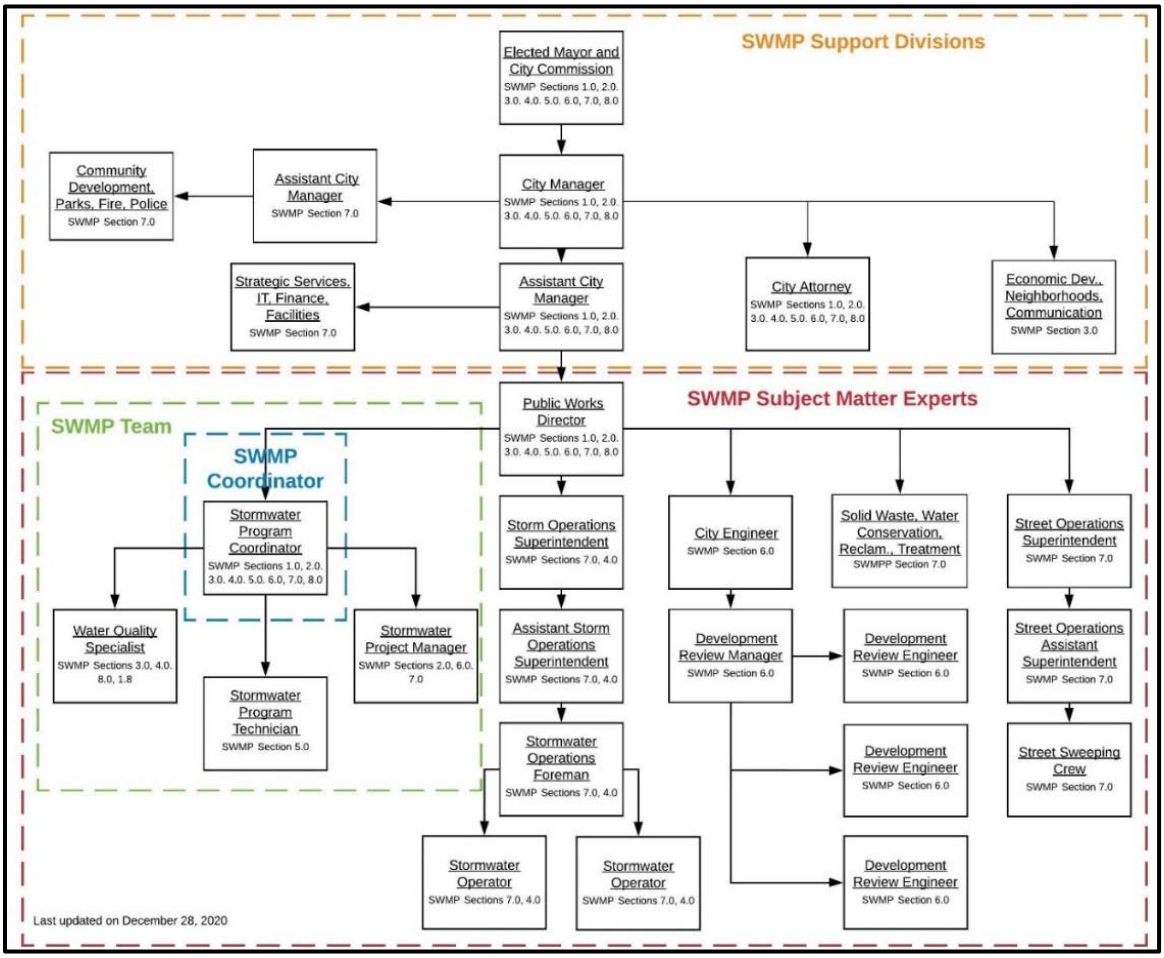
- Fiscal Year 2021 Approved Budget (July 1, 2020 - June 30, 2021)

- Percent Allocation: 100%
- Resource Justification: Budget approval process completed June 29, 2019
- Program Effectiveness: See SWMP Sections 2.0 - 8.0.
- Resource Allocation Variation: None
- Success Determination: See SWMP Sections 2.0 - 8.0.
- Staff: 0.3 FTEs

Table 1.4.3: FY20 Budget Totals	
Fiscal Year	**Budget**
Operating	$126,500
Capital	-
Total Budget:	$126,500

1.5 Stormwater Management Team

The MS4 has three Stormwater Management Teams described in Graphic 1.5.1 and the following section.



Graphic 1.5.1: Organization Chart

SWMP Team: Meets weekly and is comprised of the following positions:

1. Stormwater Program Coordinator: SWMP Coordinator and Bozeman Municipal Code (BMC) Section 40 Article 4 Enforcement Agent. Leads the SWMP Team, SWMP Subject Matter Experts, and coordination with SWMP Support Divisions. The Coordinator develops and manages the

implementation of SWMP and MS4 Permit compliance activities, administers environmental compliance programs, manages personnel, prepares budgets, develops policies, coordinates infrastructure projects, and maintains the rate model. Primary permit responsibilities include:

- Program Administration (SWMP Section 1.0)
- Capital Project Program (SWMP Section 2.0)
- Public Education Program (SWMP Section 3.0)
- Illicit Discharge Detection and Elimination Program (SWMP Section 4.0)
- Construction Site Management Program (SWMP Section 5.0)
- Post Construction Program (SWMP Section 6.0)
- Good Housekeeping Program (SWMP Section 7.0)
- Sampling and Evaluation Program (SWMP Section 8.0)

2. Stormwater Program Specialist: Develops and implements water quality monitoring, BMP effectiveness research, and data analysis. Primary permit responsibilities include:

   - Public Education Program (SWMP Section 3.0)
   - Illicit Discharge Detection and Elimination Program (SWMP Section 4.0)
   - Good Housekeeping Program (SWMP Section 7.0)
   - Sampling and Evaluation Program (SWMP Section 8.0)

3. Stormwater Project Manager: Plans and manages stormwater conveyance, flood control, and treatment capital projects, implements the City's asset maintenance efforts, and regulates drainage infrastructure. Primary permit responsibilities include:

   - Capital Project Program (SWMP Section 2.0)
   - Post Construction Program (SWMP Section 6.0)
   - Good Housekeeping Program (SWMP Section 7.0)

4. Two Stormwater Program Technicians: Perform permit reviews, site inspections, and reporting tasks. Primary permit responsibilities include:

   - Construction Site Management Program (SWMP Section 5.0)

The SWMP Team tracks phone call and email questions, requests, and complaints received from the public to gauge programmatic needs and workloads, including:

Table 1.5.1: Correspondence Tracking Totals					
Correspondence Type	**Count**				
	2018	**2019**	**2020**	**2021**	**Total**
Resident: Flooding Inquiry or Report	7	15	2	-	24
Resident: Construction Inquiry or Report	22	19	9	-	50
Resident: Water Quality Inquiry or Report	2	2	2	-	6
Resident: Pollution Inquiry or Report	14	6	3	-	23
Resident: Basin Inquiry or Report	14	12	10	-	36
Resident: Outreach Inquiry or Report	2	12	2	-	16
Resident: Rate Model Inquiry	4	6	5	-	15
Professional: Post-Const. Program	47	60	52	-	159
Professional: Pollution Program	4	18	7	-	29
Professional: Const. Program	112	295	465	-	872
Professional: Project Management	16	181	72	-	269
Professional: Education Program	14	57	32	-	103
Professional: Division Administration	9	36	43	-	88
Professional: Water Quality Program	11	8	16	-	35
Professional: Service or Product Solicitation	17	19	9	-	45
Referral to other division	5	6	4	-	15
Total:	300	752	733	-	1,785

SWMP Subject Matter Experts (SME): The SME group meets as necessary to discuss programmatic issues and is comprised of the following positions:

1. Engineering Division: Team of three positions that review and regulate new and redevelopment projects utilizing established engineering standards. The positions include the Development Review Manager and a variety of staff engineers. Primary permit responsibilities include:
   - Post Construction Program (SWMP Section 6.0)
2. Operations and Maintenance: Team of five positions that operate and maintain the public storm sewer network, including the inspection, maintenance, and repair of infrastructure. This group also inspects underground pipes to identify illicit discharges and illegal connections. This team includes a Superintendent, Assistant Superintendent, Foreman, and two Operators. Primary permit responsibilities include:
   - Illicit Discharge Detection and Elimination Program (SWMP Section 4.0)
   - Good Housekeeping Program (SWMP Section 7.0)
3. Streets Division: Numerous positions that operate the City's street sweeping, spring and fall cleanups, and surface inlet grate obstruction removal and replacement activities. This team includes a Superintendent, Assistant Superintendent, and numerous Operators. Primary permit responsibilities include:
   - Good Housekeeping Program (SWMP Section 7.0)

SWMP Support Divisions: Group engaged by the SWMP Team as needs arise. Support Divisions do not typically participate in reoccurring meetings unless invited to discuss a particular topic.

1.6 MS4 Coordination

The MS4s works collaboratively on various programs, including:

- Participation in monthly meetings.
- University payment of City stormwater fees, rate model update to occur during Q1 of each calendar year and an updated total should be in place by July 1.
- Performance tracking and reporting.
- Infrastructure project development and implementation.
- Inspection forms, training, methodologies, and program documentation sharing.
- Pollution event response and resolution, as requested.
- Stormwater treatment unit maintenance: The City removes debris collected by University stormwater mechanical treatment units and incorporates totals into SWMP Section 8.0 annually, including:
  - University Field House Downstream Defender Mechanical Separation Unit
  - 11th and College Contech CDS Mechanical Separation Unit
- Water Sampling and Analysis Program: The City manages the University's portion of this program, including purchasing equipment, collecting samples/data, and analyzing results for the following:
  - Urban Runoff Monitoring
  - In-Stream Wet Weather Monitoring
  - Sediment Reduction Monitoring
  - Long-Term Trend Monitoring
- Post Construction Program: The City completes six high-priority stormwater facility inspections on MSU property annually, and provides completed reports.
- The City provides the University an updated SWMP by February 1 of each calendar year.

1.7 Collaborative Organizations

The MS4 collaborates with a variety of organizations, including:

- Montana Stormwater Committee (MSC): An organization formed in 2016 comprised of public and private stormwater industry representatives that provides a unified voice for state scale policy changes, rules, issues, and initiatives. The MSC meets monthly to discuss relevant topics. Their most recent accomplishment includes the development of Montana's first American Society of Civil Engineers Stormwater Report Card, resulting in a statewide score of D.
- National Municipal Stormwater Alliance (NMSA): An organization formed in 2015 comprised of stormwater industry professionals that provides a unified voice for national scale policy changes, rules, issues, and initiatives.
- Montana Department of Environmental Quality (MDEQ): A state agency that administers and enforces the Montana Clean Water Act. MDEQ provides compliance training, conferences, and enforcement in cases where the MS4's resources become exhausted.
- Gallatin Local Water Quality District (GLWQD): A Gallatin County public agency that conducts water quality sampling and community education.
- Montana State Extension Water Quality: A University Extension agency that provides water quality sampling and community education.
- Montana Water Environment Association (MWEA): A Montana organization that represents water, wastewater, and stormwater professionals. MWEA is a member of the Water Environment Federation (WEF), which has over 34,000 members worldwide. WEF is working to raise knowledge regarding stormwater infrastructure, policy, and science at the national level.
- Gallatin Watershed Council (GWC): An education-based nonprofit organization that works to improve waterway health by implementing the Gallatin Watershed Restoration Plan.

1.8 Additional Regulatory Responsibilities

The following MPDES permits also fall under the purview of the MS4:

- General Permit for Stormwater Discharges Associated with Construction Activity (MTR100000): Construction projects that disturb one acre or more of land must obtain a stormwater discharge authorization from the MDEQ. The MS4 implements a Construction Management Program detailed in SWMP Section 5.0
- Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MTR000000): The MS4's Water Reclamation Facility (WRF) and Landfill obtain authorizations to discharge stormwater from their facilities. MS4 Staff assist WRF and Landfill personnel with required inspections, BMP development, training, reporting, and records keeping.

1.9 Annual Report

The MS4 submits individual Annual Report Forms, an updated SWMP, and relevant documents to the MDEQ by March 1 of each year.

1.10 Public Comments

The MS4 considers and responds to all public comment related to the SWMP. To facilitate, a public comment form exists on the MS4's website and is available year round. Also, the MS4 publically notices the SWMP after making annual updates in the Bozeman Daily Chronicle the second and third Sundays of March during each calendar year. Dates include:

- 2019: March 17th and 24th
- 2020: March 15th and 22nd
- 2021: March 14th and 21st

The MS4 has received the following comments:

Table 1.10.1: Public Comments

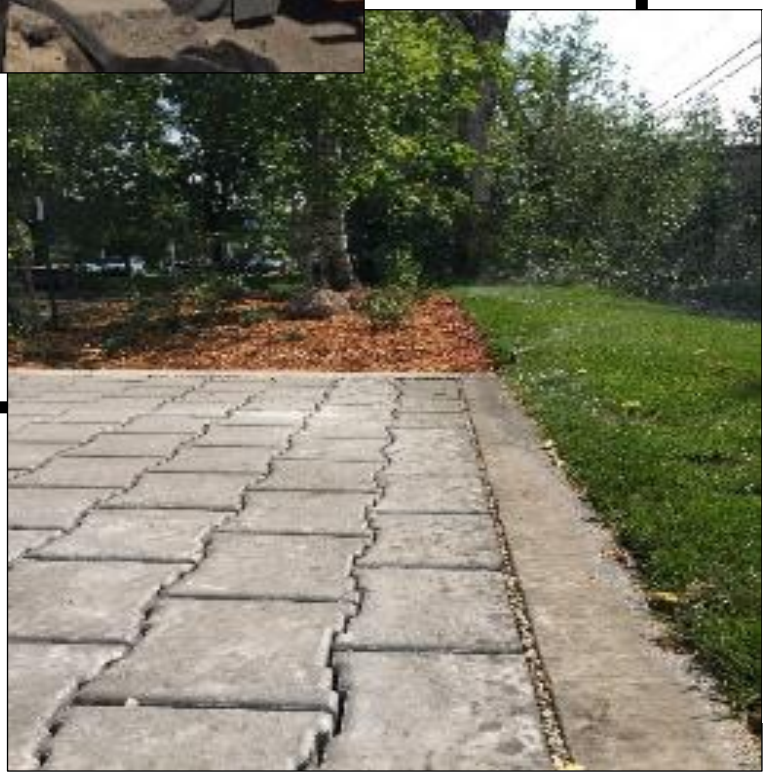
#	Date	Participant	Comment	MS4 Response
1	2019	Adopt-A-Drain Participant	I look at the City in an entirely different way now. Whenever I look at the street, I see the headwaters of a creek (In person feedback).	Noted comment and will request their participation in the 2020 Adopt-A-Drain Program.
2	7/23/19	Adopt-A-Drain Participant	I cannot believe the debris-filled the whole bucket! You are right how much more aware I have become about the drains and my street surroundings. I even found a pair of swimming goggles near the drain, kind of weird and ironic, who was swimming in the drains!?".	Noted comment and will request their participation in the 2020 Adopt-A-Drain Program.
3	7/23/19	Adopt-A-Drain Participant	Thank you, I will put the bucket on the front porch! And yes please share my email. And to add to the email...with this new Storm Drain awareness and understanding, I feel like I should be cleaning all the drains that I see that are filled with debris and to let others know how important it is to keep them free of debris. I have always been a big supporter of clean waterways and trying to do my part for the environment	Noted comment and will request their participation in the 2020 Adopt-A-Drain Program.

			but actually being involved in a community program like Adopt A Drain makes it more real and more personal. Thank you so much for being the architect of this great program!! One more note, the drain on the corner of 3rd and Short does look pretty congested inside not sure though.	
4	9/27/19	Adopt-A-Drain Participant	Of the 563.7 pounds, 563.4 was construction debris!	Noted comment and will request their participation in the 2020 Adopt-A-Drain Program.
5	1/2/20	Adopt-A-Drain Participant	Thank you for the update! Sorry I fell off the map. The last bit of debris that I removed, I accidentally threw away. I was amazed at how once you clean the drain there is not much that needs to be done until the Fall. Also the drain looked amazing after you guys cleaned the insides out. It is an amazing program! Thank you for doing it and keeping our drains clean. I look forward to doing it again this year.	Noted comment and will request their participation in the 2020 Adopt-A-Drain Program.
6	1/3/20	Adopt-A-Drain Participant	Frank! Thanks so much for the update on how much we all saved from going down the drain! I still have a full bucket of debris; what should I do with it? And should I continue cleaning my drain? Bravo to you and the others for a great experiment!	Noted comment and will request their participation in the 2020 Adopt-A-Drain Program.
7	1/3/20	Adopt-A-Drain Participant	My only feedback is that I forget to check/clean "my" drain. I'll create reminders in my calendar. I'll also create a reminder and post a photo and comment about my drain on NextDoor every now and then. What's your goal for 2020? Let's blow the lid off!!	Noted comment and will request their participation in the 2020 Adopt-A-Drain Program.
8	1/10/20	Adopt-A-Drain Participant	Thanks for the update – that is a lot of debris. Our only problem is that the compostable bags are hard to make stay up and open in the buckets. We are glad that compostable bags are being used – I wonder if there is some kid of giant rubber band that could be put around the bag to hold it up.	Noted comment and will request their participation in the 2020 Adopt-A-Drain Program.
9	5/27/20	Adopt-A-Drain Participant	Thank you so much for your email Frank! We hope you are doing well. I would love to volunteer again this year, count me in! I do have all the equipment from last year, I am pretty sure. If I don't I will let you know. I have noticed that quite a few drains around town have been Spring cleaned by the city, which is great!! Thank you again for doing this wonderful program!	Noted comment and will request their participation in the 2021 Adopt-A-Drain Program.

10	10/1/20	General Comment	Deer droppings, leaves, and lawn clippings can be prevented from going into stormwater drains by collecting this material and placing it in an area where it is unlikely to wash into gutters during a rain or while snow is melting. Ever since I began living in my single-family home in Bozeman, I have placed lawn clippings, deer droppings, and some leaves into a compost pile in my large vinyl lidded compost bin in the back yard. Other leaves I have either used as mulch around flowers and vegetables in the garden or else placed in a plastic garbage bin for green-clippings pickup by the city sanitation services once or twice a year. Composting has enabled my family to divert a large amount of kitchen waste and green clippings waste from the landfill and instead transform it into fertilizing compost with the aid of earthworms and microorganisms. This compost spurs soil fertility and makes flowers and veggies more healthy. It is a good alternative to chemical fertilizer such as ammonium nitrate, which can kill or "burn" plants if applied in too heavy a concentration, and which can discourage earthworms' aeration and enrichment of the soil.	Responded to the resident and noted the comment on 10/13/2020.
11	9/1/20 to 12/1/20	General Comments	Stormwater survey sent to 16,000 utility account holders.	Review the survey results and integrate collected information into future decision-making.

Section 2.0
Capital Project Program

Graphic 2.0.1: Stormwater treatment unit installation



Graphic 2.0.2: Permeable pavers installed at City Hall

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2.1 Introduction

The MS4's Capital Project Program works to:

- Increase storm sewer capacity;
- Preserve the integrity of underground pipes and surface conveyances;
- Replace failed or failing infrastructure assets; and
- Meet water quality requirements set by the MDEQ.

SWMP Section 2.0 details the following components necessary to administer the MS4's Capital Project Program, including:

- Total Maximum Daily Load Action Plan (2.2)
- Planned Projects (2.3)
- Ongoing or Completed Projects (2.4)
- Pollutant Reduction Totals (2.5)
- Performance Measures (2.6)

2.2 Total Maximum Daily Load Action Plan

The MS4 works to reduce stormwater impacts on local waterways, prioritizing the following:

1. Bozeman Creek due to its total stormwater discharge points and impairments identified in the 2013 Lower Gallatin Planning Area TMDLs & Framework Water Quality Improvements Plan (TMDL), including:
    - Total Suspended Solids (TSS): Contributions from the MS4 require a 37% or 81 tons/year reduction. The TMDL does not hold the MS4 to numeric TSS load limits. Instead, the TMDL states that the MS4 will meet its Waste Load Allocation (WLA) by "adhering to the (MS4) permit requirements to minimize pollutant loads." The MS4 implements the following BMPs to reduce TSS, including:
        - Stormwater Management Program implementation (SWMP Sections 1.0 - 8.0)
        - Mechanical separation unit installation at select direct discharge outfalls that drain large urban basins and lack treatment (SWMP Sections 2.3, 2.4, and 2.5).
        - Public Education Program implementation (SWMP Section 3.0), including, but not limited to, the Adopt-A-Drain Program (SWMP Section 3.4.1), Construction Training (SWMP Section 3.4.8), and Lawn Care Targeted Outreach (SWMP Section 3.4.12).
        - Construction Site Management Program implementation (SWMP Section 5.0), including the prioritization and elevated inspection rates for construction-sites within the Bozeman Creek Watershed (SWMP Section 5.4).
        - Post-Construction Program implementation (SWMP Section 6.2), including the enforcement of water quality and flood control standards for new and redevelopment projects (SWMP Section 6.2).
        - Good Housekeeping Program implementation (SWMP Section 7.0), including regular municipal storm sewer cleaning, spring/fall cleanups, and street sweeping (SWMP Sections 2.5 and 7.2), Facility Stormwater Pollution Prevention Plan execution, and Activity Stormwater Pollution Plan training.
        - Sampling and Evaluation Program implementation (SWMP Section 8.0), including the collection and analysis of stormwater runoff, in-stream water quality, BMP effectiveness, and long-term monitoring data (SWMP Section 8.0).

- Total Nitrogen: Contributions from the MS4 require a 0% reduction. The TMDL does not hold the MS4 to numeric Total Nitrogen load limits. Instead, the TMDL states that the MS4 will meet its WLA by "adhering to the (MS4) permit requirements." The MS4 implements the following BMPs to reduce Total Nitrogen, including:
    - Stormwater Management Program implementation (SWMP Sections 1.0 - 8.0).
    - Mechanical separation unit installation at select direct discharge outfalls that drain large urban basins and lack treatment (SWMP Sections 2.3, 2.4, and 2.5).
    - Public Education Program implementation (SWMP Section 3.0), including, but not limited to, the Adopt-A-Drain Program (SWMP Section 3.4.1), Construction Training (SWMP Section 3.4.8), and Lawn Care Targeted Outreach (SWMP Section 3.4.12).
    - Illicit Discharge Detection and Elimination Program implementation (SWMP Section 4.0), including the identification and resolution of illegal discharges (SWMP Sections 4.3, 4.4, and 4.5), and the investigation of outfalls (SWMP Section 4.7).
    - Construction Site Management Program implementation (SWMP Section 5.0), including the prioritization and elevated inspection rates for construction-sites within the Bozeman Creek watershed (SWMP Section 5.4).
    - Post-Construction Program implementation (SWMP Section 6.2), including the enforcement of water quality and flood control standards for new and redevelopment projects (SWMP Section 6.2).
    - Good Housekeeping Program implementation (SWMP Section 7.0), including regular municipal storm sewer cleaning, storm sewer inspection (CCTV), spring/fall cleanups, and street sweeping (SWMP Sections 2.5 and 7.2), Facility Stormwater Pollution Prevention Plan execution, and Activity Stormwater Pollution Plan training.
    - Sampling and Evaluation Program implementation (SWMP Section 8.0), including the collection and analysis of stormwater runoff, in-stream water quality, BMP effectiveness, and long-term monitoring data (SWMP Section 8.0).
- E. coli: Contributions from the MS4 require a 0% reduction. The TMDL does not hold the MS4 to numeric E. coli load limits. Instead, the TMDL states that the MS4 will meet its WLA by "adhering to the (MS4) permit requirements." The MS4 implements the following BMPs to reduce E. coli, including:
    - Stormwater Management Program implementation (SWMP Sections 1.0 - 8.0).
    - Public Education Program implementation (SWMP Section 3.0), including, but not limited to, the Dog Waste Campaign (SWMP Section 3.4.4).
    - Illicit Discharge Detection and Elimination Program implementation (SWMP Section 4.0), including the identification and resolution of illegal discharges (SWMP Sections 4.3, 4.4, and 4.5), and the investigation of outfalls (SWMP Section 4.7).
    - Good Housekeeping Program implementation (SWMP Section 7.0), including regular storm sewer inspection (CCTV), Facility Stormwater Pollution Prevention Plan execution, and Activity Stormwater Pollution Plan training.

2. Mandeville Creek due to its total stormwater discharge points and impairments identified in the TMDL, including:

- Total Nitrogen and Total Phosphorous: Contributions from the MS4 require a 0% reduction. The TMDL does not hold the MS4 to numeric Total Nitrogen and Total Phosphorous load limits. Instead, the TMDL states that the MS4 will meet its WLA by "adhering to the (MS4) permit requirements." The MS4 implements the following BMPs to reduce Total Nitrogen and Total Phosphorous, including:

- Stormwater Management Program implementation (SWMP Sections 1.0 - 8.0).
- Mechanical separation unit installation at select direct discharge outfalls that drain large urban basins and lack treatment (SWMP Sections 2.3, 2.4, and 2.5).
- Public Education Program implementation (SWMP Section 3.0), including, but not limited to, the Adopt-A-Drain Program (SWMP Section 3.4.1), Construction Training (SWMP Section 3.4.8), and Lawn Care Targeted Outreach (SWMP Section 3.4.12).
- Illicit Discharge Detection and Elimination Program implementation (SWMP Section 4.0), including the identification and resolution of illegal discharges (SWMP Sections 4.3, 4.4, and 4.5), and the investigation of outfalls (SWMP Section 4.7).
- Post-Construction Program implementation (SWMP Section 6.2), including the enforcement of water quality and flood control standards for new and redevelopment projects (SWMP Section 6.2).
- Good Housekeeping Program implementation (SWMP Section 7.0), including regular municipal storm sewer cleaning, storm sewer inspection (CCTV), spring/fall cleanups, and street sweeping (SWMP Sections 2.5 and 7.2), and Activity Stormwater Pollution Plan training.
- Sampling and Evaluation Program implementation (SWMP Section 8.0), including the collection and analysis of stormwater runoff, in-stream water quality, BMP effectiveness, and long-term monitoring data (SWMP Sections 8.4, 8.5, 8.6, and 8.7).

3. The East Gallatin due to its impairments identified in the TMDL, including:

   - Total Nitrogen and Total Phosphorous: Contributions from the MS4 require a 0% reduction. The TMDL does not hold the MS4 to numeric Total Nitrogen and Total Phosphorous load limits. Instead, the TMDL states that the MS4 will meet its WLA by "adhering to the (MS4) permit requirements." The MS4 implements the following BMPs to reduce Total Nitrogen and Total Phosphorous, including:

     - Stormwater Management Program implementation (SWMP Sections 1.0 - 8.0).
     - Mechanical separation unit installation at select direct discharge outfalls that drain large urban basins and lack treatment (SWMP Sections 2.3, 2.4, and 2.5).
     - Public Education Program implementation (SWMP Section 3.0), including, but not limited to, the Adopt-A-Drain Program (SWMP Section 3.4.1), Construction Training (SWMP Section 3.4.8), and Lawn Care Targeted Outreach (SWMP Section 3.4.12).
     - Illicit Discharge Detection and Elimination Program implementation (SWMP Section 4.0), including the identification and resolution of illegal discharges (SWMP Sections 4.3, 4.4, and 4.5), and the investigation of outfalls (SWMP Section 4.7).
     - Post-Construction Program implementation (SWMP Section 6.2), including the enforcement of water quality and flood control standards for new and redevelopment projects (SWMP Section 6.2).
     - Good Housekeeping Program implementation (SWMP Section 7.0), including regular municipal storm sewer cleaning, storm sewer inspection (CCTV), spring/fall cleanups, and street sweeping (SWMP Sections 2.5 and 7.2), Facility Stormwater Pollution Prevention Plan execution, and Activity Stormwater Pollution Plan training.
     - Sampling and Evaluation Program implementation (SWMP Section 8.0), including the collection and analysis of stormwater runoff, in-stream water quality, BMP effectiveness, and long-term monitoring data (SWMP Sections 8.4, 8.5, 8.6, and 8.7).

4. Bridger Creek due to its impairments identified in the TMDL, including:

- Nitrate: Contributions from the MS4 require a 0% reduction. The TMDL does not hold the MS4 to numeric Nitrate load limits. Instead, the TMDL states that the MS4 will meet its WLA by "adhering to the (MS4) permit requirements." The MS4 implements the following BMPs to reduce Nitrate, including:
    - Stormwater Management Program implementation (SWMP Sections 1.0 - 8.0).
    - Public Education Program implementation (SWMP Section 3.0), including, but not limited to, the Adopt-A-Drain Program (SWMP Section 3.4.1), Construction Training (SWMP Section 3.4.8), and Lawn Care Targeted Outreach (SWMP Section 3.4.12).
    - Illicit Discharge Detection and Elimination Program implementation (SWMP Section 4.0), including the identification and resolution of illegal discharges (SWMP Sections 4.3, 4.4, and 4.5), and the investigation of outfalls (SWMP Section 4.7).
    - Post-Construction Program implementation (SWMP Section 6.2), including the enforcement of water quality and flood control standards for new and redevelopment projects (SWMP Section 6.2).
    - Good Housekeeping Program implementation (SWMP Section 7.0), including regular municipal storm sewer cleaning, storm sewer inspection (CCTV), spring/fall cleanups, and street sweeping (SWMP Sections 2.5 and 7.2), Facility Stormwater Pollution Prevention Plan execution, and Activity Stormwater Pollution Plan training.
    - Sampling and Evaluation Program implementation (SWMP Section 8.0), including the collection and analysis of stormwater runoff, in-stream water quality, BMP effectiveness, and long-term monitoring data (SWMP Sections 8.4, 8.5, 8.6, and 8.7).

5. Other Notable Waterways: Numerous unassessed waterways exist that receive protections from the MS4's broad programmatic efforts. These waterways include, but are not limited to, Cattail Creek, Catron Creek, Baxter Creek, Nash Spring Creek, Flat Creek, Mathew Bird Creek, Figgins Creek, and Aajker Creek.

2.3 Planned Projects

The MS4 prepares a five-year Capital Improvement Plan (CIP) that outlines future infrastructure projects annually. The CIP process is open for public comment, approved by the City Commission, and incorporated into the applicable fiscal year's budget. The MS4 accounts for the following when preparing CIPs:

- Urban Waterway/Watershed Priority
- Development and Land Use
- Infrastructure Condition Analysis
- Programmatic Goals
- Available Budget
- Project Coordination

The MS4 maintains the following performance metrics to track Capital Project Program progress and identify future needs:

1. Pollutant Reduction Program: Comply with the MS4's stormwater permit and improve water quality by preventing the discharge of 81 tons of TSS into the Bozeman Creek watershed annually.
    - Benefit: Reduced permit noncompliance risk, improved public safety, and a healthier environment.
    - Driving Policy: Bronze Level of Service, approximately $200,000 per year
    - Risk: Permit requirements subject to change.

Table 2.3.1: Pollutant Reduction Program Performance					
Type	**2017**	**2018**	**2019**	**2020**	**2021**
Pollutant Reduction	20%	57%	56%	51%	-

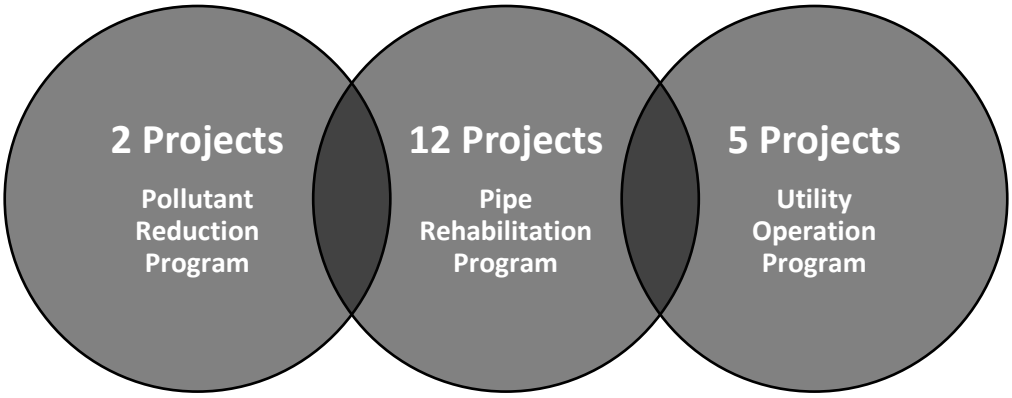
2. Pipe Rehabilitation Program: Replace 13.9 miles of structurally deficient and undersized historical storm sewer infrastructure throughout the downtown core.
    - Benefit: Reduced urban flooding and improved public safety
    - Driving Policy: Bronze Level of Service, approximately $450,000 per year
    - Risk: Increasing construction costs

Table 2.3.2: Pipe Rehabilitation Program Performance					
Type	**2017**	**2018**	**2019**	**2020**	**2021**
Pipe Rehabilitation	3%	4%	34%	40%	-

3. Utility Operation Program: Maintain 20% (+/-2.5%) of city-owned storm sewer assets annually (excludes MSU). Totals include inlet maintenance, manhole maintenance, pipe maintenance, and pipe inspection.
    - Benefit: Reduced urban flooding, extended infrastructure lifecycles, and improved environmental health.
    - Driving Policy: Bronze Level of Service
    - Risk: Rapid Growth

Table 2.3.3: Utility Operation Program Performance					
Type	**2017**	**2018**	**2019**	**2020**	**2021**
Utility Operation	-	21%	17%	19%	-

The MS4 plans to complete the following projects:



1. Pipe Rehabilitation Program: Historic Pipe Replacement Program
    - ID: STDM04
    - Year: FY22, FY23, FY24, FY25, and FY26
    - Budget: $280,000.00, $310,000.00, $530,000.00, $735,000.00, and $767,115.00
    - Description: Rehabilitation of 100-year-old vitrified clay storm sewer, which has exceeded its life cycle, does not meet modern capacity standards, and includes many structural failures.
    - Alternatives Considered: The infrastructure is a critical component of the City's storm sewer network. Delay will increase chances of collapse, road failure, and flooding.

- Advantages of Approval: This project is preventative and targets pipes prone to failure and surcharging. Rehabilitation will reduce risks by addressing structural and capacity deficiencies.
- Additional Operating Cost in the Future: Stormwater Personnel will complete maintenance on a reoccurring schedule, including flushing, vacuuming, and inspection.

2. Pipe Rehabilitation Program: Annual Unplanned Pipe Rehabilitation and Drainage Projects

   - ID: STDM05
   - Year: FY22, FY23, FY24, FY25, and FY26
   - Budget: $45,000.00, $47,250.00, $49,612.00, $52,093.00, and $54,697.00
   - Description: An annual program that provides funding for the design and construction of unplanned pipe, drainage, and treatment projects.
   - Alternatives Considered: Use of internal crews and equipment to complete work. Staff determined the workload required would reduce capacity applied towards critical services.
   - Advantages of Approval: Unplanned funds allows staff to be responsive to essential needs, increasing customer service, improving system efficiency, and reducing City liability.
   - Additional Operating Cost in the Future: Stormwater personnel will complete the maintenance of rehabilitated, repaired, or new infrastructure concurrently with existing public assets.

3. Pollutant Reduction Program: Downtown Mechanical Stormwater Treatment (Phase 3)

   - ID: STRH01
   - Year: FY22
   - Budget: $300,000
   - Description: Installation of two stormwater treatment units near the intersections of N. Rouse Ave. and E. Peach St., and N. Rouse Ave. and E. Tamarack St.
   - Alternatives Considered: Staff has not identified an alternative treatment approach with comparable maintenance ease, construction footprint, or pollutant removal efficiency.
   - Advantages of Approval: The units will collect over 20-tons of pollutants annually from 138-acres. They will improve public safety, Bozeman Creek's habitat, and MDEQ permit standing.
   - Additional Operating Cost in the Future: Staff will complete maintenance annually using existing vacuuming equipment and drying beds. Debris will eventually be tested and disposed at the landfill.

4. Utility Operation Program: Street Sweeper (#01)

   - ID: STOP05
   - Year: FY22
   - Budget: $250,000
   - Description: Replacement of a mechanical street sweeper purchased in 2015. The sweeper has been in operation for seven years.
   - Alternatives Considered: Use the existing street sweeper, resulting in increased downtime and maintenance. Industry guidance recommends replacing municipal sweepers every five years.
   - Advantages of Approval: Street sweeping protects air quality, improves waterway health, improves MDEQ stormwater permit standing, and reduces slip hazards.
   - Additional Operating Cost in the Future: The Stormwater Division will fund operation and maintenance costs. The sweeper supplements the street sweeping program led by the Streets Division.

5. Utility Operation Program: Sediment Disposal Facility Asphalt Repair

- ID: STOS01
- Year: FY22
- Budget: $50,000
- Description: Preventative maintenance of the asphalt surface located at the Sediment Disposal Facility used for stormwater waste disposal generated from infrastructure operation.
- Alternatives Considered: Prolong asphalt maintenance risking degradation of drivable surfaces and increased deferred expense.
- Advantages of Approval: The project will ensure the facility remains operational and safe.
- Additional Operating Cost in the Future: None

6. Utility Operation Program: Administrative Vehicle (#01)

   - ID: STOP03
   - Year: FY22
   - Budget: $35,000
   - Description: Replacement of staff's 2000 Dodge Dakota. The truck has been in operation for 22 years and served numerous divisions. Significant maintenance and safety issues exist.
   - Alternatives Considered: The Stormwater Division has four administrative employees that share two dedicated vehicles. Not replacing would result in impacts to daily operations of the Division.
   - Advantages of Approval: Provides for a reliable and safe vehicle for staff to complete daily activities, such as pollution mitigation, equipment transport, flood response, and field inspections.
   - Additional Operating Cost in the Future: The Stormwater Division will fund operation and maintenance costs.

7. Pollutant Reduction Program: Downtown Mechanical Stormwater Treatment (Phase 4)

   - ID: STRH02
   - Year: FY23
   - Budget: $250,000
   - Description: Installation of two stormwater treatment units near the intersections of S. Black Ave. and E. Cleveland St., and S. Bozeman Ave. and E. Cleveland St.
   - Alternatives Considered: Staff has not identified an alternative treatment approach with comparable maintenance ease, construction footprint, or pollutant removal efficiency.
   - Advantages of Approval: The units will collect over 27-tons of pollutants annually from 193-acres. They will improve public safety, Bozeman Creek's habitat, and MDEQ permit standing.
   - Additional Operating Cost in the Future: Staff will complete maintenance semi-annually using existing vacuuming equipment and drying beds. Debris will eventually be disposed at the landfill.

8. Pipe Rehabilitation Program: North 9th Avenue Ditch Rehabilitation

   - ID: STDM06
   - Year: FY23
   - Budget: $125,000
   - Description: Rehabilitation of 900 feet of conveyance ditch located near N. 9th Ave. from W. Villard St. to Durston Rd., which has sediment buildup, overgrown vegetation, and bank erosion
   - Alternatives Considered: The infrastructure is a critical component of the City's storm sewer network. Delay will result in an increased chance of adjacent property flooding.

- Advantages of Approval: The targeted ditch is increasingly prone to backups and flooding. Rehabilitation will reduce risks by addressing structural and capacity deficiencies.
- Additional Operating Cost in the Future: Stormwater Personnel will complete maintenance on a reoccurring schedule, including inspection and clearing.

9. Pipe Rehabilitation Program: Middle Creek Ditch Rehabilitation

   - ID: STDM09
   - Year: FY24
   - Budget: $175,000
   - Description: Rehabilitation of 1,500 feet of conveyance ditch located near N. 15th Ave. from W. Main St. to W. Beall St., which has sediment buildup, overgrown vegetation, and bank erosion
   - Alternatives Considered: The infrastructure is a critical component of the City's storm sewer network. Delay will result in an increased chance of adjacent property flooding.
   - Advantages of Approval: The targeted ditch is increasingly prone to backups and flooding. Rehabilitation will reduce risks by addressing structural and capacity deficiencies.
   - Additional Operating Cost in the Future: Stormwater Personnel will complete maintenance on a reoccurring schedule, including inspection and clearing.

10. Utility Operation Program: Pipe Inspection Van (#01)

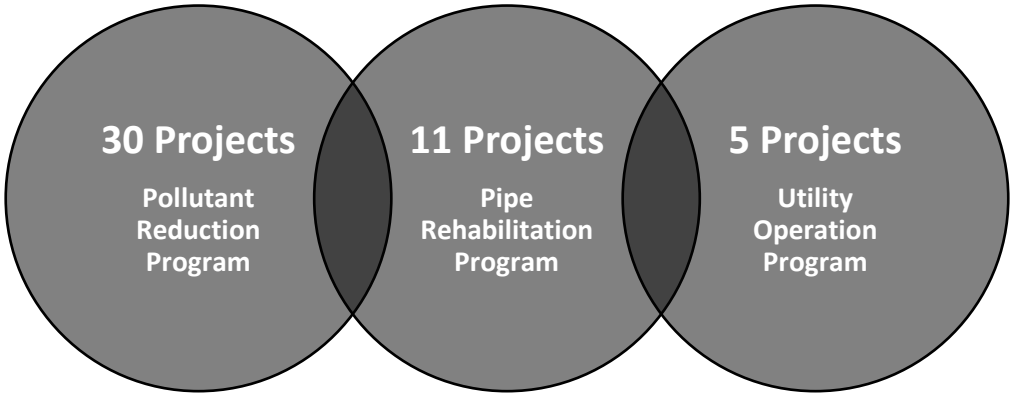
    - ID: STOP04
    - Year: FY25
    - Budget: $290,000
    - Description: Replacement of the pipe inspection van purchased in 2001 and refurbished in 2015. The vehicle's chassis is heavily worn and the onboard computer system is aged.
    - Alternatives Considered: Continue to use the existing vehicle, which could result in downtime and increasingly costly maintenance.
    - Advantages of Approval: The vehicle facilitates the City's pipe inspection program, which identifies maintenance needs, locates structural deficiencies, and detects illegal connections.
    - Additional Operating Cost in the Future: The Stormwater Division will fund operation and maintenance costs.

11. Utility Operation Program: Vacuum and Jetting Truck (#01)

    - ID: STOP08
    - Year: FY26
    - Budget: $527,000
    - Description: Replacement of the Division's vacuum and jetting truck purchased in 2015.
    - Alternatives Considered: Continue to use the existing vehicle, which will result in downtime and increasingly costly maintenance.
    - Advantages of Approval: The vehicle facilitates infrastructure maintenance, pollution event cleanup, and vacuum excavation for pipe repairs.
    - Additional Operating Cost in the Future: The Stormwater Division will fund operation and maintenance costs.

2.4 Ongoing or Completed Projects

The MS4 has or is in the process of completing the following projects:



1. Pipe Rehabilitation Program: 2020 Storm Improvements
   - Purpose: Three drainage repairs to fix localized flooding issues (S. 20th Ave., O'Connell Dr., and Spruce Dr.)
   - Type: Inlets, pipes, and concrete structures
   - Treatment Efficiency: n/a
   - Treatment Area: n/a
   - Discharge Location: Varied
   - Date of Completion: Winter 2020
   - Co-Benefit(s): Reduced erosion, improved public safety
2. Utility Operation Program: Stormwater Utility Cost of Service and Rate Study
   - Purpose: Cost of service and financial rate study to guide the future rate structure.
   - Type: Planning document
   - Expected Treatment Efficiency: n/a
   - Treatment Area: n/a
   - Discharge Location: n/a
   - Date of Completion: Mid-2021
   - Co-Benefit(s): n/a
3. Utility Operation Program: Stormwater Facility Plan Update
   - Purpose: Update the City's 2008 Stormwater Facilities Plan to provide modern policy, programmatic, and infrastructure recommendations for future implementation.
   - Type: Planning document
   - Treatment Efficiency: n/a
   - Treatment Area: n/a
   - Discharge Location: n/a
   - Date of Completion: Mid-2021
   - Co-Benefit(s): n/a
4. Pipe Rehabilitation Program: Downtown Trunk Line Rehabilitation
   - Purpose: Rehabilitate a historical storm sewer trunk line (Tracy to Rouse)
   - Type: CIPP liner

- Treatment Efficiency: n/a
- Treatment Area: n/a
- Discharge Location: Bozeman Creek
- Date of Completion: Mid-2021
- Co-Benefit(s): Improved public safety

5. Pipe Rehabilitation Program: Manley Ditch Rehabilitation

   - Purpose: Rehabilitate a historical irrigation drainage ditch and convey drainage from a 58-acre urban area to the Cherry Creek Fishing Access property.
   - Type: Ditch rehabilitation, bio-retention treatment areas, and flood control weirs
   - Treatment Efficiency: n/a
   - Treatment Area: n/a
   - Discharge Location: Cherry Creek
   - Date of Completion: Mid-2021
   - Co-Benefit(s): Improved public safety, enhanced water quality

6. Pollutant Reduction Program: Mechanical Separation Unit (Westridge)

   - Purpose: Reduced pollutant loading
   - Type: 5' Contech CDS
   - Treatment Efficiency: 50% TSS reduction
   - Treatment Area: ≈28 Acres
   - Discharge Location: Bozeman Creek tributary
   - Date of Completion: Winter 2020
   - Co-Benefit(s): Improved public safety

7. Pollutant Reduction Program: Rouse Stormwater Upgrades (Rouse - Main to Oak, MDT)

   - Purpose: Flood control, reduced pollutant loading
   - Type: Five Contech CDS units, various sizes
   - Treatment Efficiency: 50% TSS Reduction
   - Treatment Area: ≈94 Acres
   - Discharge Location: Bozeman Creek
   - Date of Completion: Fall 2020
   - Co-Benefit(s): Improved public safety, reduced erosion

8. Utility Operation Program: Administrative Vehicle Purchase

   - Purpose: Transportation for Administrative Staff
   - Type: 2019 Dodge Ram
   - Expected Treatment Efficiency: n/a
   - Treatment Area: n/a
   - Discharge Location: n/a
   - Date of Completion: Spring 2019
   - Co-Benefit(s): n/a

9. Pipe Rehabilitation Program: BMX Park Storm Improvements (Peach and 4th)

   - Purpose: Flood control
   - Type: 244' of 30" RCP Pipe, three 72" manhole structures
   - Expected Treatment Efficiency: n/a
   - Treatment Area: n/a

- Discharge Location: East Gallatin River
- Date of Completion: Spring 2019
- Co-Benefit(s): Reduced erosion

10. Pollutant Reduction Program: Mechanical Separation Unit (Church and Main)

- Purpose: Reduced pollutant loading
- Type: 6' Contech CDS
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈35 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Fall 2019
- Co-Benefit(s): Improved public safety

11. Pollutant Reduction Program: Mechanical Separation Unit (Black and Main)

- Purpose: Reduce sediment loads
- Type: Contech CDS (6' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈28 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Spring 2019
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

12. Pollutant Reduction Program: Mechanical Separation Unit (Bozeman and Main)

- Purpose: Reduce sediment loads
- Type: Contech CDS (6' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈29 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Spring 2019
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

13. Pollutant Reduction Program: Rouse Stormwater Upgrades (Oak to Story Mill , Phase 1, MDT)

- Purpose: Flood control, reduced pollutant loading
- Type: Inlets, manholes, pipes, and three mechanical treatment units
- Expected Treatment Efficiency: 50% TSS
- Treatment Area: n/a
- Discharge Location: Bozeman Creek
- Date of Completion: Spring 2019
- Co-Benefits: Flood control and water quality

14. Pollutant Reduction Program: Boulevard Infiltration Structure (Mason and Tracy)

- Purpose: Reduce sediment loads and flood mitigation
- Type: Rain Garden
- Expected Treatment Efficiency: 100% TSS Reduction
- Treatment Area: ≈2 Acres
- Discharge Location: Matthew Bird Creek (a tributary of Bozeman Creek)
- Date of Completion: Summer 2019
- Co-Benefits: Progress towards Bozeman Creek TSS WLA and flow reduction.

15. Pollutant Reduction Program: Mechanical Separation Unit (11th and College)

- Purpose: Reduce sediment loads
- Type: Contech CDS (8' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈60 Acres
- Discharge Location: Mandeville Creek
- Date of Completion: Summer 2019
- Co-Benefits: n/a

16. Pollutant Reduction Program: Tracy Stormwater Upgrades (College to Babcock)

- Purpose: Flood control
- Type: Inlets, manholes, and 2,850 ft. of pipe
- Expected Treatment Efficiency: n/a
- Treatment Area: n/a
- Discharge Location: Bozeman Creek
- Date of Completion: Summer 2018 and 2019
- Co-Benefits: n/a

17. Pollutant Reduction Program: Mechanical Separation Unit (3rd and Main)

- Purpose: Reduce sediment load to Bozeman Creek
- Type: Contech CDS (6' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈94 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Spring 2018
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

18. Pollutant Reduction Program: Mechanical Separation Unit (Grand and Main)

- Purpose: Reduce sediment load to Bozeman Creek
- Type: Contech CDS (6' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈58 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Spring 2018
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

19. Pollutant Reduction Program: Mechanical Separation Unit (Tracy and Main)

- Purpose: Reduce sediment load to Bozeman Creek
- Type: Contech CDS (6' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈32 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Spring 2018
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

20. Pollutant Reduction Program: Permeable Streetscape Project (7th and Peach)

- Purpose: Pilot permeable paver use
- Type: Basalite Pavers

- Expected Treatment Efficiency: 100% TSS Reduction
- Treatment Area: .1 Acres
- Discharge Location: East Gallatin
- Date of Completion: Spring 2018
- Co-Benefits: Flood control and water quality

21. Pipe Rehabilitation Program: Baxter Lane Stormwater Upgrades

    - Purpose: Improve drainage for 7th and Baxter
    - Type: Inlets, manholes, and mains
    - Expected Treatment Efficiency: n/a
    - Treatment Area: n/a
    - Discharge Location: Mandeville Creek
    - Date of Completion: Summer 2018
    - Co-Benefits: Flood control and water quality

22. Utility Operation Program: Bozeman Creek Stream Gage Installation

    - Purpose: Data collection
    - Type: DNRC Stream Gage
    - Expected Treatment Efficiency: n/a
    - Treatment Area: n/a
    - Discharge Location: n/a
    - Date of Completion: Summer 2018
    - Co-Benefits: Includes port for turbidity monitoring device

23. Pipe Rehabilitation Program: East Olive Street Stormwater Upgrades

    - Purpose: Improve drainage for East Olive Street
    - Type: Inlets, manholes, and mains
    - Expected Treatment Efficiency: n/a
    - Treatment Area: n/a
    - Discharge Location: Bozeman Creek
    - Date of Completion: Fall 2017
    - Co-Benefits: Flood control and water quality

24. Pollutant Reduction Program: City Hall Patio Permeable Paver Project

    - Purpose: LID/Green infrastructure pilot project and community education
    - Type: Pave Drain Permeable Pavers
    - Expected Treatment Efficiency: 100% TSS Reduction
    - Treatment Area: ≈1,000 square feet
    - Discharge Location: Bozeman Creek
    - Date of Completion: Summer 2017
    - Co-Benefits: Progress towards Bozeman Creek TSS WLA and flood control

25. Pipe Rehabilitation Program: Inlet Replacements

    - Purpose: Reduce sediment to Bozeman Creek and flood control
    - Type: Standard inlet with 9” sump
    - Expected Treatment Efficiency: Unknown
    - Treatment Area: 23 inlets
    - Discharge Location: Bozeman Creek

- Date of Completion: Fall 2017
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

26. Pipe Rehabilitation Program: Pipe Replacements (Black and Bozeman)

- Purpose: Flood control
- Type: 15" SDR
- Expected Treatment Efficiency: n/a
- Treatment Area: 600'
- Discharge Location: Bozeman Creek
- Date of Completion: Fall 2017
- Co-Benefits: n/a

27. Pollutant Reduction Program: Mechanical Separation Unit Installation (Rouse and Griffin)

- Purpose: Reduce sediment load to Bozeman Creek
- Type: Contech CDS (6' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈ 14 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Fall 2017
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

28. Pollutant Reduction Program: Mechanical Separation Unit Installation (Rouse and Bridger Center)

- Purpose: Reduce sediment load to the East Gallatin River
- Type: Contech CDS (5' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈12 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Fall 2017
- Co-Benefits: Progress towards WLA

29. Pollutant Reduction Program: Mechanical Separation Unit Installation (Rouse and Olive)

- Purpose: Reduce sediment load to Bozeman Creek
- Type: Contech CDS (5' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈9 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Fall 2017
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

30. Pollutant Reduction Program: Mechanical Separation Unit Installation (Perkins and Peach)

- Purpose: Reduce sediment load to Bozeman Creek
- Type: Contech CDS (4' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈ 22 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Fall 2017
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

31. Utility Operation Program: Stormwater Operations Disposal Facility

- Purpose: Sediment dewatering and storage
- Type: Asphalt pad with ecology block bays
- Expected Treatment Efficiency: n/a
- Treatment Area: n/a
- Discharge Location: Lined wastewater pond
- Date of Completion: Fall 2017
- Co-Benefits: Facilitates pollutant reduction totals

32. Pollutant Reduction Program: Mechanical Separation Unit Installation - S. Rouse and E. Lincoln

- Purpose: Reduce sediment load to Bozeman Creek
- Type: Contech CDS (5' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈32 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Fall 2016
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

33. Pollutant Reduction Program: Mechanical Separation Unit Installation - N. 11th and W. Lamme

- Purpose: Reduce sediment load to Mandeville Creek
- Type: Contech CDS (4' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈7 Acres
- Discharge Location: Mandeville Creek
- Date of Completion: Fall 2016
- Co-Benefits: Located adjacent to High School

34. Pollutant Reduction Program: Mechanical Separation Unit, Underground Infiltration Basin, Wash Pad, and Paving Project – Shops Complex

- Purpose: Reduce sediment load to Bozeman Creek
- Type: Contech CDS (4' Diameter), ADS StormTech, and Inlet Sumps
- Expected Treatment Efficiency: 50% TSS Reduction for Mechanical Separation Unit and 100% for Underground Infiltration Basin
- Treatment Area: ≈2 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: Fall 2016
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

35. Pollutant Reduction Program: Mechanical Separation Unit Installation – N. Wallace and E. Tamarack

- Purpose: Reduce sediment load to Bozeman Creek
- Type: Contech CDS (8' Diameter)
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: ≈100 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: November 2016
- Co-Benefits: Progress towards Bozeman Creek TSS WLA

36. Pollutant Reduction Program: Underground Infiltration Basin – N. 7th and Baxter

- Purpose: Reduce localized flooding; reduce sediment load to Mandeville Creek
- Type: Perforated gravity main embedded in aggregate for storage
- Expected Treatment Efficiency: 100% TSS Reduction
- Treatment Area: ≈9 Acres
- Discharge Location: Mandeville Creek
- Date of Completion: Summer 2016
- Co-Benefits: Joint Water Conservation and Stormwater LID pilot project.

37. Pollutant Reduction Program: Underground Infiltration Basin – Plum and Avocado

- Purpose: Reduce localized flooding; reduce sediment load to East Gallatin;
- Type: ADS StormTech
- Expected Treatment Efficiency: 100% TSS Reduction
- Treatment Area: ≈14 Acres
- Discharge Location: Subsurface
- Date of Completion: Fall 2016
- Co-Benefits: Resolved localized flooding issue

38. Pollutant Reduction Program: Backwater Slough – Story Mill Park

- Purpose: Reduce sediment load in Bozeman Creek
- Type: Constructed wetland
- Expected Treatment Efficiency: 100% TSS Reduction
- Treatment Area: Entire Bozeman Creek Watershed
- Discharge Location: Bozeman Creek
- Date of Completion: Summer 2015
- Co-Benefits: Nutrient uptake, flood mitigation, and wetland restoration

39. Pollutant Reduction Program: Bozeman Creek Meander Construction – Bogert Park

- Purpose: Stream restoration; improve streamside vegetative cover; reduce sediment load due to streambank erosion; flood control
- Type: Excavated meander and pool addition; inset floodplain construction
- Expected Treatment Efficiency: Unknown
- Treatment Area: Entire Bozeman Creek Watershed
- Discharge Location: Bozeman Creek
- Date of Completion: Spring 2017
- Co-Benefits: Education, fish habitat, stream bank stabilization, and flood control

40. Pollutant Reduction Program: Meander the Mandeville Construction – Bozeman High School

- Purpose: Stream restoration; improve streamside vegetative cover; flood control
- Type: Construction of meanders, riffles, and pools
- Expected Treatment Efficiency: Unknown
- Treatment Area: Entire Mandeville Creek Watershed
- Discharge Location: Mandeville Creek
- Date of Completion: 2016
- Co-Benefits: Education, fish habitat, stream bank stabilization, and flood control

41. Pollutant Reduction Program: LID Infiltration Galleries – University Field House

- Purpose: Reduce sediment load to Mandeville Creek
- Type: LID Infiltration Galleries

- Expected Treatment Efficiency: 100% TSS Reduction
- Treatment Area: 2.4 Acres
- Discharge Location: Mandeville Creek
- Date of Completion: 2016

42. Pollutant Reduction Program: Mechanical Separation Unit Installation – University Field House

- Purpose: Reduce sediment load to Mandeville Creek
- Type: Hydro International Downstream Defender and Sediment Separator
- Expected Treatment Efficiency: 50% TSS Reduction
- Treatment Area: 3 Acres
- Discharge Location: Mandeville Creek
- Date of Completion: Fall 2015

43. Pollutant Reduction Program: Underground Infiltration – Jabs and Wilson Halls

- Purpose: Reduce sediment load to Mandeville Creek
- Type: Underground Infiltration Gallery
- Expected Treatment Efficiency: 100% TSS Reduction
- Treatment Area: 3.9 Acres
- Discharge Location: Subsurface
- Date of Completion: 2016

44. Pipe Rehabilitation Program: Gravity Main Install – 15th and Babcock

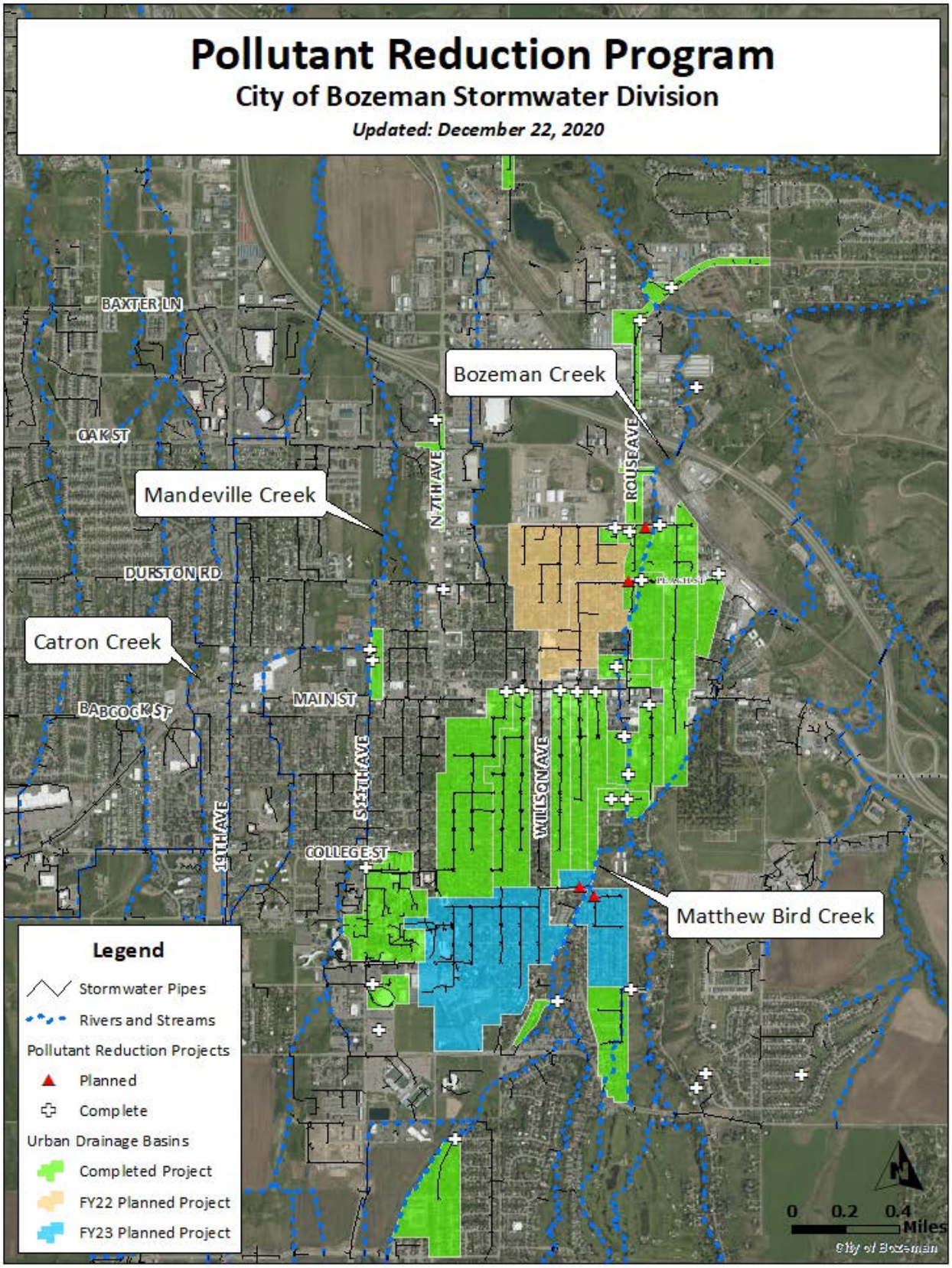
- Purpose: Eliminate localized flooding issue
- Type: Construction of underground stormwater main
- Expected Treatment Efficiency: None
- Treatment Area: None
- Discharge Location: Mandeville Creek
- Date of Completion: Fall 2015

45. Pipe Rehabilitation Program: Wallace Reconstruction and Stormwater System Improvements

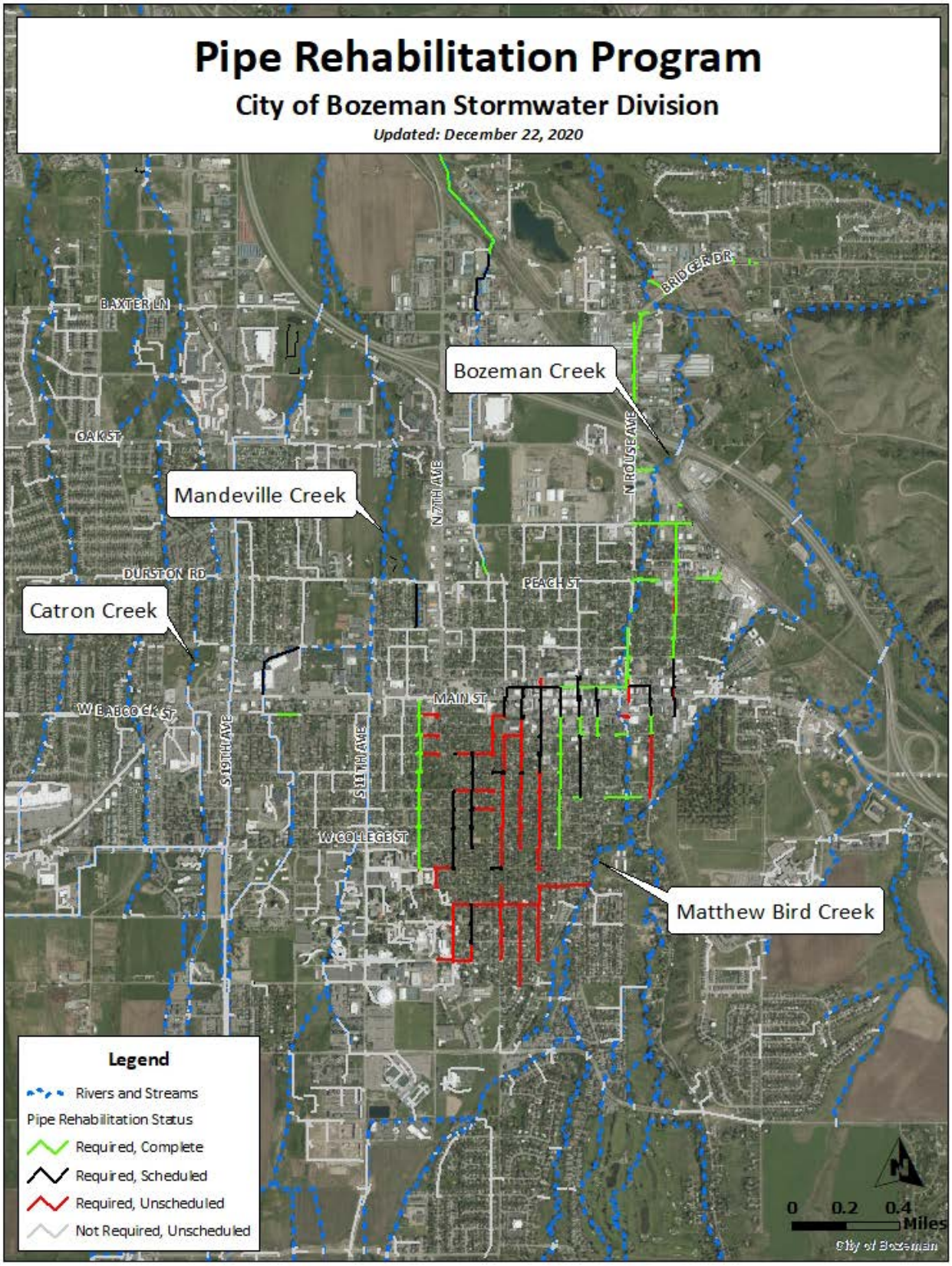
- Purpose: Eliminate localized flooding issue and provide treatment
- Type: Construction of 3,000 feet of underground stormwater mains and new inlets
- Expected Treatment Efficiency: None
- Treatment Area: None
- Discharge Location: Bozeman Creek
- Date of Completion: 2016

46. Pipe Rehabilitation Program: Story Street Reconstruction and Stormwater System Improvements

- Purpose: Eliminate localized flooding issue and provide treatment
- Type: Construction of underground stormwater mains, new inlets, and oil/sand separators
- Expected Treatment Efficiency: Unknown
- Treatment Area: 10 Acres
- Discharge Location: Bozeman Creek
- Date of Completion: 2015



Graphic 2.4.2: Planned and completed pollutant reduction projects



Graphic 2.4.3: Planned and complete pipe rehabilitation projects

2.5 Pollutant Reduction Totals

The MS4 tracks pollutant reduction totals using a variety of data tracking mechanisms:

- Total Suspended Solids (TSS)
  - Treatment Unit Maintenance: The MS4 calculates tonnage totals by measuring the depth of debris within each unit before cleaning. The MS4 subtracts a top of debris depth measurement from a total unit depth measurement, calculates a volume of debris (cubic feet) using dimension information for each unit, and converts the volume to tons by using an assumed sand weight ratio of .056 tons = 1 cubic foot of sand.

Table 2.5.1: Treatment Unit Maintenance Pollution Reduction Totals

Watershed	2017	2018	2019	2020	2021
Bozeman Creek	16 Tons	45 Tons	45 Tons	41 Tons	-
Mandeville Creek	5 Tons	1 Ton	6 Tons	8 Tons	-
East Gallatin River	1 Ton	4 Tons	6 Tons	6 Tons	-
Total:	22 Tons	50 Tons	57 Tons	55 Tons	-

  - Storm Sewer Maintenance: The MS4 calculates tonnage totals by calculating the depth of debris vacuumed out of manholes and inlets before cleaning. The MS4 multiplies the area of each assets sump by an assumed 1/2 full depth measurement, multiplies the volume by the total assets maintained for that year, and converts the volume to tons by using an assumed sand weight ratio of .056 tons = 1 cubic foot.

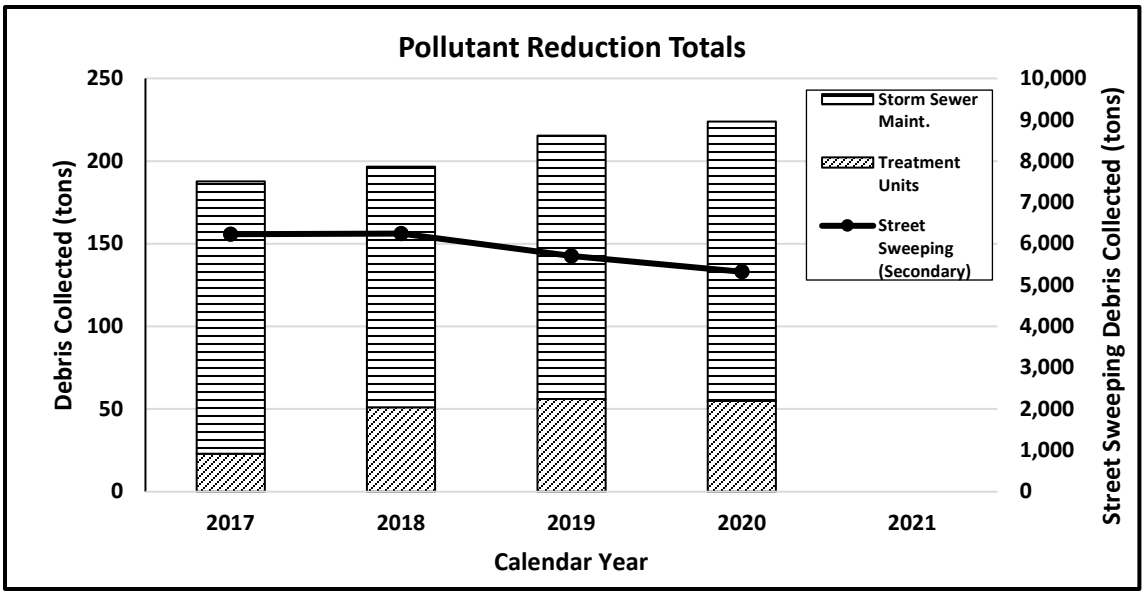
Table 2.5.2: Storm Sewer Maintenance Pollution Reduction Totals

Entity	2017	2018	2019	2020	2021
City of Bozeman	118 Tons	99 Tons	111 Tons	131 Tons	-
Montana State University	47 Tons	46 Tons	48 Tons	38 Tons	-
Total:	165 Tons	145 Tons	159 Tons	169 Tons	-

  - Street Sweeping: The MS4 calculates tonnage totals for year-round and spring/fall cleanup street sweeping operations. The Streets Division tracks cubic yard totals for each of the activities, which is then stored in Cityworks and reported. The MS4 converts yards to tons using an assumed weight ratio of 1.5 tons = 1 cubic yard of sand for reoccurring and spring street sweeping and converts yards to tons using an assumed weight ratio of .18 tons = 1 cubic yard of leaves for fall street sweeping.

Table 2.5.3: Street Sweeping Pollution Reduction Totals

Entity	2017	2018	2019	2020	2021
City of Bozeman	6,108 Tons	6,022 Tons	5,502 Tons	5,127 Tons	-
Montana State University	124 Tons	224 Tons	206 Tons	195 Tons	-
Total:	6,232 Tons	6,246 Tons	5,708 Tons	5,322 Tons	-



Graphic 2.5.4: Pollutant Reduction Totals Chart

2.6 Performance Measures

The MS4 utilizes performance measures to evaluate programmatic strategies with the goal of optimizing limited resources, increasing efficiencies, and balancing annual workloads.

1. Stormwater Report Card: Final Grade generated by the MS4 that provides a consistent and communicable method for tracking stream health improvement and permit compliance risk. The MS4's target level of service is to facilitate an upward trend annually, which is calculated using the methods described in SWMP Section 8.0.

Table 2.6.1: Stormwater Report Card Score

Calendar Year	Score (%)	Score (Grade)
2018	61%	D
2019	54%	F
2020	65%	D
2021	-	-

2. Community Safety and Urban Flood Risk: Tracking mechanism utilized by the MS4 that provides a consistent and communicable method for tracking community safety and urban flood risk. The MS4's target level of service is to have zero insurance claims filed annually as a result of public storm sewer deficiencies.

Table 2.6.2: Storm Sewer Affilitated Insurance Claims

Calendar Year	Filed Insurance Claims
2018	0
2019	0
2020	0
2021	-

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Section 3.0

Public Education Program

Graphic 3.0.1: Construction field academy

Graphic 3.0.2: Dog waste station with educational signage

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3.1 Introduction

The MS4 strives to improve waterway health, protect public safety, and comply with its MS4 Permit through the education of the public by:

- Passively engaging residents through the consistent supply of educational information; and
- Actively engaging residents, providing them tools to take direct action.

SWMP Section 3.0 details the following components necessary to administer the MS4's Public Education Program, including:

- Education Protocol (3.2)
- Key Audiences (3.3)
- Ongoing Initiatives (3.4)
- Future and Deferred Opportunities (3.5)

3.2 Education Protocol

The MS4 educates audiences on stormwater-related issues to reduce the public's contribution of pollutants to waterbodies using the following strategies:

1. Passive Engagement (Education): Creation and distribution of educational messages, targeting pollutant-generating activities and behaviors distributed via the following platforms:
   - Website
   - Utility bill inserts
   - Internet and radio advertisements
   - Brochures
   - Magazine articles
   - Educational signage
   - Vehicle wraps
   - Surveys
2. Active Engagement (Involvement and Enforcement): Customized interpersonal interactions with various audiences, targeting pollutant-generating activities and behaviors distributed via the following activities:
   - Presentations/Meetings
   - Trainings
   - Tours
   - Activities
   - Events
   - Penalties

3.3 Key Audiences

The MS4 targets key audiences since they conduct activities that result in stormwater pollution, including:

Table 3.3.1: Key Audiences

Targeted Audience	Pollutants(s)	Activity	Rationale	Engagement Type	Initiatives
Residents	Nutrients, E. coli, TSS	Yard Maintenance	SWMP Sec. 8.9	Passive/Active	SWMP Sec. 3.4
Construction Industry	TSS	Construction	SWMP Sec. 5.6	Passive/Active	SWMP Sec. 3.4
Youth/MSU Students	Nutrients, E. coli, TSS	Education and class projects	Paradigm shift, trickle up impact	Active	SWMP Sec. 3.4
HOAs - Home Owner Associations	Nutrients, E. coli, TSS	Facility Maintenance	SWMP Sec. 6.8	Passive/Active	SWMP Sec. 3.4
Carpet Cleaning Firms	Wash Waste	Dumping	SWMP Sec. 4.4	Active	SWMP Sec. 3.4
Pet Owners	E.coli	Dog waste	SWMP Sec. 8.2	Active/Passive	SWMP Sec. 3.4

3.4 Ongoing Initiatives

The MS4 completes initiatives to engage, educate, and promote sustainable behavior of its key target audiences. Ongoing initiatives include:

1. Adopt-a-Drain: A program that actively engages watershed champions and supplies them with a tool to make a measurable difference in their neighborhoods by periodically cleaning debris from adopted storm sewer inlets. The program also passively engages residents by creating an environment where stormwater-related issues can be discussed and acted upon at a neighborhood level, rather than the City acting as the sole information provider.

   - Key Audience: Residents
   - Strategy: Active and Passive Engagement
   - Treatment Area: Citywide
   - Distribution Channels: Recruitment, training, troubleshooting, and engagement
   - Performance Measure: Total weight of debris collected annually

Table 3.4.1: Adopt a Storm Drain Program Summary

Year	Task	Task Outcome	Goal	Goal Outcome	Notes
2019	Implement pilot program	Complete	Collect 250 lbs.	Met 773 lbs.	Time intensive but effective program, 11 Residents cared for 21 inlets.
2020	Implement program, retain majority of the recruited residents, explore expansion	Complete	Collect 500 lbs.	Met 1,362 lbs.	Covid-19 affected ability to engage residents, many participants started strong but tapered in their efforts mid-year, 14 residents cared for 30 inlets.
2021	Implement program, retain majority of the recruited residents, develop expansion plan	-	Collect 750 lbs.	-	-

2. Educational Stormwater Video: Seven-minute video that describes the MS4's Program, the context for why stormwater is important, and ways residents/property owners can make a difference. Residents view the video on the City's website.

   - Key Audience: Residents
   - Strategy: Passive Engagement
   - Treatment Area: Citywide
   - Distribution Channels: MS4 website and email signature attachment
   - Performance Measure: Total views, watch time, and average view duration tracked annually

Table 3.4.2: Educational Stormwater Video Summary

Year	Task	Task Outcome	Goal	Goal Outcome	Notes
2017	Maintain video	Complete	n/a	n/a 179 Views	12 hours watch time, 4:02 average duration
2018	Maintain video	Complete	Repeat 2017 Views	Met 502 Views	31 hours watch time, 3:42 average view duration
2019	Maintain video, add to City Channel	Not Complete	Repeat 2018 Views	Not Met 214 Views	14.1 hours watch time, 3:57 average view duration

2020	Maintain video, add to City Channel, promote using Facebook	Not Complete	Repeat 2019 Views	Not Met 167 Views	Moved video to different viewing service in September, shifted training platform that no longer uses YouTube and results in views
2021	Maintain video, add to City Channel	-	Repeat 2020 Views	-	-

3. Dog-Waste Campaign: Campaign devoted to educating residents about the importance of dog waste collection and disposal. The campaign includes the deployment and maintenance of educational signage and dog waste stations in numerous parks and trail corridors.

   - Key Audience: Residents
   - Strategy: Passive and Active Engagement
   - Treatment Area: Citywide
   - Distribution Channels: Strategic signage and waste stations placed in high use areas.
   - Performance Measure: Tonnage tracked annually by calculating the total amount of dog waste collected at all waste stations. The MS4 derives the total by multiplying the total waste station bags collected by 10 lbs., which is the assumed weight of each bag.

Table 3.4.3: Dog Waste Campaign Summary

Year	Task	Task Outcome	Goal	Goal Outcome	Notes
2017	Maintain stations	Complete	n/a	n/a 19.5 Tons	n/a
2018	Maintain stations	Complete	Repeat 2017 Total	Met 20.6 Tons	n/a
2019	Maintain stations, add urban specific signs in 4 locations	Not Complete	Repeat 2018 Total	Not Met 18.2 Tons	27% drop in visits from 2018, meaning bags likely filled up more and replaced less often due to staffing shortages
2020	Maintain stations	Complete	Repeat 2019 Total	Not Met 17.6 Tons	Increased cleanout visitation by Park's Staff; however, COVID-19 impacts.
2021	Maintain stations	-	Repeat 2020 Total	-	-

4. Vehicle Decal Wraps: Educational signage installed on the MS4's Vactor truck and street sweeper that visually displays the connection between urban areas and waterways.

   - Key Audience: Residents
   - Targeted Pollutant(s): E.coli, nutrients, oil, grease, floatables, and sediment
   - Strategy: Passive Engagement
   - Treatment Area: Citywide
   - Distribution Channel: Vehicle use
   - Performance Measure: Stormwater operator hours

Table 3.4.4: Vehicle Decal Wrap Summary

Year	Task	Task Outcome	Goal	Goal Outcome	Notes
2017	Maintain decals	Complete	n/a	n/a 4,300 Hours	n/a
2018	Maintain decals	Complete	Repeat 2017 Hours	Met 5,400 Hours	n/a

2019	Maintain decals	Complete	Repeat 2018 Hours	Not Met 4,100 Hours	Staffing shortages prevalent through 2019.
2020	Maintain decals	Complete	Repeat 2019 Hours	Not Met 3,400 Hours	Staffing shortages prevalent through 2020.
2021	Maintain decals	-	Repeat 2020 Hours	-	-

5. Website: Website that includes a variety of information, spanning from what stormwater is, how to report a pollution event, construction stormwater permits, rate model information, post-construction design standards, and more. Address: www.bozeman.net/government/stormwater.

   - Key Audience: Residents, Home Owner Associations, and Contractors
   - Strategy: Passive Engagement
   - Treatment Area: Citywide
   - Distribution Channels: Available to the public via the internet
   - Performance Measure: Total unique page views tracked by Google Analytics.

Table 3.4.5: Website Summary

Year	Task	Task Outcome	Goal	Goal Outcome	Notes
2017	Maintain website	Complete	n/a	n/a 677 Views	
2018	Maintain website	Complete	Repeat 2017 Views	Met 1,225 Views	
2019	Maintain website	Complete	Repeat 2018 Views	Met 2,408 Views	Most Visitations: Homepage, Construction, and Contact Us
2020	Maintain website, update periodically	Complete	Repeat 2019 Views	Met 4,700 Views	Most Visitations: Homepage, Construction, and Contact Us
2021	Maintain website, update periodically	-	Repeat 2020 Views	-	-

6. General Outreach: Information developed by the MS4 and applied in various settings focused on providing general stormwater information and soliciting public participation.

   - Key Audience: Residents
   - Strategy: Active Engagement
   - Treatment Area: Citywide
   - Distribution Channels: Presentations, conferences, community events, and advertisements
   - Performance Measure: Total events
     - 2017: 10 (Green Drinks Event, MSU Class Presentations, GLWQD Board Presentation, (2) MSAWWA Conference Presentation, SWMBIA Home Show Booth, Environment Summit Community Event, Water Works Art Initiative, Gallatin Watershed Sourcebook, Breaking Ground Advertisement)
     - 2018: 15 (Montana DNRC Water Summit Presentation, MDEQ Stormwater Conference Presentation, MDEQ Stormwater Conference Tour, Parade of Homes Garden Tour, Gallatin College Presentation, MSU Landscape School Presentation, Stream Team Training, City Commission Emergency Ordinance Presentation, City Commission Capital and Budget Presentation, Gallatin Watershed Sourcebook Creation and Distribution, Water and Society Class Presentation, Horticulture 201

Stormwater Design Project, (2) Student-Led Campus Cleanup Events: Loose Litter and Cigarettes, Campus Cleanup Event)

- 2019: 17 (City of Bozeman Planning Board Presentation, Lives and Landscapes Article, Raccoon Facebook Post, Arbor Day Event, Mountain Outlaw Article, S. Church Traffic Calming, MSU Teacher Tour, Water School Presentation, MSU EENG 341 Class Presentation, Active Aging Week Presentation, Eagle Scout Stenciling Project, Montana Stormwater Committee Webinar, Water and Society Class Presentation, Water Hydrology Class Presentation, Hort. 201 Stormwater Design Project, Health Advancement Butt Clean Up-Day, and Campus Clean Up Event)
- 2020: 12 (CATs Project #2, CATs Project #3, Grass Clippings Mailer, City of Bozeman Climate Action Plan, MSU HORT 440 Class Project Review, Commission Budget Presentation, City Clerk Training, Water and Society Class Presentation, Water Hydrology Class Presentation, Hort 201 Stormwater Design Project, Campus Clean-Up Event, Arbor Day Plantings along Mandeville Creek)

7. Construction Training: Trainings that educate contractors on proper selection and use of best management practices (BMPs) and permit preperation. The MS4 holds training tailored to various education levels, construction activities, and inspection procedures. Further, the MS4 maintains a Construction Program that includes permits and materials for this group (SWMP Section 5.0).

   - Key Audience: Contractors and Engineers
   - Strategy: Active and Passive Engagement
   - Treatment Area: Citywide
   - Distribution Channels: BMP Manual, annual training, and lunch and learns
   - Performance Measure: Annual construction-site audit earned score (see SWMP Section 5.4)

Table 3.4.6: Website Summary

Year	Task	Task Outcome	Goal	Goal Outcome	Notes
2018	Hold trainings	Complete	n/a	n/a, 33%	
2019	Hold trainings	Complete	Improve the 2018 Score	Not Met, 28%	Most Visitations: Homepage, Construction, and Contact Us
2020	Hold trainings	Not Complete	Improve the 2019 Score	Met, 34%	Scheduled classes cancelled due to Covid-19 meeting regulations.
2021	Hold trainings	-	Improve the 2020 Score	-	-

8. Project WET Curriculum: Class exercises taught by 4th, 5th, and 6th-grade teachers in Bozeman School District (BSD) classrooms, educating students on stormwater-related issues, utilizing customized, and location-specific lesson plans and activities. The City's Park's Division also uses the lesson plans for their summer camps.

   - Key Audience: Residents
   - Strategy: Active Engagement
   - Treatment Area: Entire MS4
   - Distribution Channel: Trainings for teachers who then present lessons to students
   - Performance Measure: Total student participants

Table 3.4.7: Project WET Curriculum Summary

Year	Task	Task Outcome	Goal	Goal Outcome	Notes

2017	Coordinate Classroom Use	Complete	n/a	n/a 492 Students	-
2018	Coordinate Classroom Use	Complete	Repeat 2017 Student Count	Met 526 Students	-
2019	Coordinate Classroom and Camp Use	Not Complete	Repeat 2018 Student Count	Not Met 100 Students	Spent year incorporating into the BSD curriculum.
2020	Coordinate Classroom and Camp Use	Not Complete	Repeat 2019 Student Count	Not Met Students	Program discontinued until Covid-19 regulations lift.

9. Post-Construction Stormwater Program: Tailored outreach that educates HOA Boards and management representatives on the proper function and maintenance of stormwater basins. The MS4 maintains a Post-Construction Program that includes processes and materials tailored to this group further described in SWMP Section 6.0.

   - Key Audience: Home Owner Associations and Property Management Companies
   - Strategy: Active and Passive Engagement
   - Treatment Area: Citywide
   - Distribution Channels: Participation in facility tours, board meetings, annual assemblies, and development of educational information
   - Performance Measure: Annual post-construction audit earned score (see SWMP Section 6.4)

Table 3.4.8: Post-Construction Stormwater Program Summary

Year	Task	Task Outcome	Goal	Goal Outcome	Notes
2018	Inspect Facilities and Educate Owners	Complete	n/a	n/a 25%	-
2019	Inspect Facilities and Educate Owners	Complete	Improve the 2018 Score	Met 32%	Limited capacity to complete due to other priorities.
2020	Inspect Facilities and Educate Owners	Complete	Improve the 2019 Score	Met 56%	Hired Project Manager to assist with program.
2021	Inspect Facilities and Educate Owners	-	Improve the 2020 Score	-	-

10. Carpet Cleaning Targeted Outreach: Educate local carpet cleaning and restoration companies on proper disposal methods and potential enforcement penalties for illicit discharges to the storm sewer system.

    - Key Audience: Carpet Cleaning and Restoration Companies
    - Strategy: Active Engagement
    - Treatment Area: Entire MS4
    - Distribution Channels: Written and verbal correspondence
    - Performance Measure: Illicit discharge reports related to targeted activities

Table 3.4.9: Carpet Cleaning Targeted Outreach Summary

Year	Task	Task Outcome	Goal	Goal Outcome	Notes
2018	n/a	n/a	No Related Illicit Discharges	Not Met 1	-
2019	Distribute a letter to owners	Complete	No Related Illicit Discharges	Met 0	Increased engagement yielded a good result.

2020	Inspect Facilities and Educate Owners	Complete	No Related Illicit Discharges	Met 0	-
2021	Inspect Facilities and Educate Owners	-	No Related Illicit Discharges	-	-

11. Lawn Care Targeted Outreach: Educate residents on best practices related to lawn mowing.
    - Key Audience: Residents
    - Strategy: Passive Engagement
    - Treatment Area: Entire MS4
    - Distribution Channels: Mailer sent with a monthly utility bill.
    - Performance Measure: Residential sites' TSS median concentration (SWMP Section 8.4)

Table 3.4.10: Lawn Care Targeted Outreach Summary

Year	Task	Task Outcome	Goal	Goal Outcome	Notes
2020	Distribute a mailer to residents	Complete	One mailer in 2020	Met, sent Fall 2020	First year tracking this metric.
2021	Distribute a Mailer	-	One mailer in 2021	-	-

3.5 Future and Deferred Initiatives

The following items represent future initiatives for the MS4:

1. Education Video Series: Development of a multi-faceted video library that would bring to life many of the concepts presented in the MS4's static educational materials.
2. Adopt a Rain Garden: A program that would actively engage businesses to periodically clean and dispose debris from adopted rain gardens.
3. CATs Program: Collaborative program where MSU students complete projects in support of the City's goals. Projects typically span a semester and include a variety of activities.

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Section 4.0

Illicit Discharge Detection and Elimination Program

Graphic 4.0.1: Bentonite slurry spill

Graphic 4.0.2: Illicit connection confirmation

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4.1 Introduction

The MS4 strives to improve waterway health, protect public safety, and comply with its MS4 Permit through the identification and elimination of pollutant sources by:

- Completing dry weather screening of outfalls;
- Inspecting the storm sewer for illegal connections;
- Responding to and resolving pollution events; and
- Enforcing municipal ordinances preventing illegal dumping.

SWMP Section 4.0 details the following components necessary to administer the MS4's Illicit Discharge Detection and Elimination Program, including:

- Regulatory Framework (4.2)
- Illicit Discharge Detection and Corrective Action Plan (4.3)
- Enforcement Response Plan (4.4)
- Event Tracking (4.5)
- Non-Stormwater Discharge Evaluation (4.6)
- Outfall Reconnaissance Inventory (4.7)
- Storm Sewer Infrastructure Totals (4.8)

4.2 Regulatory Framework

Pursuant to §40.04.200 Bozeman Municipal Code (BMC), it shall be unlawful to discharge or cause to be discharged into the MS4 any materials, including, but not limited to, pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards or that could cause the city to be in violation of its MPDES. It shall be unlawful to store, handle, or apply any pollutant in a manner that will cause exposure to rainfall or runoff and discharge to the MS4 and to state waters or waters of the United States.

4.3 Illicit Discharge Detection and Corrective Action Plan

The MS4 uses the following Corrective Action Plan (CAP) to determine event priority, formulate a response, and, if necessary, pursue enforcement:

1. Assign an Event Coordinator (EC).
2. Investigate to determine pollutant type and severity (site visit and correspondence). Methods for investigation include:
    - Field observation (in person, CCTV, ORI).
    - Sampling and analysis (grab sample, turbidimeter, multi-parameter probe (pH and temperature), and ammonia test strips).
    - Infrastructure analysis (GIS, plats, and record drawings).
    - Dye testing.
    - Correspondence with property owners.
3. Determine an event tier and response based on the following thresholds:
    - Tier 1 Event: Minimal impact to public safety, infrastructure, and environment. Spills with a major dimension less than six feet and non-continuous. Outfalls and illicit connections deemed potential sources of pollution. Response includes:
        - Team: MS4 Staff and Code Compliance Officer

- Timeline: Initiate response within five days
- Resolution: MS4 Operations and/or contracted restoration firm.
- Pollutant Disposal: Public, Sediment/Pollutant Disposal Facility. Private, Contracted Hauler.
- Report: Internal
- Examples: Leaking vehicles and dripping dumpsters.

➢ Tier 2 Event: Moderate impact to public safety, infrastructure, and environment. Spills with a major dimension greater than six feet and non-continuous, or spills with a major dimension greater than six feet, continuous, and contained. Outfalls and illicit connections deemed suspect and obvious sources of pollution. Response includes:

- Team: MS4 Staff and Code Compliance Officer
- Timeline: Initiate response within 24-hours
- Resolution: MS4 Operations and/or contracted restoration firm.
- Pollutant Disposal: Public, Sediment/Pollutant Disposal Facility. Private, Contracted Hauler.
- Report: Internal
- Examples: Carpet cleaning process water discharge, sanitary overflow, camper waste disposal, homeless camp cleanup, floor drain, illicit sanitary connections, and non-hazardous chemical spills.

➢ Tier 3 Event: Immediate threat to human health, infrastructure, and environment. Spills with a major dimension greater than 6', continuous, and not contained.

- Team: MS4 Staff, Code Compliance Office, and Emergency Services
- Timeline: Immediate
- Resolution: Fire, MS4 Operations, and/or contracted restoration firm.
- Pollutant Disposal: Public, Sediment/Pollutant Disposal Facility. Private, Contracted Hauler.
- Reporting: Internal and MDEQ Notification
- Example: Hazardous spills

4. Eliminate discharge through various mitigation measures depending on event severity. Options include:

➢ Absorbent
➢ Vaccum and disposal
➢ Pipe plugs or seals
➢ Decontamination
➢ Enforcement
➢ Infrastructure retro-fit

5. If applicable, notify appropriate state and federal agencies.
6. Complete an event report that includes:

➢ Event Coordinator
➢ Date
➢ Event Location
➢ Pollutant(s) of Concern
➢ Event Tier Level
➢ Response Staff
➢ Response Time
➢ Discharge Location
➢ Description
➢ Event Timeline
➢ Conclusion/Resolution
➢ Images

4.4 Enforcement Response Plan

Pursuant to §40.04.860 and §40.04.890 BMC, the MS4 has the authority to implement the following Enforcement Response Plan (ERP) and use the following enforcement protocols for violators of BMC, including:

1. Informal Response: Warning issued via email notification or verbal notice used for cases when the responsible party unknowingly commits a violation of BMC. If not dealt with in an agreed upon timeframe, or an agreement does not occur, the MS4 escalates to a Formal Response. The MS4 handles most Tier 1 events under this category.
2. Formal Response: Notice of Violation and Cease and Desist Order using a set compliance timeline and monetary penalties based on staff time accrued and remediation costs. The MS4 uses this approach in cases when the responsible party knowingly violates BMC or has a record of non-compliance. The MS4 handles most Tier 2 and 3 events under this category.
3. Judicial Response: Civil penalties, injunctive relief, or criminal penalties using the Bozeman Police Department, City Attorney, and Municipal Court. The MS4 uses this approach in cases where the responsible party repeatedly and knowingly commits violations of BMC and fails to remedy issues under a Formal Response.
4. Additional ERP Information:
    - Staff with Enforcement Authority: Stormwater Program Technician, Stormwater Program Specialist, Stormwater Program Project Manager, Stormwater Program Coordinator have the authority to investigate events as an EC; however, the the Stormwater Coordinator is the authorized Enforcement Agent and makes determinations regarding penalties.

4.5 Event Tracking

1. 2017 Events: 5
    - Tier 1 Event: Ellis Apartments - Leaking vehicle
        - Event ID: 201701
        - Pollutant: Oil
        - Local Control: Bozeman Municipal Code *(report available upon request)*
        - Resolved: Yes, owner cleaned up oil.
        - Significant: No, less than 5-gallons, no confirmed discharge to the storm sewer
    - Tier 1 Event: Crystal Bar - Illicit roof drain
        - Event ID: 201702
        - Pollutant: Wash water
        - Local Control: Bozeman Municipal Code *(report available upon request)*
        - Resolved: Yes, owner disconnected sink from the roof drain
        - Significant: Yes, over 5-gallons, confirmed discharge to the storm sewer
    - Tier 2 Event: Lindley Park - Homeless camp clean up
        - Event ID: 201703
        - Pollutant: Trash, human waste, and drug paraphernalia
        - Local Control: Bozeman Municipal Code *(report available upon request)*
        - Resolved: Yes, restoration firm cleaned up debris
        - Significant: No, less than 5-gallons, no confirmed discharge to the storm sewer
    - Tier 1 Event: NAC Construction Site Fueling Spill

- Event ID: 201704
- Pollutant: Diesel Fuel
- Local Control: MSU Safety and Risk Management
- Resolved: Yes, MSU Facility Services clean up
- Significant: Yes, over 5-gallons

➢ Tier 1 Event: Stadium Tractor Hydraulic Oil Spill

- Event ID: 201705
- Pollutant: Hydraulic Oil (<25 gallons)
- Local Control: MSU Safety and Risk Management
- Resolved: Yes, MSU Facility Services clean up
- Significant: Yes, over 5-gallons, no confirmed discharge to the storm sewer

2. 2018 Events: 7

➢ Tier 1 Event: 15th & Patrick Oil Dumping

- Event ID: 201801
- Location: See map 4.2.1
- Pollutant: Used motor oil
- Local Control: BMC Section 40.04.200 and system cleaning
- Significant: No, less than 5-gallons, confirmed discharge to the storm sewer

➢ Tier 1 Event: Solid Waste Hydraulic Hose

- Event ID: 201802
- Location: See map 4.2.1
- Pollutant: Hydraulic fluid
- Local Control: Solid Waste and Streets spill response
- Significant: No, over 5-gallons, no confirmed discharge to the storm sewer

➢ Tier 1 Event: Prue Clean Technologies Carpet Cleaners

- Event ID: 201803
- Location: See map 4.2.1
- Pollutant: Soaps and cleaning chemicals
- Local Control: BMC Section 40.04.200
- Significant: Yes, over 5-gallons, confirmed discharge to the storm sewer

➢ Tier 1 Event: Northwestern Energy Frac-Out

- Event ID: 201804
- Location: See map 4.2.1
- Pollutant: Bentonite slurry
- Local Control: BMC Section 40.04.200
- Significant: No, over 5-gallons, no confirmed discharge to the storm sewer

➢ Tier 2 Event: Sanitary Sewer Overflow

- Event ID: 201805
- Location: See map 4.2.1
- Pollutant: Sediment and pathogens
- Local Control: Sewer Department sanitary sewer overflow response and system cleanout

- Significant: Yes, over 5-gallons, confirmed discharge to the storm sewer

- Tier 1 Event: John Deer Contractor Hydraulic Hose Failure
  - Event ID: 201806
  - Location: See map 4.2.1
  - Pollutant: Hydraulic Fluid
  - Local Control: MSU Safety and Risk Spill Response (sorbent material, 55-gallon drum, disposal)
  - Significant: No, under 5-gallons, no confirmed discharge to the storm sewer

- Tier 1 Event: Barnard Holder Snow Machine Hydraulic Hose Failure
  - Event ID: 201807
  - Location: See map 4.2.1
  - Pollutant: Hydraulic Fluid
  - Local Control: MSU Safety and Risk Spill Response (sorbent material, 5-gallon buckets, disposal)
  - Significant: No, under 5-gallons, no confirmed discharge to the storm sewer

3. 2019 Events: 4

- Tier 2 Event: Sobo Lofts Fire
  - Event ID: 201901
  - Location: See map 4.2.1
  - Pollutant: Ash, construction debris/chemicals, traction sand, and chlorinated water
  - Local Control: Emergency fire operation and system cleaning
  - Significant: Yes, 1.5 million gallons of water sprayed on the fire. The majority did not discharge to Mandeville Creek due to a degraded historical irrigation conveyance that ponded the flows until infiltration occurred.

- Tier 1 Event: Durston Oil Spill
  - Event ID: 201902
  - Location: See map 4.2.1
  - Pollutant: Motor oil
  - Local Control: BMC Section 40.04.200
  - Significant: No, immediate response and mitigation by MS4 Staff.

- Tier 2 Event: Bogert Pool Filter Backflush
  - Event ID: 201903
  - Location: See map 4.2.1
  - Pollutant: Chlorinated water, Celatom Diatomite Filter Media, and filter debris
  - Local Control: BMC Section 40.04.200
  - Significant: No, immediate response and implementation of operational controls, plugged connection soon after eliminating the chance of future discharges.

- Tier 1 Event: Karst Stage Oil Spill
  - Event ID: 201904
  - Location: See map 4.2.1
  - Pollutant: Motor oil
  - Local Control: BMC Section 40.04.200

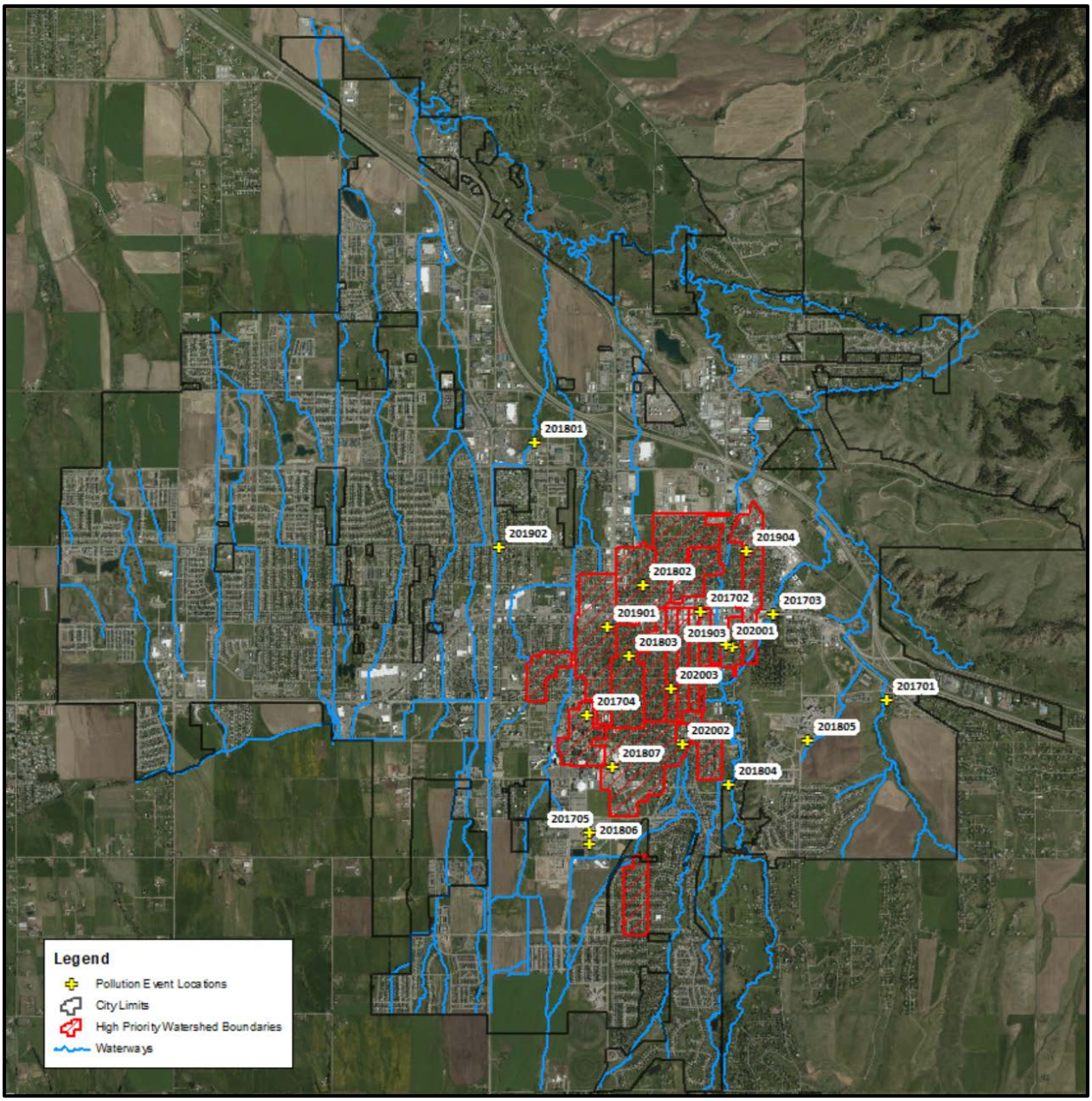
- Significant: No, immediate response and mitigation by Karst stage staff.

4. 2020 Events: 3

   - Tier 1 Event: Bogert Pavilion
     - Event ID: 202001
     - Location: See map 4.2.1
     - Pollutant: Chlorinated wash-water
     - Significant: No, implementation of operational controls and plugged the connection eliminating the chance of future discharges.
   - Tier 1 Event: Vehicle Oil Leak
     - Event ID: 202002
     - Location: See map 4.2.1
     - Pollutant: Diesel Fuel
     - Significant: No, vehicle towed and spill cleaned.
   - Tier 1 Event: Willson Ave. Paint Spill
     - Event ID: 202003
     - Location: See map 4.2.1
     - Pollutant: Paint
     - Significant: No, immediate response by the Bozeman Fire Department and Streets Division.

Table 4.5.1: Illicit Discharge Events

Event Tier	2017	2018	2019	2020	2021
Tier 1	4	6	2	3	-
Tier 2	1	1	2	0	-
Tier 3	0	0	0	0	-
Total:	5	7	4	3	-



Graphic 4.5.2: Event Locations

4.6 Non-Stormwater Discharge Evaluation

The MS4 evaluates the following non-stormwater discharges to identify if they pose a waterway threat:

1. Water Line Flushing
    - Description: Chlorinated water resulting from Bac-T testing and cleaning of new water lines
    - Associated Pollutant(s): Chlorine
    - Local Control(s): Construction specifications requiring contractors to contain flush water
    - Risk: Medium, managed as Tier 2 illicit discharge
    - Illicit Discharges Reported: 0

2. Landscape Irrigation, Irrigation, Lawn Watering, and Potable Water

   - Description: Intermittent over-watering or faulty sprinklers
   - Associated Pollutant(s): Varied depending on the source (well or potable supply)
   - Local Control(s): Water Conservation landscaping audits and outreach initiatives
   - Risk: Low, not managed as an illicit discharge
   - Illicit Discharges Reported: 0

3. Rising Groundwater, Springs, and Flows from Riparian Habitats

   - Description: Flows that enters the storm sewer system when ground and surface water levels rise above the bottom elevation of the storm drain
   - Associated Pollutant(s): None
   - Local Control(s): Prohibition of sump drains that discharge to a street or other public right-of-way, a sanitary sewer line, or onto neighboring properties
   - Risk: Low, not managed as an illicit discharge
   - Illicit Discharges Reported: 0

4. Uncontaminated Groundwater Infiltration

   - Description: Water other than wastewater that enters a storm sewer system from the ground through such means as defective pipes, pipe joints, connections, or utility holes
   - Associated Pollutant(s): None
   - Local Control(s): Inspection of storm sewer pipe annually, and defective pipe repair
   - Risk: Low, not managed as an illicit discharge
   - Illicit Discharges Reported: 0

5. Uncontaminated Pumped Groundwater

   - Description: Groundwater pumped into the storm sewer system for lowering subsurface levels, particularly for construction
   - Associated Pollutant(s): None
   - Local Control(s): Discharge must originate from a well located in an undisturbed area, initial turbid first flush contained on site
   - Risk: Low, not managed as an illicit discharge
   - Illicit Discharges Reported: 0

6. Foundation Drains, Crawl Space Pumps, and Footing Drains

   - Description: Groundwater pumped or diverted from building foundations to the MS4.
   - Associated Pollutant(s): None
   - Local Control(s): Prohibition of sump drains that discharge to a street or other public right-of-way, a sanitary sewer line, or onto neighboring properties
   - Risk: Low, not managed as an illicit discharge
   - Illicit Discharges Reported: 0

7. Air Conditioning Condensation

   - Description: HVAC and refrigeration condensation discharged to the MS4
   - Associated Pollutant(s): None
   - Local Control(s): Allowed
   - Risk: Low, not managed as an illicit discharge
   - Illicit Discharges Reported: 0

8. Swimming Pool and Hot Tub Drain Water

   - Description: Dumping of swimming pool and hot tub drain water into the MS4
   - Associated Pollutant(s): Chlorine
   - Local Control(s): Infiltration or discharge to sanitary sewer
   - Risk: Medium, managed as Tier 2 illicit discharge
   - Illicit Discharges Reported: 0

9. Fire Hydrant Flushing

   - Description: Discharges resulting from regular fire hydrant flushing by MS4 operators
   - Associated Pollutant(s): Chlorine
   - Local Control(s): Water and Sewer Division fire hydrant flushing process
   - Risk: Low, not managed as an illicit discharge
   - Illicit Discharges Reported: 0

10. Non-Commercial, Individual Residential, and Charity Carwashes

    - Description: Wash-waters resulting from vehicle washing
    - Associated Pollutant(s): Soaps, oils, greases, metals, and sediment
    - Local Control(s): The City requires a public assembly permit for non-commercial and charity car washes on public property. If deemed appropriate, the MS4 can utilize this process to require specific controls.
    - Risk: Low, not managed as an illicit discharge
    - Illicit Discharges Reported: 0

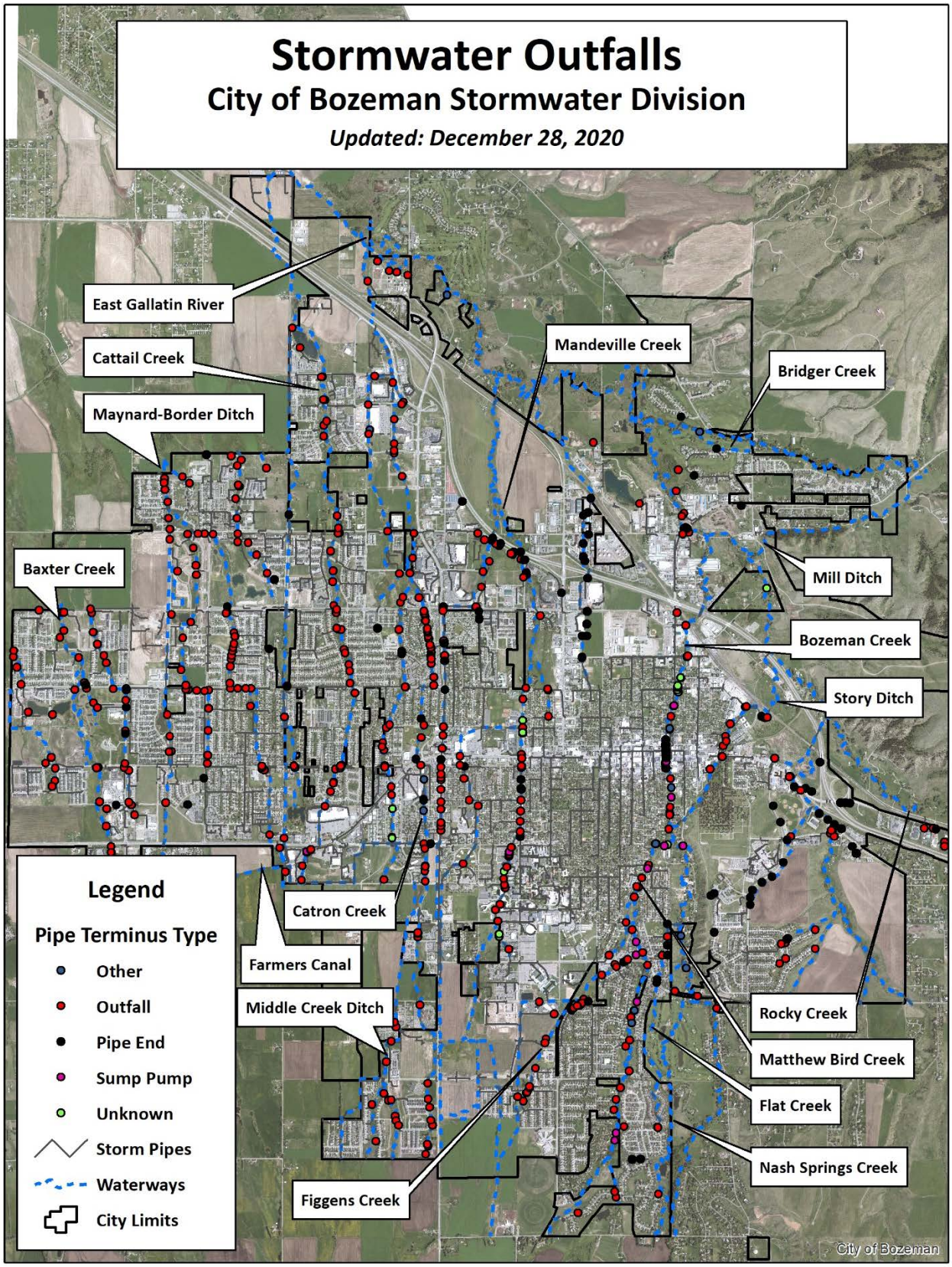
11. Street Wash Waters

    - Description: Water used to wash sidewalks, streets, parking lots, and buildings
    - Associated Pollutant(s): Sediment, oils, greases, and metals
    - Local Control(s): Allowed
    - Risk: Low, not managed as an illicit discharge
    - Illicit Discharges Reported: 0

4.7 Outfall Reconnaissance Inventory (ORI)

The MS4 has hundreds of storm sewer outfalls that discharge into numerous waterways and irrigation ditches within its boundary. Staff uses the Draft 2016 Integrated Report available at the MDEQ's Clean Water Act Information Center, TMDL, and City GIS databases (250' buffer with "outfall" terminus type) to compile the following information:

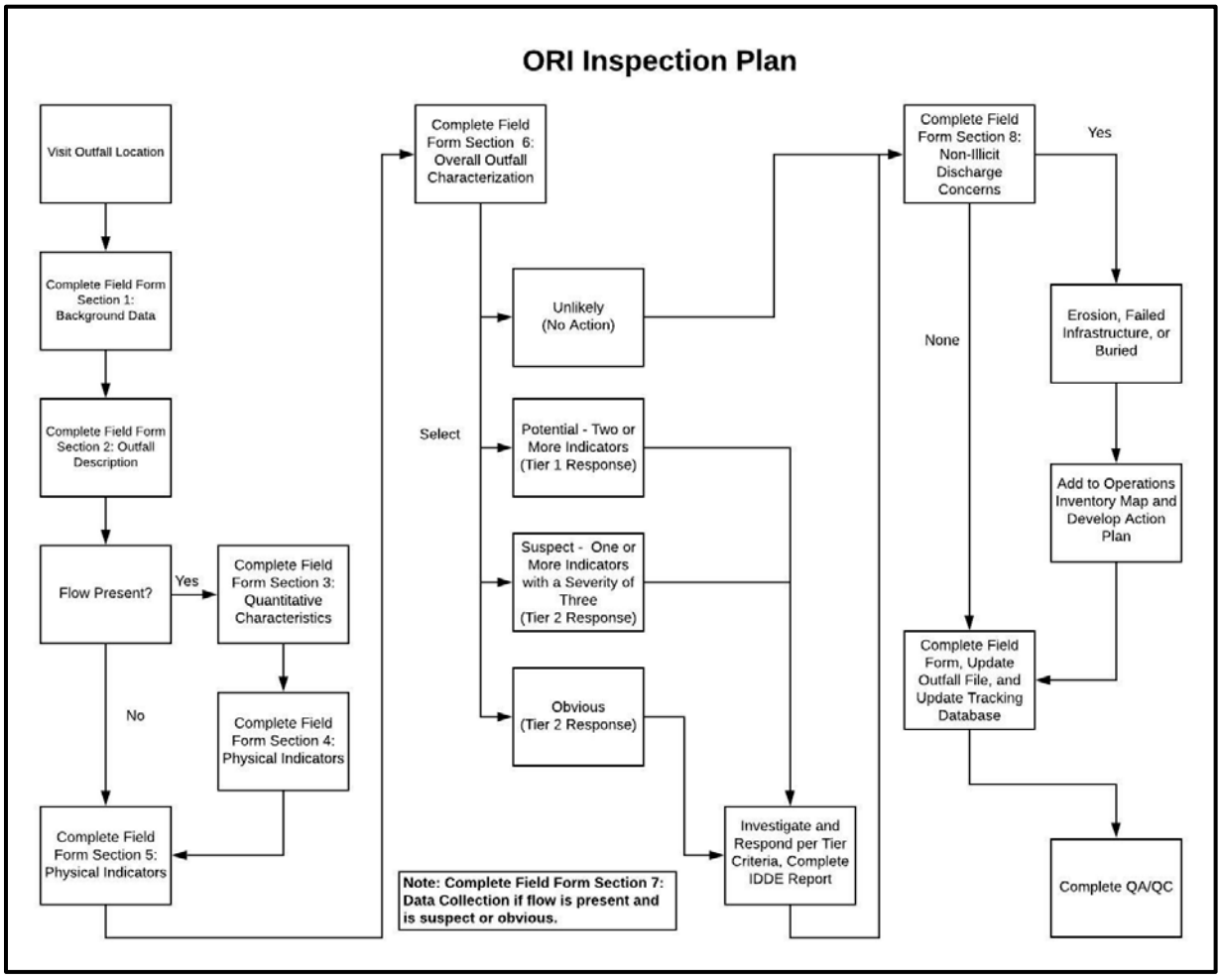
Table 4.7.1: Receiving Waterways								
#	Waterway Name	2018 Outfalls	2019 Outfalls	2020 Outfalls	2021 Outfalls	TMDL	Impairments	MS4 Waste Load Allocation
1	Baxter Creek	14	18	17	-	No	None	None
2	Bozeman Creek	60	63	20	-	Yes	E. Coli, Nitrogen, Sediment, Chlorophyll-a, alteration in streamside cover	Sediment: 81 tons/year
3	Bridger Creek	1	1	0	-	Yes	Chlorophyll-a and Nitrate/Nitrite (Nitrite + Nitrate as N)	None
4	Catron Creek	82	83	72	-	No	None	None
5	Cattail Creek	42	44	43	-	No	None	None
6	East Gallatin River	13	22	10	-	Yes	Total Nitrogen, Total Phosphorous	None
7	Farmers Canal	46	51	40	-	No	None	None
8	Figgins Creek	23	22	22	-	No	None	None
9	Flat Creek	11	11	5	-	No	None	None
10	Mandeville Creek	48	53	50	-	Yes	Total Nitrogen, Total Phosphorous	None
11	Matthew Bird Creek	29	31	19	-	No	None	None
12	Maynard-Border Ditch	16	13	14	-	No	None	None
13	Middle Creek Ditch	26	25	35	-	No	None	None
14	Mill Ditch	0	0	0	-	No	None	None
15	Nash Spring Creek	0	1	2	-	No	None	None
16	Rocky Creek	1	3	0	-	Yes	Alteration in Streamside Cover, Anthropogenic Substrate Alterations, Physical Substrate Alterations, Sediment	None
17	Story Ditch	10	10	12	-	No	None	None
18	W. Gallatin Canal	31	30	32	-	No	None	None
19	Unnamed	167	153	70	-	No	None	None



Graphic 4.7.2: Stormwater outfall map

The MS4 prioritizes and inspect outfalls once during each MS4 Permit term using the Center for Watershed Protection protocol, including:

- Outfall Inventory: Field and GIS analysis to update existing and add new outfalls to the MS4's databases. Coordination occurs between the Stormwater and Strategic Services Divisions.
- Field Preparation: Staff utilizes waders, high visibility vest, measuring tape, multi-parameter sensor (temp and pH), ammonia test strips, turbidimeter, sample bottles, field forms, clipboard, camera, flashlight, legal pad, marker, pen, outfall maps, and nitrile gloves.
- Develop Inspection Plan: The MS4 has five maintenance districts that contain approximately 20% of the MS4's outfalls. Staff inspects one maintenance district per year, or all within a five-year permit cycle. Planning includes using GIS software to identify clusters of outfalls, property ownership, safety concerns, and accessibility to plan inspection routes.
- ORI Inspection: The MS4 visits individual outfalls and completes the following workflow:



Graphic 4.7.3: ORI Inspection Plan

- If applicable, implement Corrective Action Plan: The MS4 initiates a response as defined in SWMP Section 4.3 for any outfall classified as potential, suspect, or obvious pollution source.

The MS4 inspects outfalls deemed a high-priority annually. The MS4 considers an outfall to be high-priority if it meets the following criteria:

- 18" or more in diameter.

- Drains an urban watershed area of 25 acres or more.
- Dumps stormwater directly into an impaired receiving water (i.e., no stormwater basin).
- Obvious or suspect outfalls classified through previous years' ORI.

High-priority outfalls include:

1. Outfall ID: OF.G08.00035
   - Discharge Location: Overbrook Dr. and Langhor Ave.
   - Receiving Waterway: Figgins Creek
   - Size and Material: 30" RCP

Table 4.7.4: OF.G08.00035

Inspection Year	Date	Flow	Characterization
2019	February 1, 2019	Yes, Trickle	Unlikely, No Indicators
2020	October 7, 2020	Yes, Trickle	Unlikely, No Indicators
2021	-	-	-

2. Outfall ID: OF.F06.00090
   - Discharge Location: S. Bozeman Ave. and E. Cleveland St.
   - Receiving Waterway: Matthew Bird Creek
   - Size and Material: 20" Steel

Table 4.7.5: OF.F06.00090

Inspection Year	Date	Flow	Characterization
2019	July 19, 2019	No	Unlikely, No Indicators
2020	July 7, 2020	No	Unlikely, No Indicators
2021	-	-	-

3. Outfall ID: OF.F06.00089
   - Discharge Location: S. Black Ave. and W. Cleveland St.
   - Receiving Waterway: Matthew Bird Creek
   - Size and Material: 19" RCP

Table 4.7.6: OF.F06.00089

Inspection Year	Date	Flow	Characterization
2019	July 19, 2019	No	Unlikely, No Indicators
2020	July 7, 2020	No	Unlikely, No Indicators
2021	-	-	-

4. Outfall ID: OF.H05.00370
   - Discharge Location: N. 11th Ave. and W. College St.
   - Receiving Waterway: Mandeville Creek
   - Size and Material: 18" RCP

Table 4.7.7: OF.H05.00370

Inspection Year	Date	Flow	Characterization
2019	July 19, 2019	Yes, Moderate	Unlikely, No Indicators
2020	July 7, 2020	No	Unlikely, No Indicators
2021	-	-	-

5. Outfall ID: OF.H05.00384

- Discharge Location: N. 11th Ave. and W. Koch St.
- Receiving Waterway: Mandeville Creek
- Size and Material: 12" RCP

Table 4.7.8: OF.H05.00384			
Inspection Year	**Date**	**Flow**	**Characterization**
2019	January 31, 2019	No	Unlikely, No Indicators
2020	July 8, 2020	No	Unlikely, No Indicators
2021	-	-	-

6. Outfall ID: OF.F04.00441

- Discharge Location: N. Rouse Ave. and E. Villard St.
- Receiving Waterway: Bozeman Creek
- Size and Material: 42" RCP (42" CMP replaced during Rouse Reconstruction in 2020)

Table 4.7.9: OF.F04.00441			
Inspection Year	**Date**	**Flow**	**Characterization**
2019	August 8, 2019	No	Unlikely, No Indicators
2020	July 7, 2020	No	Unlikely, No Indicators
2021	-	-	-

7. Outfall ID: OF.G04.00398

- Discharge Location: N. 9th Ave. and W. Villard St.
- Receiving Waterway: Tributary SWWW_00053
- Size and Material: 24" RCP

Table 4.7.10: OF.G04.00398			
Inspection Year	**Date**	**Flow**	**Characterization**
2019	January 19, 2019	No	Unlikely, No Indicators
2020	July 8, 2020	No	Unlikely, One Indicator
2021	-	-	-

8. Outfall ID: OF.F03.00446

- Discharge Location: N. Rouse Ave. and E. Peach St.
- Receiving Waterway: Bozeman Creek
- Size and Material: 43" RCP (Pipe upgraded from 27" RCP during Rouse Reconstruction)

Table 4.7.11: OF.F03.00446			
Inspection Year	**Date**	**Flow**	**Characterization**
2019	January 31, 2019	No	Unlikely, No Indicators
2020	July 7, 2020	No	Unlikely, No Indicators
2021	-	-	-

9. Outfall ID: OF.G03.00399

- Discharge Location: N. 4th Ave. and W. Peach St.
- Receiving Waterway: Tributary SWWW_00034
- Size and Material: 30" RCP
- Note: Outfall removed in 2020 because of BMX Bike Park project. New outfall location is the jurisdictional boundary of SWWW_00034 (Manley Ditch) and the Cherry Creek Fishing Access.

Table 4.7.12: OF.G03.00399			
Inspection Year	**Date**	**Flow**	**Characterization**
2019	January 31, 2019	No	Potential, Two+ Indicators
2020	-	-	-
2021	-	-	-

10. Outfall ID: OF.E03.00450

- Discharge Location: N. Rouse Ave. and E. Tamarack St.
- Receiving Waterway: Bozeman Creek
- Size and Material: 36" RCP

Table 4.7.13: OF.G03.00450			
Inspection Year	**Date**	**Flow**	**Characterization**
2019	January 31, 2019	No	Unlikely, No Indicators
2020	July 7, 2020	No	Unlikely, One Indicator
2021	-	-	-

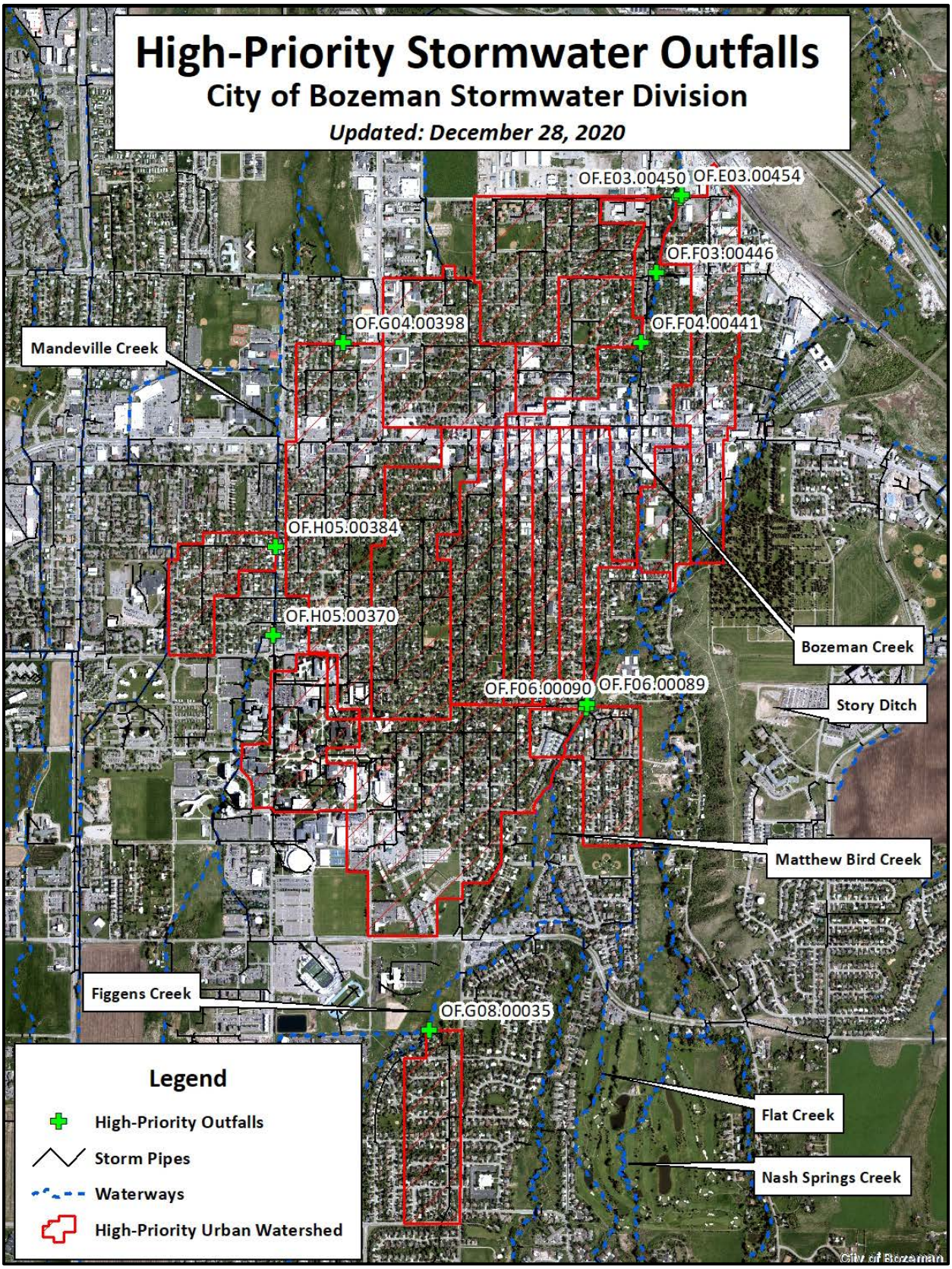
11. Outfall ID: OF.E03.00454

- Discharge Location: N. Rouse Ave. and E. Tamarack St.
- Receiving Waterway: Bozeman Creek
- Size and Material: 30" RCP

Table 4.7.14: OF.E03.00454			
Inspection Year	**Date**	**Flow**	**Characterization**
2019	January 31, 2019	No	Unlikely, No Indicators
2020	July 7, 2020	No	Unlikely, No Indicators
2021	-	-	-

The MS4 completed the following outfall inspections:

Table 4.7.15: Outfall Inspection Totals				
ORI Year	**Outfalls**	**Outfalls Inspected**	**High-Priority Outfalls**	**High-Priority Outfalls Inspected**
2019	634	108 Flow: 99 No, 1 Trickle, 6 Moderate, 2 Unknown Pollution Charecterization: 104 Unlikely, 1 Potential, 1 Suspect, 2 Unknown	11	11 Flow: 9 No, 1 Trickle, 1 Moderate Pollution Charecterization: 10 Unlikley, 1 Potential
2020	463	113 Flow: 104 No, 6 Trickle, 3 Moderate Pollution Charecterization: 113 Unlikely	10	10 Flow: 8 No, 2 Trickle Pollution Charecterization: 10 Unlikley
2021	-	-	-	-



Graphic 4.7.16: High-Priority Stormwater Outfalls Map

4.8 Storm Sewer Infrastructure Totals

The MS4 collects and updates storm sewer data annually from the City's GIS. The public can view the MS4's storm sewer system at: https://gisweb.bozeman.net/Html5Viewer/?viewer=infrastructure.

Table 4.8.1: Manholes

Owner	2017	2018	2019	2020	2021
City of Bozeman	-	999	1,162	1,146	-
Montana State University	-	155	155	155	-
Montana Department of Transportation	-	68	67	76	-
Private or Null	-	352	398	440	-
Total:	1,484	1,574	1,782	1,817	-

Table 4.8.2: Inlets

Owner	2017	2018	2019	2020	2021
City of Bozeman	-	2,524	2,800	2,779	-
Montana State University	-	207	207	204	-
Montana Department of Transportation	-	187	187	187	-
Private or Null	-	661	734	840	-
Total:	3,457	3,579	3,928	4,010	-

Table 4.8.3: Storm Sewer

Owner	2017	2018	2019	2020	2021
City of Bozeman	-	67 Miles	73 Miles	74 Miles	-
Montana State University	-	8 Miles	8 Miles	8 Miles	-
Montana Department of Transportation	-	4 Miles	4 Miles	4 Miles	-
Private, Other, and Null	-	30 Miles	31 Miles	31 Miles	-
Total:	89 Miles	109 Miles	116 Miles	117 Miles	-

Table 4.8.4: Stormwater Facilities

Owner	2017	2018	2019	2020	2021
Total:	435	497	591	769	-

Table 4.8.5: Outfalls

Owner	2017	2018	2019	2020	2021
Total:	594	622	634	463	-

Table 4.8.6: Public Stormwater Treatment Units

Owner	2017	2018	2019	2020	2021
City of Bozeman	-	9	12	17	-
Montana State University	-	1	2	2	-
Montana Department of Transportation	-	2	2	8	-
Total:	7	12	16	27	-

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Section 5.0

Construction Site Management Program

Graphic 5.0.1: Compliant single-family residential property

Graphic 5.0.2: Inlet sump clogged with construction debris

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5.1 Introduction

The MS4 strives to improve waterway health, protect public safety, and comply with its MS4 Permit through the regulation of construction sites by:

1. Providing educational opportunities;
2. Administering a permitting program;
3. Conducting site inspections; and
4. Enforcing municipal and state regulations.

SWMP Section 5.0 details the following components necessary to administer the MS4's Construction Site Management Program, including:

- Regulatory Framework (5.2)
- Construction Site Permitting Program (5.3)
- Construction Site Enforcement Response Plan (5.4)
- Construction Site Inventory (5.5)
- Performance Tracking (5.6)
- Future Opportunities (5.7)
- Program Documents (5.8)

5.2 Regulatory Framework

Pursuant to §40.04.350 Bozeman Municipal Code (BMC), the MS4 requires owners/operators of construction sites to comply with the following regulations:

1. Article 4 Chapter 40 Bozeman Municipal Code (BMC);
2. 75-5-101 Montana Code Annotated (MCA); and
3. 17.30.1101, 17.30.1301 et seq., and 17.30.601 et seq Administratve Rules of Montana (ARM).

5.3 Construction Site Permitting Program

Pursuant to §40.04.350 BMC, the MS4 requires owners/operators of construction sites to submit Stormwater Pollution Prevention Plans (SWPPPs) before receiving a Building Permit or Infrastructure Project Notice to Proceed. Three permit application types exist, including:

1. MDEQ General Permit for Stormwater Discharges Associated with Construction Activity (Construction General Permit): The MS4 requires owners/operators to submit for construction sites that meet the Eligibility Requirments of the most current Construction General Permit. The MS4 completes one permit review for compliance with the most current Construction General Permit's Technology-Based Effluent Limitations and Stormwater Pollution Prevention Plan (SWPPP) requirements. The MS4 provides the owner/operator a Permit Review Checklist and Confirmation Letter. The MS4 does not confirm the owner/operator has corrected deficiencies through consecutive reviews. Instead, the MS4 reviews changes onsite during Stormwater Compliance Evaluation Inspections (CEI).
2. Construction Stormwater Permit: Sites Less than One (1) Acre: The MS4 requires owners/operators to submit for construction sites with land disturbance less than one acre and greater than 10,000 square feet. The MS4 completes numerous content and adequacy reviews of the owner/operator's submitted application and map, and provides a Construction Stormwater Permit once deemed compliant with BMC.
3. Construction Stormwater Permit: Single-Family Residential Projects: The MS4 requires for individual single-family and duplex home construction sites. The MS4 completes numerous

content and adequacy reviews of the owner/operator's submitted application and provides a Construction Stormwater Permit once deemed compliant with BMC.

5.4 Enforcement Response Plan

The MS4 implements the following Construction Site Enforcement Response Plan (ERP) to ensure compliant construction sites within its jurisdiction:

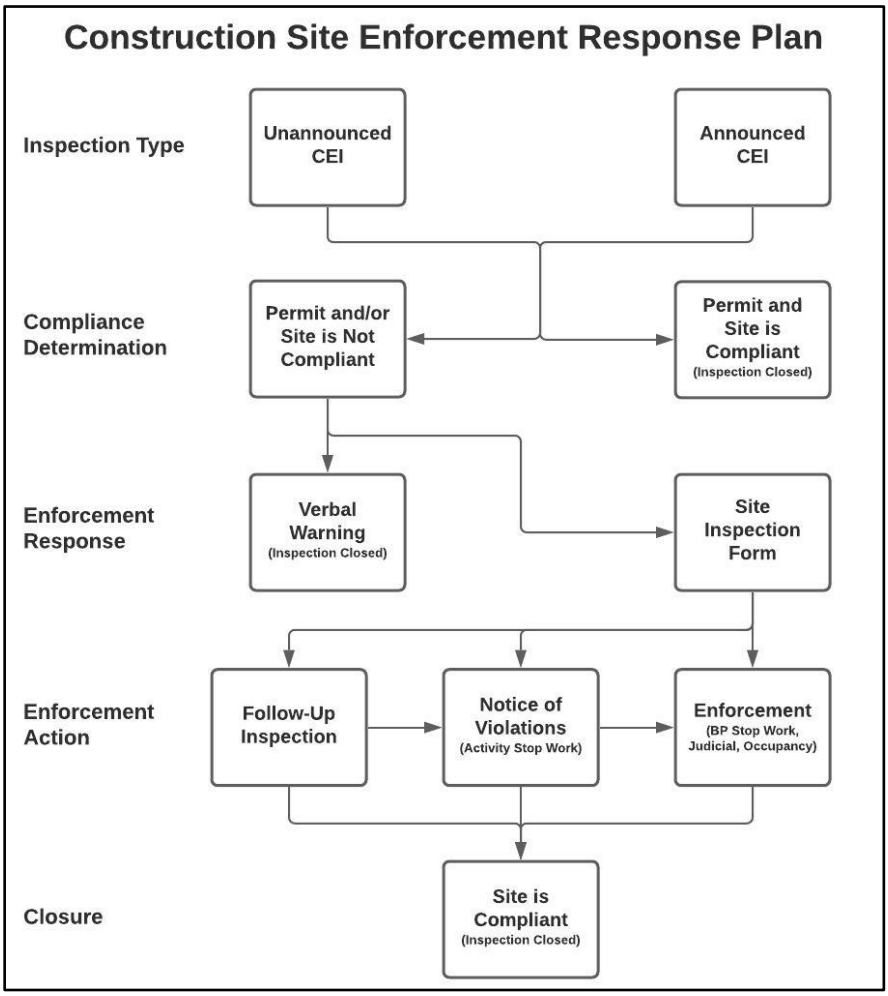


Image 5.4.1: ERP workflow

1. Inspection Type: Pursuant to §40.04.850.D BMC, the MS4 has the authority to complete CEIs at construction sites to ensure compliance with BMC and the Construction General Permit. Inspections may include: (1) Document review, including the site's NOI, SWPPP, BMP specifications, site maps, self-inspection records, and administrator certification, and (2) Site tour identifying pollutant sources, inspection of implemented BMPs, and compliance determinations with the BMC and Construction General Permit. Inspection types include:
   - Unannounced: CEI resulting from a complaint or field observation. See SWMP Section 5.4.2.
   - Announced: CEI resulting from reoccurring inspection efforts, which the MS4 prioritizes based on site prioritization and complaints. See SWMP Section 5.4.2.
2. Compliance Determination: Pursuant to §40.04.860 BMC, the MS4 has the authority to make BMC and Construction General Permit non-compliance determinations, including:

- Permit and/or Site is Complaint: No permit nor site non-compliance determinations issued. Inspection closed.
- Permit and/or Site is Not Complaint: Permit and/or site non-compliance determinations issued. See SWMP Section 5.4.3.

3. Enforcement Response: The MS4's enforcement response options, including:

   - Verbal Warning: An informal response used when the MS4 determines the BMC and Construction General Permit non-compliance determinations are low-risk, and there are reasonable grounds that the owner/operator will correct the issues. Verbal warnings take the form of phone calls, emails, or in-person meetings. Inspection closed.
   - Site Inspection Form: An informal response by the MS4 to document BMC and Construction General Permit non-compliance determinations. The MS4 emails or delivers the Site Inspection Form to the site owner/operator. See SWMP Section 5.4.4.

4. Enforcement Action: Pursuant to §40.04.860 and §40.04.890 BMC, the MS4 has the authority to require the owner/operator to comply with BMC and/or the Construction General Permit using the following actions:

   - Follow-Up CEI: An informal action completed to ensure the site owner/operator corrects the non-compliance determinations issued in the Site Inspection Form. A Follow-Up CEI can take the form of a site visit, a conversation, or a review of submitted information. If so, inspection closed. If not, See SWMP Section 5.4.4 – Notice of Violations.
   - Notice of Violations (NOV): A formal enforcement action taken when the site owner/operator does not resolve the non-compliance determinations. An NOV includes written violations of the BMC and the Construction General Permit, a Cease and Desist Order, and Stop Work Order. Both Orders apply to the site activities resulting in the issued violations and associated non-compliance determinations. NOVs require the site owner/operator to submit a written response within a set timeframe, documenting that they have resolved the violations and associated non-compliance determinations. Upon the MS4's review and approval of the written response, the inspection is closed. If existing non-compliance determinations remain or additional areas of non-complaince are identified, see SWMP Section 5.4.4 - Enforcement. In severe cases, the MS4 bypasses the Follow-Up CEI and immediately issues an NOV.
   - Enforcement: A variety of formal enforcement penalties used by the MS4 when the site owner/operator does not comply with the NOV's requirements, including:
     - Building Permit Stop Work Order: Pursuant to §10.02.010.D, BMC, a Building Official may issue an order requiring any site owner/operator to immediately stop all work of any kind related to site's Building Permit. Any person who continues work after having been served with a Stop Work Order, except such work as that person is directed by the City to perform to remove a violation or unsafe condition, shall be subject to the misdemeanor penalty provision of §10.02.100 BMC. The issuance of a Stop Work Order cancels any pending inspections.
     - Withholding Issuance of a Certificate of Occupancy: Pursuant to §10.02.010.C, BMC, a Building Official of the City may withhold the issuance of a certificate of occupancy when the available evidence shows the structure and associated development does not conform with the standards of Chapter 40 BMC, a permit issued pursuant to Chapter 40 BMC, or has failed to pay costs of the abatement of stormwater violations as may be ordered by the City.
     - Misdemeanor Criminal Charge and Prosecution (Judicial): Pursuant to §40.04.910 BMC, any person, firm or corporation, their agents or servants who violate any

provision or requirement of Chapter 40 BMC or of a permit issued shall be guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine not exceeding $500.00 and in addition shall pay all costs and expenses of the case. A separate offense shall be deemed committed upon each day during or on which a violation occurs or continues.

5. Additional ERP Information:

   - Elimination and Abatement of Illegal Construction Discharges: The MS4 uses the ERP to identify and resolve violations of BMC and/or the Construction General Permit.
   - Staff with Enforcement Authority: Stormwater Program Technician, Stormwater Program Specialist, Stormwater Program Project Manager, Stormwater Program Coordinator have the authority to issue non-compliance determinations. The Stormwater Coordinator is the authorized Enforcement Agent and makes determinations regarding enforcement penalties.
   - Enforcement Action Available, Escalation Process, and Schedule: The MS4's ERP is flexible and includes escalation protocols based on a owner/operator's response, while also providing options for immediate action when the Enforcement Agent identifies severe violations of BMC and/or the Construction General Permit. The MS4's ERP schedule is based on the Enforcement Agent's determination of risk (weather, capacity, waterway proximity, site size, pollutant source scale and severity, owner/operator compliance history, etc.). ERP implementation ranges from immediate action to a timeframe extending a week or more. A typical Follow-Up CEI occurs within five days. An NOV standard response timeframe is 10 days.
   - Abate Damages and Prevent Reoccourences: Upon the conclusion of the NOV via the Closure Letter issuance, the MS4 maintains the authority to enact immediate enforcement action, as detailed in SWMP Section 5.4.4 - Enforcement upon the identification of any repeat violations.

6. Site Prioritization and Inspection Frequency Protocol:

   The MS4 uses the following Construction Site Scoring Matrix to determine a site's priority level.

Table 5.4.2: Construction Site Scoring Matrix

Criteria	3-Points	2-Points	1-Point
Site Size (Acres)	> 10-Acres	5 - 10 Acres	< 5-Acre
Proximity to Waterbody	< 1,000 ft	> 1,000 or < 2,000 ft	> 2,000 ft
Site Steepness per SWPPP	Yes	-	No
Bozeman Creek Watershed	Yes	-	No
Permit Review Checklist Score	> 50	25 - 50	< 25

Once priority is determined, the MS4 completes inspections per the frequencies outlined below.

- <u>High-Priority Construction Sites (Over 10 Points)</u>:
  - Once at construction commencment.
  - After every .25" rain event. The MS4 interprets this standard to mean any rain event that occurs within a six-hour timeframe and uses the Bozeman International Airport NOAA Rain Gage.
  - After every snow melt event resulting in visible erosion.
  - Once at the conclusion of the project.
- <u>Medium-Priority Construction Sites (5 - 10 Points)</u>:
  - As need basis per complaints and field observations.
- <u>Low-Priority Construction Sites (Below 5 Points)</u>:

- As need basis per complaints and field observations.
- Less than One Acre Construction Sites
- Single-Family Residential Construction Sites

5.5 Construction Site Inventory

The following tables contain an inventory of construction site permits and inspection:

Table 5.5.1: Permit Type Inventory

Permit Type	2018	2019	2020	2021
City Single- Family Residential Total	-	292	272	-
City Less than One Acre Total	-	63	34	-
City Greater than One Acre Total	24	29	36	-
MSU Greater than One Acre Total	2	1	1	-

Table 5.5.2: Inpsection Type Inventory * Totals represent new permits/year and do not include return visits or final occupancy inspections. High-priority inspections count as one inspection.

Inspection Type	2018	2019	2020	2021
City Single-Family Residential Total	32	19	1	-
City Single-Family Residential Percentage (%)	17%	7%	.4%	-
City Less than One Acre Total	17	16	5	-
City Less than One Acre Percentage (%)	32%	25%	14%	-
City Greater than One Acre Total	10	6	15	-
City Greater than One Acre Percentage (%)	42%	21%	42%	-
MSU Greater than One Acre Total	2	3	2	-
MSU Greater than One Acre Percentage (%)	100%	>100%	>100%	-

High-Priority Construction Sites:

1. OAC18-0014 South Tracy Reconstruction: Four acre site within the Bozeman Creek watershed. The site includes the reconstruction of an existing road and underlying utilities.
   - Permit Confirmation: May 29, 2018
   - Initial Inspection: June 1, 2018
   - Precipitation Triggered Inspections:
     - Inspection 1: June 19, 2018
     - Inspection 2: June 22, 2018
     - Inspection 3: July 2, 2018
     - Inspection 4: August 28, 2018
   - Final Inspection: n/a
2. OAC18-0020 East Tamarack Reconstruction: Three acre site within the Bozeman Creek watershed. The site includes the reconstruction of an existing road and underlying utilities.
   - Permit Confirmation: August 7, 2018
   - Initial Inspection: n/a
   - Precipitation Triggered Inspections:
     - Inspection 1: August 28, 2018
     - Inspection 2: September 17, 2018
     - Inspection 3: October 5, 2018

- Final Inspection: n/a

3. OAC19-0001 16 Willson Residential Development: One acre site within the Bozeman Creek watershed. The site includes the demolition of exisitng structures and construction of numerous row houses.

   - Permit Confirmation: January 8, 2019
   - Initial Inspection: n/a
   - Precipitation Triggered Inspections:
     - Inspection 1: May 28, 2019
     - Inspection 2: June 10, 2019
     - Inspection 3: June 21, 2019
     - Inspection 4: July 9, 2019
     - Inspection 5: July 16, 2019
     - Inspection 6: September 9, 2019
     - Inspection 7: September 23, 2019
     - Inspection 8: June 8, 2020
     - Inspection 9: June 16-17, 2020
     - Inspection 10: July 23, 2020
     - Inspection 11: September 7, 2020
   - Final Inspection: TBD

4. OAC19-0026 Bozeman Public Safety Center: Eight acre site within the Bozeman Creek watershed. The site includes the demolition of existing structures and construction of commercial building.

   - Permit Confirmation: August 27, 2019
   - Initial Inspection: n/a
   - Precipitation Triggered Inspections:
     - Inspection 1: August 27, 2019
     - Inspection 2: September 23, 2019
     - Inspection 3: January 8, 2020
     - Inspection 4: June 8, 2020
     - Inspection 5: June 16-17, 2020
     - Inspection 6: July 23, 2020
     - Inspection 7: September 7, 2020
   - Final Inspection: TBD

5. OAC20-0017 Front Street Interceptor Project: Three acre site within the Bozeman Creek watershed. The site includes the installation of a trunk sewer line.

   - Permit Confirmation: August 12, 2020
   - Initial Inspection: August 18, 2020
   - Precipitation Triggered Inspections:
     - Inspection 1: September 7, 2020
   - Final Inspection: TBD

6. OAC20-0043 Allision Subdivision: Fory-eight acre site within the Bozeman Creek watershed. The site includes the installation of a subdivision, including utilities, roads, and structures.

   - Points: 12

- Permit Confirmation: December 17, 2020
- Initial Inspection: January 12, 2021
- Precipitation Triggered Inspections:
    - Inspection 1: TBD
- Final Inspection: TBD

5.6 Performance Tracking

The MS4 completes a Construction Site Compliance Audit in the fall, evaluating 50 random construction sites to determine their compliance with the BMC and Construction General Permit. The MS4 evaluates each construction site using the following criteria:

1. Implementation: BMPs present or absent.
2. Adequacy: Appropriate type and scale of BMPs for site conditions.
3. Installation: Adequate BMP installation per industry standard specifications.
4. Maintenance: Sufficient maintenance so that BMPs are in good working order.

After evaluation, the MS4 grades each construction site using one of the following categories:

1. 0-Points: Not compliant with permit, high risk to infrastructure, public, and environment
2. 1-Point: Partially compliant with permit, moderate risk to infrastructure, public, and environment
3. 2-Points: Compliant with permit, low risk to infrastructure, public, and environment

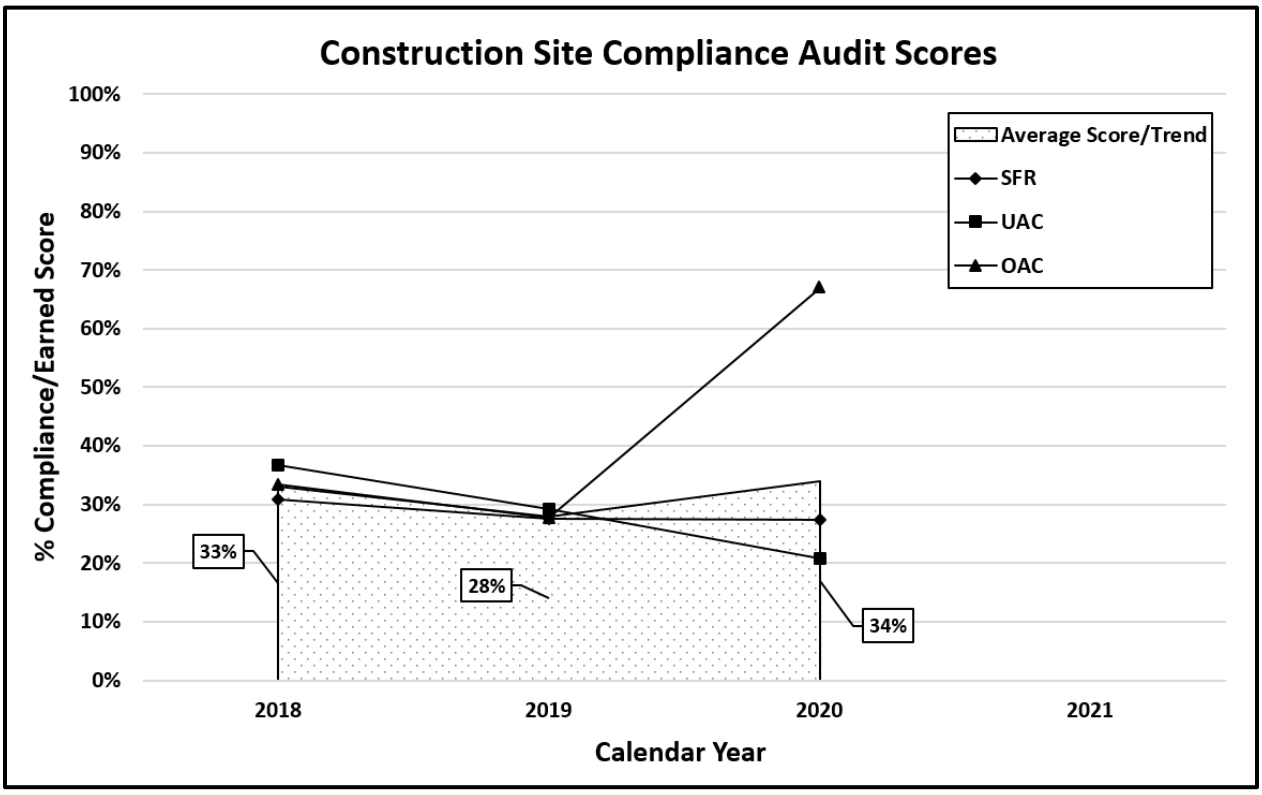
The MS4 compiles the collected data and updates the following:

Table 5.6.1: Construction Site Compliance Audit Scores

Audit Year	Audit Dates	Compliance Trend	Total Points	Earned Score	OAC Average	UAC Average	SFR Average
2018	October 24 - 26	n/a	33/100	33%	33%	37%	31%
2019	October 14 - 16	Decreasing	28/100	28%	28%	29%	28%
2020	November 6 - 13	Increasing	34/100	34%	67%	21%	27%
2021	-	-	-	-	-	-	-

1. 2018 Discussion:
    - Increased BMP use but many not adequately maintained.
    - Noncompliance was mostly contained within private sites.
    - Increased inspection frequency is effective at increasing compliance rates.
2. 2019 Discussion:
    - Compliance degrades back to pre-inspection levels after inspections.
    - Permit applicant does not always communicate the requirements to onsite workers.
    - 64% of commercial and infrastructure sites yielded a score with moderate or low risk.
    - 44% of residential sites yielded a score with moderate or low risk.
    - Only three sites fully complied with regulations.
    - Increase inspection frequency to ensure compliance throughout project life.
    - Inspect sites proportional to ratios (i.e. residential/commercial/infrastructure).
    - Apply more emphasis on installation, maintenance, and records during inspections.
3. 2020 Discussion:
    - Multiple SWPPP reviews for a respective project do not result in elevated onsite compliance.
    - Inspection time and constant presence equates to improved compliance onsite.

- The City's consulting engineer should create SWPPPs for public projects, not the contractor.
- More emphasis required on installation, maintenance, and records during inspections.



Graphic 5.6.2: Construction Compliance Audit Scores

5.7 Future Opportunities

1. Inspection Optimization Software: Develop a web-based inspection platform that will expedite documentation and communication with construction site owner/operators.

5.8 Program Documents

1. Single-Family Residential Sites:
   - Construction Stormwater Permit: Single-Family Residential Projects
   - SFR Permit Review Checklist
   - Construction Stormwater Permit Confirmation
   - SFR and UAC Site Inspection Form
2. Less than One Acre Sites:
   - Construction Stormwater Permit: Sites Less than One Acre
   - UAC Permit Review Checklist
   - Construction Stormwater Permit Confirmation
   - SFR and UAC Site Inspection Form
3. Greater than One Acre Sites:
   - MDEQ Construction General Permit
   - MDEQ Construction General Permit Notice of Intent (NOI)

- MDEQ Construction Stormwater Pollution Prevention Plan (SWPPP)
- MDEQ Construction Stormwater Permit Notice of Termination
- MDEQ Construction Stormwater Permit Transfer Notification
- OAC Permit Review Checklist
- OAC Site Inspection Form

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Section 6.0

Post-Construction Program

Graphic 6.0.1: Overgrown stormwater basin

Graphic 6.0.2: Dredged stormwater basin

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6.1 Introduction

The MS4 strives to improve waterway health, protect public safety, and comply with its MS4 Permit through the regulation and oversight of existing and new structural BMPs in the following ways:

1. Enforcing water quality and flood control standards on new and redevelopment projects; and
2. Completing inspections of structural BMPs.

SWMP Section 6.0 details the components necessary to administer the MS4's Post-Construction Management Program, including:

- Regulatory Framework and Applicable Documents (6.2)
- Development Review (6.3)
- Structural BMP Inventory (6.4)
- Inspection Program (6.5)
- High-Priority Structural BMPs (6.6)
- Enforcement Response Plan (6.7)
- Performance Tracking (6.8)
- Ongoing and Future Initiatives (6.9)

6.2 Regulatory Framework and Applicable Documents

The MS4 requires developers with projects over one-acre to infiltrate, evapo-transpire, or capture for reuse the first half-inch of rainfall to address stormwater runoff quality from new and redevelopment from a 24-hour storm preceded by 48-hours of no measurable precipitation using structural best management practices (BMPs). The runoff generated from the first half-inch of rainfall contains the majority of pollutants deposited on impervious area during dry periods. Structural BMPs can mitigate the loads by capturing the first flush, preventing pollutants from entering waterways.

Developers use surface and subsurface structural BMPs, which typically take the form of permeable pavers, infiltration basins, and bio-retention areas. Additionally, in Bozeman, structural BMPs must also be designed to limit runoff to the predevelopment level during a 10-year, 2-hour storm. This reduces peak runoff and helps protect waterways and property.

The MS4 also requires developers to implement non-structural BMPs that promote waterway health, including zoning and land planning, wetland regulations, waterway setbacks, and open space standards.

Various governing documents contain standards, policies, and regulations related to structural and non-structural BMPs for new and redevelopment, including:

- City of Bozeman Design Standards and Specification Policy - 2020
- City of Bozeman Modifications to Montana Public Works Standard Specifications - 6th Edition
- Montana Public Works Standard Specifications - 6th Edition
- Bozeman Municipal Code
- Montana Post-Construction Storm Water BMP Design Guidance Manual - 2017
- City of Bozeman Stormwater Facilities Plan - 2008

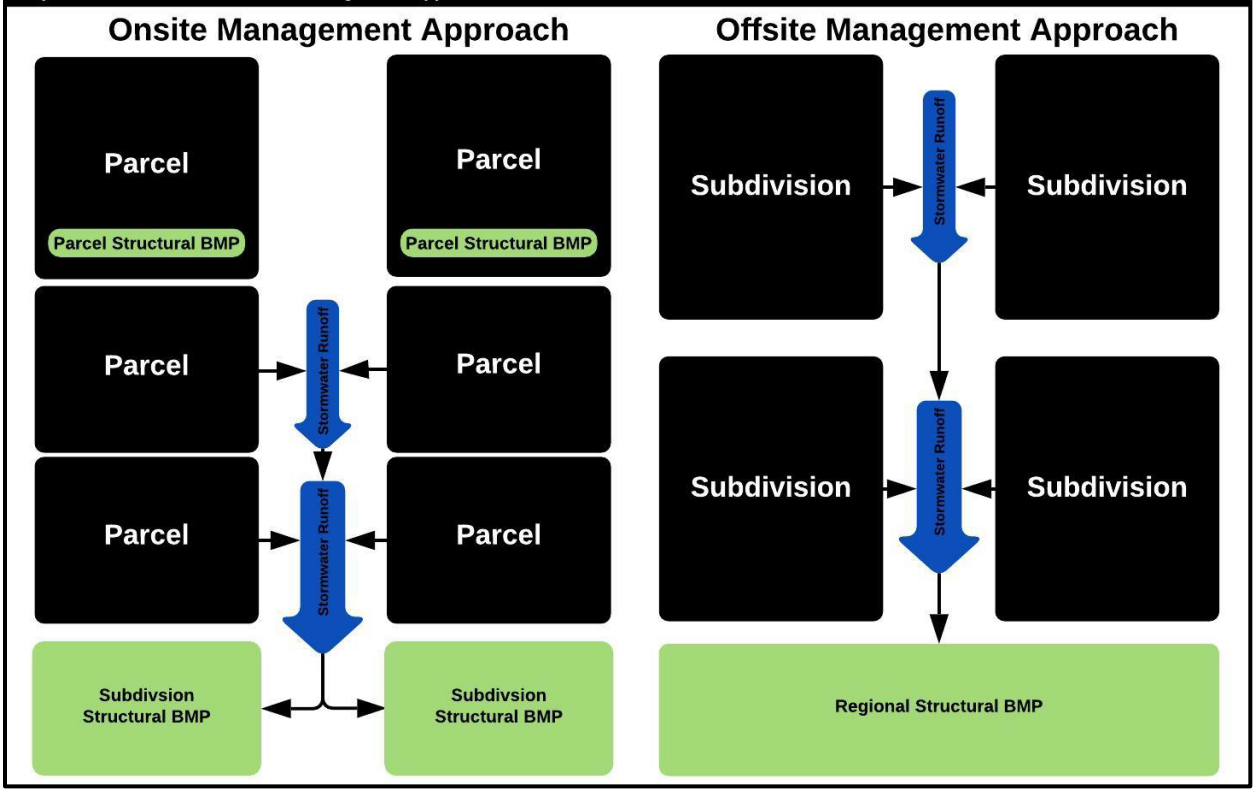
6.3 Development Review

The MS4 completes development review tasks related to structural BMPs as Developers submit new and redevelopment project proposals. Projects triggering the regulatory threshold covered in SWMP Section

6.2 include commercial, multi-family, and subdivision developments. In most cases, Developers utilize structural BMPs through an onsite management approach, which the MS4 defines as either on the developing parcel or at the overarching subdivision scale. The onsite management approach's primary benefits are the decentralized siting of structural BMPs, promoting green space and better integrating structural BMPs into the landscape. The disadvantage of this approach includes increased structural BMP totals throughout the MS4 and costly long-term maintenance.

An alternative to the onsite management approach is the use of an offsite management approach. This approach results in structural BMPs located at the bottom of watersheds that contain numerous subdivisions. This approach's primary benefit is that it reduces the number of structural BMPs, focusing on a select few that the MS4 can more effectively inspect and maintain. The disadvantages of this approach are that it requires significant planning, upfront MS4 investment, and an extensive payback financing mechanism. The MS4 does not utilize an offsite management approach; however, is exploring future opportunities. Graphic 6.3.1 provides a conceptual view of the varying management approaches.

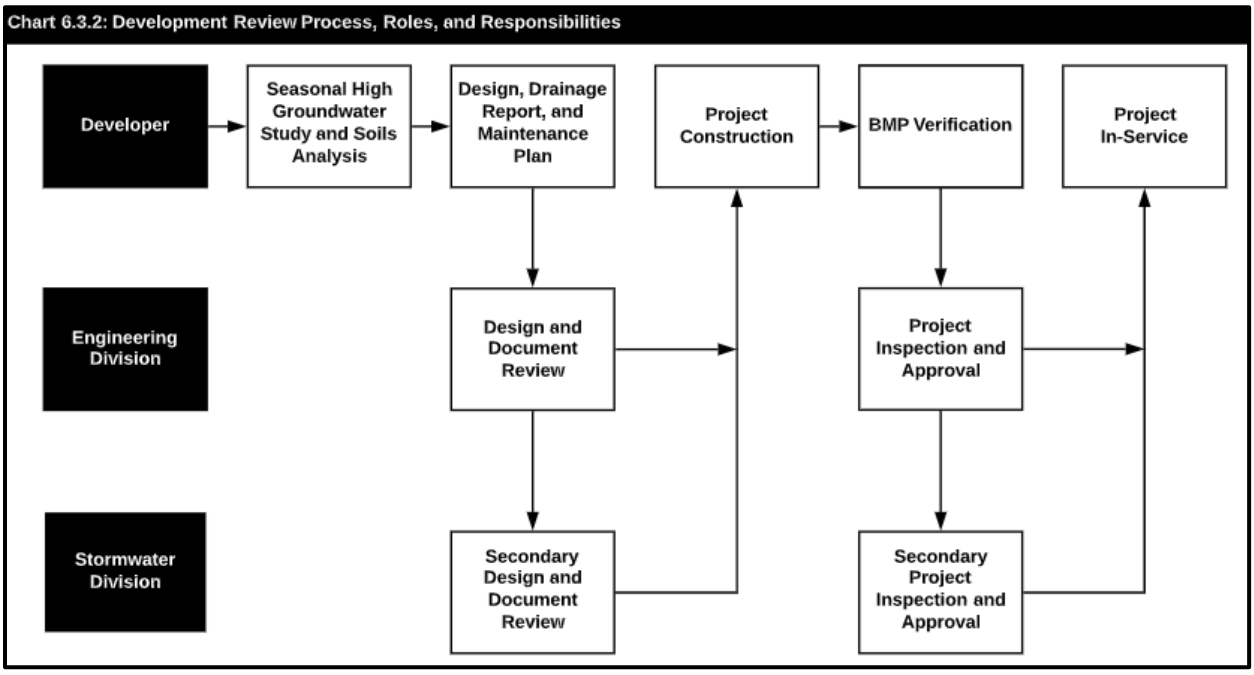
Graphic 6.3.1: Stormwater Runoff Management Approaches



The following information and Chart 6.3.2 describes the MS4's typical structural BMP review process:

1. The Developer completes a seasonal high-groundwater analysis and soil study to establish a baseline for the project's pre-construction site conditions.
2. The Developer selects a structural BMP based on site conditions, completes a design, and submits documents for review, including a drawings, drainage report, and maintenance plan.
3. The Engineering Division reviews the documents, ensures compliance with standards and policies, and provides comments to the Developer via a review letter. This step can repeat until the proposed design fully complies. The Stormwater Division offers review support, primarily focusing on the maintenance-related aspects of the structural BMP.

4. The Developer constructs the project and associated structural BMP after receiving approval. In some cases, modifications may occur at this stage in response to unforeseen site conditions.
5. Once complete, the Engineering Division completes an inspection to verify the Developer installed the BMP as approved. The Stormwater Division provides a secondary inspection focused on stabilization. Results from the Stormwater Division's inspection are stored in the Site Inspection Form and shared with the Developer. This step can repeat numerous times until the constructed BMP fully complies with the approved documents and Bozeman Municipal Code. The Stormwater Division confirms that the GIS database contains the structural BMP.
6. The BMP goes into service and is managed by the owner indefinitely.



6.4 Structural BMP Inventory

The MS4 maintains an inventory of structural BMPs as construction occurs. The process typically includes a combination of GIS digitization and field verification to ensure adequate data capture. The tables below show the breakdown of structural stormwater BMPs based on four ownership categories, including:

1. Public: Contains structural BMPs located on public land, including the City, MSU, and MDT.
2. Private: Contains structural BMPs located on private property.
3. Open Space/Parkland: Contains structural BMPs located on HOA open space or parkland.
4. Unknown: Contains structural BMPs without known ownership.

The MS4 also categorizes and tracks the type of structural BMPs:

1. Surface Detention Facility: Regulated discharge to receiving waterway via an outlet structure.
2. Underground Detention Facility: Regulated discharge to waterway via an outlet structure.
3. Surface Retention Facility: No discharge to a waterway.
4. Underground Retention Facility: No discharge to a waterway.

The MS4 updates the inventory annually, with variations occurring as ownership determinations arise.

Table 6.4.1: Public Structural BMPs					
Type	**2017**	**2018**	**2019**	**2020**	**2021**
Surface Detention Facility	-	-	-	26	-
Underground Detention Facility	-	-	-	2	-
Surface Retention Facility	-	-	-	12	-
Underground Retention Facility	-	-	-	1	-
Total:	-	-	-	41	-

Table 6.4.2: Private Structural BMPs					
Type	**2017**	**2018**	**2019**	**2020**	**2021**
Surface Detention Facility	-	-	-	133	-
Underground Detention Facility	-	-	-	12	-
Surface Retention Facility	-	-	-	137	-
Underground Retention Facility	-	-	-	40	-
Total:	-	-	-	322	-

Table 6.4.3: Open Space/Parkland Structural BMPs					
Type	**2017**	**2018**	**2019**	**2020**	**2021**
Surface Detention Facility	-	-	-	247	-
Underground Detention Facility	-	-	-	32	-
Surface Retention Facility	-	-	-	88	-
Underground Retention Facility	-	-	-	7	-
Total:	-	-	-	374	-

Table 6.4.4: Unknown Owner Structural BMPs					
Type	**2017**	**2018**	**2019**	**2020**	**2021**
Surface Detention Facility	-	-	-	18	-
Underground Detention Facility	-	-	-	-	-
Surface Retention Facility	-	-	-	14	-
Underground Retention Facility	-	-	-	-	-
Total:	-	-	-	32	-

Table 6.4.5: Summary					
Land Classification	**2017**	**2018**	**2019**	**2020**	**2021**
Public	-	-	-	41	-
Private	-	-	-	322	-
Open Space/Parkland	-	-	-	374	-
Unknown	-	-	-	32	-
Total:	439	497	589	769	-

The MS4 also completes an analysis annually to identify high-priority structural BMPs. To complete the analysis, the MS4 completes a risk assessment in GIS using the following criteria:

- Size: Structural BMPs larger than 1,076 square feet. Analyzed using geometry data in GIS.
- Proximity: Within 500 feet of an impaired waterbody. Analyzed using a 500' buffer in GIS.
- Type: Surface detention or underground detention facility. Analyzed using GIS data.

The MS4 deems structural BMPs that meet all criteria as high-priority and manages them per the criteria detailed in SWMP Section 6.5. Table 6.4.6 includes analysis totals, and Table 6.6.1 includes specific structural BMP information.

Table 6.4.6: High-Priority Structural BMP Ownership					
Land Classification	**2017**	**2018**	**2019**	**2020**	**2021**
Public	-	-	12	13	-
Private	-	-	3	3	-
Open Space/Parkland	-	-	3	3	-
Unknown	-	-	1	1	-
Total:	-	-	19	20	-

6.5 Inspection Program

The MS4 completes inspections of typical and high-priority structural BMPs using qualitative and quantitative data collection practices. Inspection frequencies for the two types include:

- Typical: Complaint based, field observation, or as needed. No reoccurring return interval established at this time.
- High-Priority: Annual inspection per the requirements detailed in the MS4 Permit.

The MS4 receives permission from the underlying property owner to access the structural BMP. Once granted, a typical inspection involves the review of the physical characteristics, flow path, maintenance needs, and geometry of the structural BMP. The MS4 documents all notes and findings in a standard inspection form. Post-inspection, the MS4 assigns each structural BMP a maintenance priority level:

- Low: Structural BMP appears to be functioning as designed.
- Medium: Structural BMP requires minor to moderate sediment and vegetation maintenance to mitigate the risk of flooding, waterway pollution, and infrastructure failure.
- High: Structural BMP requires significant sediment dredging, vegetation removal, and/or infrastructure repairs to restore function.

The MS4 typically sends the owner a letter, inspection form, map, and maintenance guide, and requests they submit a plan to complete necessary maintenance and resolve the identified issues.

The MS4 has completed the following inspections of structural BMPs (including high-priority):

Table 6.5.1: Post-Construction Facility Inspections										
Land Type	**2017**		**2018**		**2019**		**2020**		**2021**	
	# Inspected	**% of Total**	**# Inspected**	**% of Total**	**# Inspected**	**% of Total**	**# Inspected**	**% of Total**	**# Inspected**	**% of Total**
Public	-	-	-	-	-	-	13		-	-
Private	-	-	-	-	-	-	4		-	-
OS/Parkland	-	-	-	-	-	-	30		-	-
Unknown	-	-	-	-	-	-	1		-	-
Total:	8	1.8%	15	3.0%	72	12%	48	6%	-	-

The MS4 has completed the following occupancy inspections:

Table 6.5.2: Post-Construction Certificate of Occupancy Inspections					
Project Type	**2017**	**2018**	**2019**	**2020**	**2021**
Under 1 Acre	-	-	-	-	-
Over 1 Acre	-	-	-	-	-
Total:	-	-	-	-	-

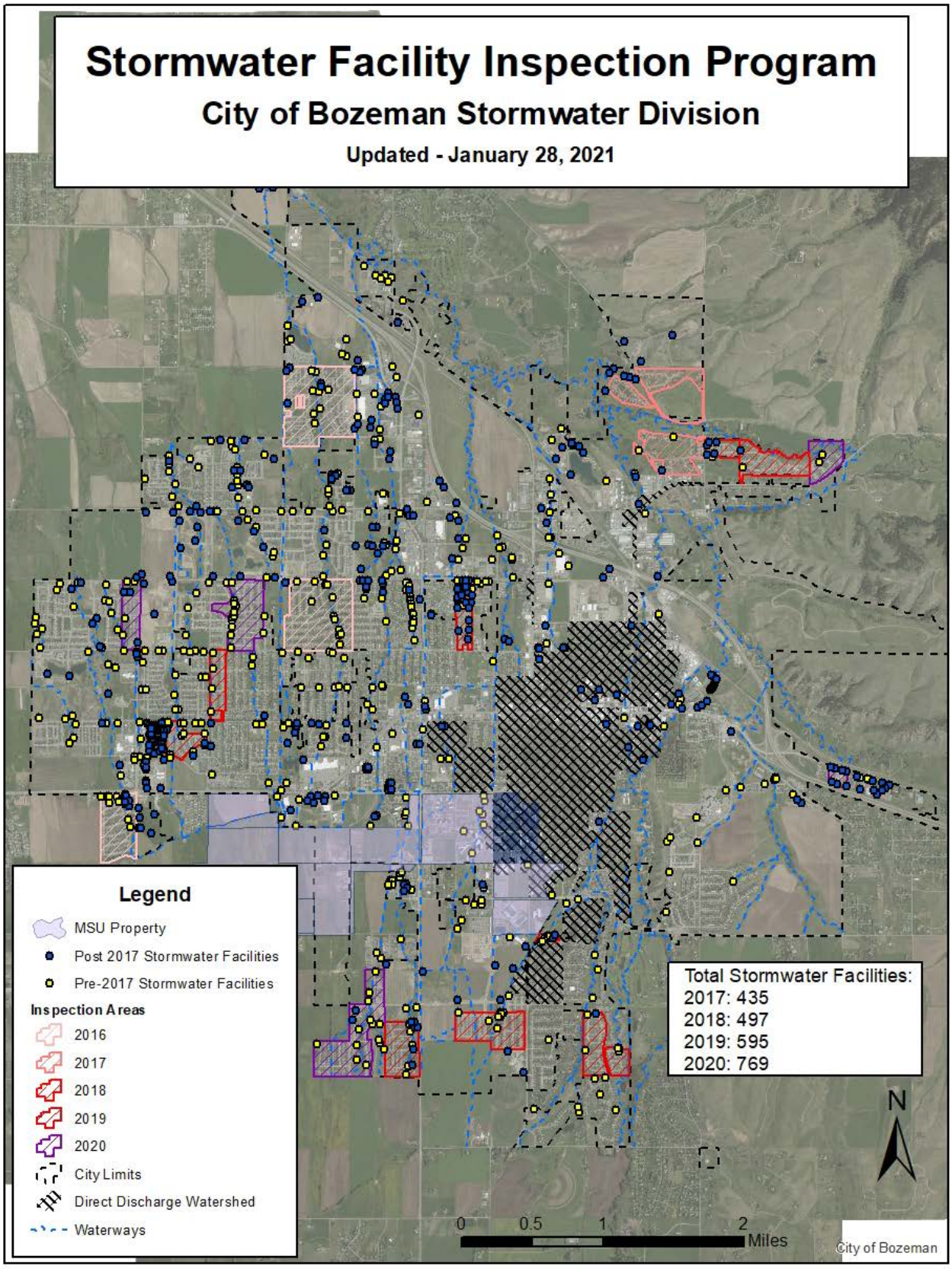


Image 6.5.3: Post-Construction Program Map

6.6 High-Priority Structural BMPs

The MS4 manages the following structural BMPs as high-priority:

Table 6.6.1: High-Priority Structural BMPs

#	Facility ID	Owner	Area (ft^2)	Receiving Waterbody	2019 Rating	2020 Rating	2021 Rating
1	DP.H06.00026	MSU Facility 1	3,185	Mandeville Creek	Low	Low	-
2	DP.H06.00400	MSU Facility 2	7,591	Mandeville Creek	Low	Low	-
3	DP.H06.00024	MSU Facility 3	11,829	Mandeville Creek	Low	Low	-
4	DP.H06.00023	MSU Facility 4	4,667	Mandeville Creek	Low	Medium	-
5	DP.H06.00028	MSU Facility 5	1,294	Mandeville Creek	Low	Low	-
6	DP.H06.00025	MSU Facility 6	7,231	Mandeville Creek	-	Low	-
7	DP.I51.00073	City WRF 1	10,744	East Gallatin River	Low	Low	-
8	DP.I51.00075	City WRF 2	1,355	East Gallatin River	Low	Low	-
9	DP.I51.00074	City WRF 3	10,314	East Gallatin River	Low	Low	-
10	DP.E02.00006	City Vehicle Maintenance	5,577	East Gallatin River	Medium	Medium	-
11	DP.H04.00006	Bozeman School District 1	7,188	Mandeville Creek	Low	Low	-
12	TBD	Bozeman School District 2	7,000	Mandeville Creek	-	Low	-
13	DP.E01.00007	Bridger Creek HOA	22,765	East Gallatin River	High	-	-
14	DP.G02.00017	Tange's Addition	2,245	Mandeville Creek	-	Medium	-
15	DP.G02.00048	Best Western GranTree	3,464	Mandeville Creek	-	Medium	-
16	DP.H02.00001	Kenyon Noble	5,450	Mandeville Creek	-	High	-
17	DP.F01.00026	SID 674	7,354	East Gallatin River	-	High	-
18	DP.H07.00022	South University District 1	14,775	Mandeville Creek	-	Low	-
19	DP.H07.00023	South University District 2	26,987	Mandeville Creek	-	Low	-
20	DP.B05.00001	West Paw	3,967	Rocky Creek	-	Low	-

A summary of work related to each high-priority structural BMP includes:

1. MSU Facilities 1-6
   - 2019: All inspected and reports submitted to the MSU Facilities Director other than MSU Facility 6, which was under construction.
   - 2020: All inspected and reports submitted to MSU Facilities Director other than MSU Facility 6, which was under construction.
2. City WRF 1-3
   - 2019: All inspected and reports submitted to the WRF Superintendent.
   - 2020: All inspected and reports submitted to the WRF Superintendent.
3. City Vehicle Maintenance
   - 2019: Inspected and report submitted to Public Works.
   - 2020: Inspected and report submitted to the Streets Superintendent.
4. Bozeman School District 1-2

- 2019: Bozeman School District 1 inspected and report submitted to the BSD Facilities Director. Bozeman School District 2 not mapped or identified.
- 2020: Bozeman School District 1 and 2 inspected and reports submitted to the BSD Facilities Director.

5. Bridger Creek HOA
   - 2019: Inspected and report submitted to the Bridger Creek Subdivision Community Association, Inc.
   - 2020: Not inspected due to pending legal and policy issues.
6. Tanges Addition
   - 2019: Not inspected.
   - 2020: Inspected and report compiled; however, not sent to owner due to legal/policy issues.
7. Best Western GranTree
   - 2019: Not inspected.
   - 2020: Inspected and report submitted to the General Manager.
8. Kenyon Noble
   - 2019: Not inspected.
   - 2020: Inspected and report compiled; however, not sent to owner due to legal/policy issues.
9. SID 674
   - 2019: Not inspected.
   - 2020: Inspected and report compiled; however, not sent to owner due to legal/policy issues.
10. South University District 1-2
    - 2019: Not inspected.
    - 2020: Inspected and report compiled; however, not sent to owner due to legal/policy issues.
11. West Paw
    - 2019: Not inspected.
    - 2020: Inspected and report submitted to the General Manager.

6.7 Enforcement Response Plan

This section outlines the MS4's Enforcement Response Plan, which provides strategies and authority to ensure owners install, operate, and maintain structural BMPs.

1. Design: SWMP Section 6.2 references numerous documents containing regulations and requirements regarding structural BMP design. If a developer does not fully comply with regulations, the MS4 denies the site plan, making it impossible to acquire a building permit and construct their project. If a developer were to move forward with construction without a building permit, the Community Development's Code Compliance offer would issue a Stop Work Order per BMC Sec. 38.200.040.
2. Installation: SWMP Section 6.3 details the MS4's structurtal BMP review process. During this stage, the MS4 uses the following enforcement protocols:
   - Informal, Formal, and Judicial: The MS4 submits a written notification to the owner when an erosion, sediment, and pollutant control issue is identified using the protocol in SWMP

Section 5.3. The Construction Enforcement Response Plan is the authority until the site reaches final stabilization. Requirements and permission to enter property are found in Bozeman Municipal Code Section 40.04.350.

- Formal: If an engineering-related issue, such as groundwater, geometry, location, or depth, or a site plan deviation, such as a utility conflict, occurs the owner is required to coordinate with the Engineering Division to find a solution. The MS4 withholds occupancy on the project or does not accept infrastructure until the owner resolves the identified issues.

3. Operation and Maintenance: SWMP Section 6.5 outlines the MS4s structural BMP inspection program. Upon sending the documents, the MS4 uses the following enforcement protocol:

   - Informal: The MS4 communicates with the owner and offers to review the results of the MS4's inspection. A six-month timeline is set, which requires the owner to submit a maintenance plan to the MS4 describing how the identified issues will be resolved.
   - Formal and Judicial: The MS4 does not have formal policy or process at this time. Two projects are ongoing as of late 2020 to determine this portion of the MS4's ERP. The projects include the Engineering Standards Update and the 2021 Stormwater Facilities Plan Update. The MS4 plans to present policy recommendations from these efforts to the Commission for decision-making as soon as they are complete.

6.8 Performance Tracking

The MS4 completes a Structural BMP Compliance Audit annually, evaluating 50 random structural BMPs to determine their condition based on the following criteria:

1. Vegetation Management: Evidence of reoccurring cattail, grass, and woody shrub removal.
2. Flow path: As designed, blocked by vegetation and/or sediment, and channelization.
3. Sediment accumulation, stagnant water or accumulation of vegetation which is reducing volume.

After evaluation, the MS4 grades each structural BMP using one of the following categories:

1. 0-Points: Structural BMP requires sediment dredging, vegetation removal, or infrastructure repairs to restore function.
2. 1-Point: Structural BMP requires minor to moderate sediment and vegetation maintenance to maintain function.
3. 2-Points: Structural BMP appears to be well-maintained and functioning as designed.

The MS4 compiles the collected data and updates Table 6.8.1:

Table 6.8.1: Stormwater Structural BMP Audit Scores

Audit Year	Audit Dates	Trend	Total Points	Earned Score
2018	October 17 - 26	-	25/100	25%
2019	November 14 - 15	Increasing	32/100	32%
2020	November 2 - 6	Increasing	56/100	56%

1. 2018 Summary:

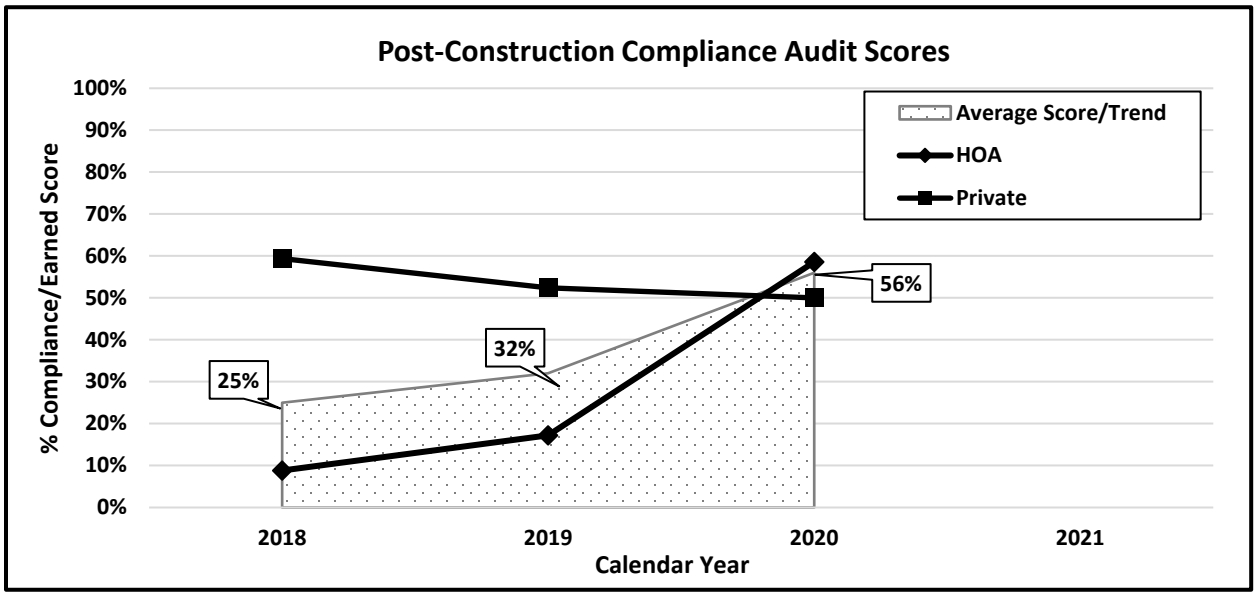
   - Wal-Mart, Safeway, and other private entities maintain their structural BMPs more frequently, yielding an average score six times greater than HOAs.
   - Structural BMPs integrated into landscapes are in better condition than those hidden.
   - The overwhelming majority of HOAs are unaware of their responsibilities and do not complete maintenance regardless of previous engagement by the City.
   - Current design standards allow for the construction of inadequate systems.

2. 2019 Summary:

   - Structural BMPs integrated into landscapes are in better condition than those hidden.
   - The overwhelming majority of HOAs are ignorant of their maintenance responsibilities.
   - Current design standards allow for the construction of inadequate systems.
   - Legal private property access is an issue that requires consideration and resolution
   - Average Scores: Private = 1.0 and HOA = .3

3. 2020 Summary:

   - New structural BMPs rate high and were a disproportionate majority, elevating the score.
   - HOA scores are improving mainly resulting from the addition of new structural BMPs.
   - Older private structural BMPs declined in performance.
   - Many structural BMPs are located on parkland property and may be the responsibility of the MS4 due to the recently approved Parks and Trails District.
   - Private property access is an issue that requires consideration.
   - Average Scores: Private = 1.0 and HOA = 1.2



6.9 Ongoing and Future Initiatives

The following initiatives are planned or ongoing to facilitate improved plans, policies, and ordinances related to the MS4's Post-Construction Program:

1. 2021 Engineering Design Standards Update (Standards Update): A project that includes reviewing and updating the MS4's Engineering Standards. Improvements will consist of better incorporating the MS4 Permit's water quality requirements, integrating the Montana Post-Construction BMP Guidance Manual, and standardizing forms, such as drainage reports and maintenance agreements.
2. 2021 Stormwater Facility Plan Update (Facility Plan Update): The MS4's Facilities Plan has not received an update since 2008. The project will include reviewing and developing policy recommendations related to deficient or previously unexplored programmatic components.

3. Center for Watershed Protection Code and Ordinance Worksheet: In 2020, the MS4 met with the Parks, Planning, and Engineering Divisions and completed the worksheet to determine barriers to implementing stormwater and land-use structural and non-structural BMPs.

   The worksheet was helpful for barrier identification and internal discussion. The MS4 found that some of the recommendations were not applicable or practicable due to various local conditions. Further, the MS4 confirmed it already has aggressive and protective environmental regulations in place, such as watercourse setbacks, open space requirements, a suite of structural BMP options, strategic land use planning, and impervious area maximums. In summary, the MS4 identified the following items for having improvement potential:

   - Recommendation: Allow for alternative sidewalk and driveway materials.
     - Current Status: The MS4 has seen a variety of permeable concrete paver surfaces installed in the last few years. Current design standards do not explicitly cover.
     - Future Opportunity: Consider modifying codes as a part of the Standards Update.
   - Recommendation: Secure permanent funding arrangements for the long-term management and maintenance of open space.
     - Current Status: The City requires the establishment of HOA's at the time of subdivision development; however, it does not require financial guarantees regarding the maintenance of open space, which often includes stormwater facilities and natural resource areas. This issue spans numerous policies and mainly centers on the lack of assurance that HOAs exist and stay funded into perpetuity. Often HOAs dissolve due to a lack of volunteers, representation, or ability to raise money.
     - Future Opportunity: Review policy options as a part of the Facility Plan Update.
   - Recommendation: Long-term management plans that conserve natural systems required for all open space areas.
     - Current Status: Maintenace plans and open space agreements are typically not specific and fail to address all needs adequately.
     - Future Opportunity: Consider reviewing policies during the Park's PROST Plan update.
   - Recomendation: Require limits of disturbance to be shown on construction plans and physically marked at the site.
     - Current Status: The Montana Construction General Permit does not require.
     - Future Opportunity: Coordinate with MDEQ during the next permit issuance.
   - Recommendation: Require special treatment criteria for discharges to impaired or sensitive waters, such as natural wetlands, lakes, trout streams, nutrient-sensitive estuaries, drinking water supplies, etc.
     - Current Status: The MS4 does not designate or select high-priority drainage areas.
     - Future Opportunity: Consider modifying codes as a part of the Standards Update and/or review policy options as a part of the Facility Plan Update.
   - Recomendation: Implement a local wetland protection ordinance.
     - Current Status: Wetland mitigation is covered under USACE policy and requirements.
     - Future Opportuinity: Review project options as a part of the Facility Plan Update.
   - Recommendation: Provide a reference to clear, understandable, and local or regionally based design guidance or stormwater manual.

- Current Status: The Montana Post-Construction BMP Design Guidance Manual exists; however, it is not referenced nor codified in the MS4's Engineering Standards.
- Future Opportuinity: Consider modifying codes as a part of the Standards Update.

- Recomendation: Mandate performance bonds and periodic inspections to ensure proper installation of stormwater practices based on the approved plans.
  - Current Status: No requirements exist.
  - Future Opportuinity: Review policy options as a part of the Facility Plan Update.
- Recomendation: Include provisions for runoff reduction practice easements, inspector right-of-entry, maintenance agreements, and post-construction inspections.
  - Current Status: The listed items either do not exist or require improvement.
  - Future Opportuinity: Consider modifying codes as a part of the Standards Update.
- Recomendation: Require some percentage of treatment on-site if off-site stormwater compliance is authorized.
  - Current Status: The MS4 does not allow offsite stormwater management at this time.
  - Future Opportuinity: Review policy options as a part of the Facility Plan Update.

Section 7.0

Good Housekeeping Program

Graphic 7.0.1: Street sweeping debris pile

Graphic 7.0.2: Sediment management facility

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7.1 Introduction

The MS4 strives to improve waterway health, protect public safety, and comply with its MS4 Permit through the responsible management of its storm sewer system, facilities, and daily work activities by:

1. Inspecting, maintaining, and repairing public assets;
2. Mitigating stormwater pollutants through the development and implementation of Facility and Activity Stormwater Pollution Prevention Plans; and
3. Maintaining an environmentally conscious workforce through training.

SWMP Section 7.0 details the following components necessary to administer the MS4's Good Housekeeping Program, including:

- Infrastructure Operations (7.2)
- Facility Stormwater Pollution Prevention Program (7.3)
- Activity Stormwater Pollution Prevention Program (7.4)
- Training (7.5)

7.2 Infrastructure Operation

The City inspects, maintains, and repairs its storm sewer system on an annual basis. MSU maintains infrastructure within its boundary. The following Divisions are responsible for conducting infrastructure operations:

Table 7.2.1: Infrastructure Operations

Operation	Goal	Season	Operational Area
Stormwater Division Operations			
Storm Sewer Inspection (CCTV)	20% per year	Year-round	Citywide
Storm Sewer Cleaning	20% per year	Year-round	Citywide
Storm Sewer Repair	As Required	Spring, Summer, Fall	Citywide
Treatment Unit Maintenance	Annually	Fall	Individual Locations
Infiltration Facility Maintenance	Annually	Fall	Individual Locations
Debris Hauling	Annually	Varies	Sediment Facility
Streets Division Operations			
Spring Cleanup	Annually	Spring	Citywide
Fall Cleanup	Annually	Fall	Citywide
Street Sweeping	Annually	Year-round	Citywide
Sweepings Hauling	Annually	Varies	East Gallatin Area

The MS4 uses the following metrics to track performance. The performance data comes from the MS4's Operation's Dashboard, and infrastructure totals from SWMP Section 4.8. The metrics include:

1. Inlets and Manholes Cleaned: Storm sewer inlets and manholes serve two purposes: (1) mitigate flood risk by collecting runoff from streets, parking lots, alleyways, and other hard surfaces, and (2) treat stormwater by capturing sediment, trash, and other pollutants in their sumps.
   - Performance Measure: Clean 20% of public inlets and manholes annually
   - Calculation Type: Total assets (includes duplicate effort)

Table 7.2.2: Inlet and Manholes Totals						
Year	City/MDT Maintained	City/MDT Total	% Complete	MSU Maintained	MSU Total	% Complete
2018	742	3,778	20%	256	362	71%
2019	809	4,216	19%	263	362	73%
2020	909	4,188	22%	207	365	57%
2021	-	-	-	-	-	-

2. Storm Sewer Cleaned: Storm sewers serve two purposes: (1) convey stormwater collected by inlets to their point of discharge, and (2) capture sediment, trash, and other pollutants that fall out of suspension, requiring reoccurring maintenance to remain functional.

   - Performance Measure: Clean 20% of pipes annually
   - Calculation Type: Total assets (mains and laterals, includes duplicate effort)

Table 7.2.3: Storm Sewer Totals						
Year	City/MDT Maintained	City/MDT Total	% Complete	MSU Maintained	MSU Total	% Complete
2018	17 Miles	71 Miles	24%	.1 Miles	8 Miles	1%
2019	14 Miles	77 Miles	18%	.1 Miles	8 Miles	1%
2020	17 Miles	78 Miles	22%	.1 Miles	8 Miles	1%
2021	-	-	-	-	-	-

3. Infrastructure Repairs: Infrastructure repairs or "spot repairs" serve two purposes: (1) fix known pipe failures and restrictions to ensure the adequate flow of stormwater, and (2) repair open sections of pipe where scouring of subgrade soils occur, mitigating the chance of a road failure and sediment load contribution.

   - Performance Measure: Pipe integrity indicator
   - Calculation Type: Total repairs

Table 7.2.4: Infrastructure Repair Totals		
Year	City Total	MSU Total
2018	16 Repairs	2 Repairs
2019	10 Repairs	0 Repairs
2020	3 Repairs	1 Repair
2021	-	-

4. Storm Sewer Inspection: Storm sewer inspections serve two purposes: (1) identification and prioritization of structural and maintenance needs for underground infrastructure and (2) identifies illicit discharges, cross-connections, or illegal pipe connections.

   - Performance Measure: Inspect 20% of storm sewer mains annually
   - Calculation Type: Total assets (mains and laterals, includes duplicate effort)

Table 7.2.5: Storm Sewer Totals						
Year	City/MDT Maintained	City/MDT Total	% Complete	MSU Maintained	MSU Total	% Complete
2018	14 Miles	71 Miles	20%	.4 Miles	8 Miles	5%
2019	11 Miles	77 Miles	14%	.02 Miles	8 Miles	.2%
2020	9 Miles	78 Miles	12%	.5 Miles	8 Miles	6%
2021	-	-	-	-	-	-

7.3 Facility Stormwater Pollution Prevention Program

The purpose of the MS4's Facility Stormwater Pollution Prevention Program (FSWPPP) is to mitigate stormwater pollutants generated on municipal facilities. To complete, the MS4 works to ensure all municipal facilities meet or exceed the following Facility Minimum Standards (FMS):

- Connect wash bays and interior floor drains to the sanitary sewer.
- Store chemicals under cover and within secondary containment.
- Prevent tracking at entries, exits, and within parking areas.
- Stock spill kits with instructions, disposable bags, PPE, and absorbent products.
- Perform preventative maintenance on vehicles and equipment.
- Wash vehicles and equipment in designated locations.
- Contain fuel tanks with secondary containment.
- Implement BMPs for identified pollutants.
- Maintain stormwater facilities per the following frequencies: (1) Stormwater basins, annual vegetation and debris clearing, 10-15 year dredging; (2) Mechanical separators, annual vacuuming; (3) Infiltration facilities, annual flushing; (4) Parking and drive surfaces, as required; and (5) Inlets, manholes, and pipes, five-year flushing, vacuuming, and inspection cycle.
- Stabilize disturbed areas within 14-days.

The MS4 uses the following FSWPPP inspection protocol:

1. If applicable, collect stormwater runoff sample to characterize facility pollutant concentrations.
2. Inspect facility and establish baseline compliance with FMSs.
3. Review existing documents, such as existing Standard Operating Guides (SOGs), safety data sheets, spill documentation, and stormwater facility record drawings.
4. Coordinate with applicable leadership and develop FSWPPP that includes:
    - Overview
    - Stormwater Team
    - Site Description
    - Impaired Waterbodies
    - Sampling
    - Pollution Identification
    - Site Assessment
    - Spill Response Plan
    - Training
    - Inspections
    - Infrastructure Improvements
    - Record Keeping and Reporting
    - Site Map
5. Implement FSWPPP.
6. Train applicable staff annually.
7. Re-inspect and update the FSWPPP annually.

The following facilities are subject to the FSWPPP protocol:

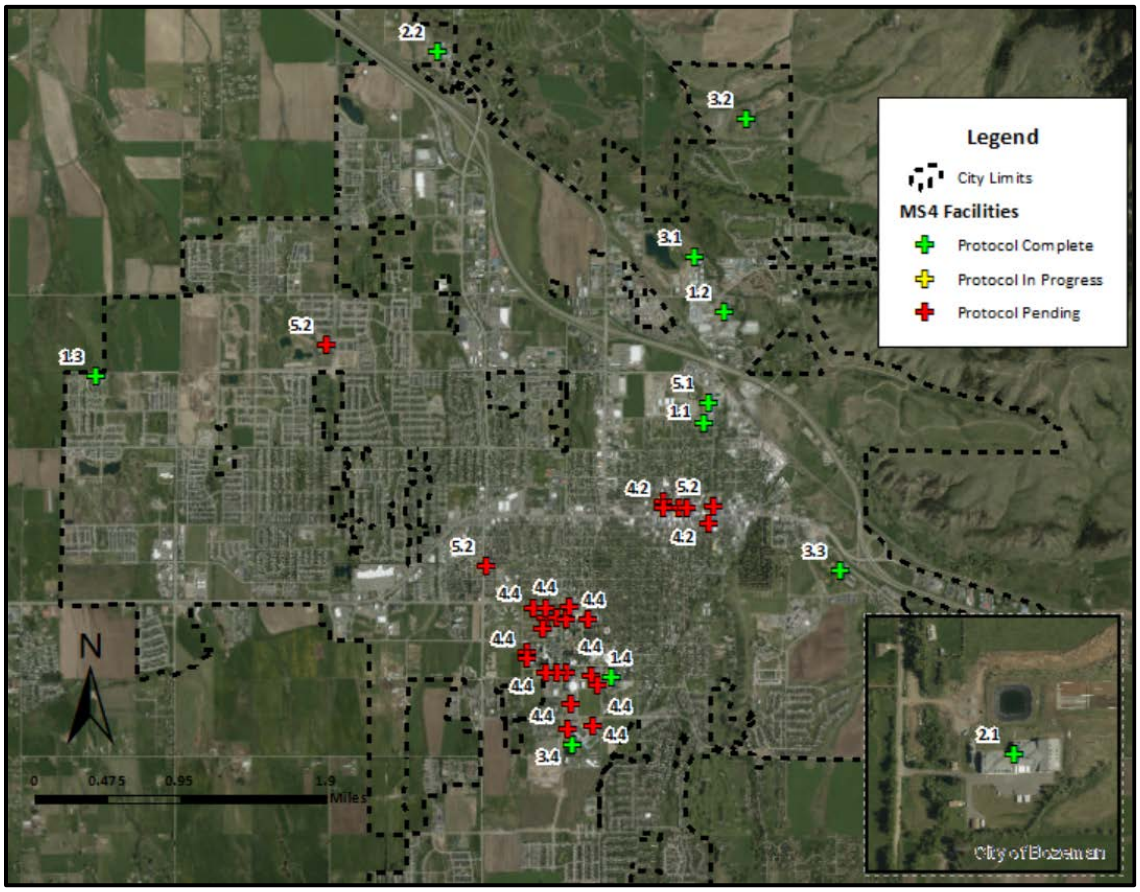
Table 7.3.1: City Facilities

Facility ID	Facility Name	Facility Classification	Initial Inspection	FSWPPP Development	FSWPPP Update
1.1	City Shops Complex	Operations and Storage Area	~~2019~~	~~2019~~	~~2020~~, 2021
1.2	Vehicle Maintenance Facility	Operations and Storage Area	~~2019~~	~~2019~~	~~2020~~, 2021

1.3	Laurel Glen Operations Facility	Operations and Storage Area	~~2020~~	~~2020~~	2021
2.1	Water Treatment Plant	Treatment Works	~~2020~~	~~2020~~	2021
2.2	Water Reclamation Facility	Treatment Works	~~2019~~	~~2019~~	~~2020~~, 2021
3.1	East Gallatin Storage Area	Material Storage Area	~~2020~~	~~2020~~	2021
3.2	Closed Landfill	Material Storage Area	~~2019~~	~~2019~~	~~2020~~, 2021
3.3	Snow Storage Area	Material Storage Area	~~2019~~	~~2019~~	~~2020~~ 2021
4.1	Public Parking Garage	Parking Facilities	2021	2021	2022
4.2	Public Parking Lots (4)	Parking Facilities	2021	2021	2022
5.1	Bozeman Public Safety Facility	Public Safety Facility	~~2019~~	~~2019~~	~~2020~~ 2021
5.2	Fire Stations #1-3	Public Safety Facility	2021	2021	2022

Table 7.3.2: MSU Facilities

Facility ID	Facility Name	Facility Classification	Initial Inspection	FSWPPP Development	FSWPPP Update
1.4	University Shops Facility	Operations and Storage Area	~~2019~~	2021	2022
3.4	MSU Material Storage Area	Material Storage Area	~~2020~~	2021	2022
4.3	MSU Parking Garage	Parking Facilities	2021	2021	2022
4.4	MSU Parking Lots (17)	Parking Facilities	2021	2021	2022



Graphic 7.3.3: MS4 facilities

7.4 Activity Stormwater Pollution Prevention Program

The purpose of the MS4's Activity Stormwater Pollution Prevention Program (ASWPPP) is to mitigate stormwater pollutants generated from municipal operations. To complete, the MS4 works to ensure all operations meet or exceed the following Activity Minimum Standards (AMS):

- Protect street surfaces and inlets by deploying controls that capture, contain, and allow the collection and disposal of generated pollutants.
- Cover or contain material stockpiles, and control run-on.
- Stabilize disturbed areas within 14-days of activities.
- Prevent tracking and the off-site migration of debris.
- Capture and dispose concrete waste.
- Manage dewatering flows to remove sediment to the maximum extent practicable before entering the storm sewer system or waterways.

The MS4 uses the following ASWPPP inspection protocol:

1. Review activity and establish baseline compliance with AMSs.
2. Coordinate with applicable leadership and develop ASWPPP that includes:
   - Overview
   - Stormwater Team
   - Activity Description
   - Pollutant Identification
   - Standards Assessment and SOGs
   - Training
   - Record Keeping
3. Implement ASWPPP.
4. Train applicable crews annually.

The following activities are subject to the ASWPPP protocol:

Table 7.4.1: MS4 Activities

Activity ID	Activity Name	Division	Responsible Entity	Location	Inspection Year	ASWPPP Development
1.1	Emergency Water Main Breaks	Water/Sewer	City	Citywide	~~2019~~	~~2019~~
1.2	Sanitary Sewer Overflows	Water/Sewer	City, MSU	Citywide	~~2019~~	~~2019~~
1.3	Trenching and Excavation	Water and Sewer	City	Citywide	~~2020~~	~~2020~~
2.1	Sidewalk and Curb Construction	Water/Sewer, Streets	City	Citywide	2021	2021
2.2	Concrete Cutting	Water/Sewer, Streets	City	Citywide	2021	2021
3.1	Roadway Traction Sand Application	Streets	City, MSU	Citywide	~~2020~~	~~2020~~
4.1	Solid Waste Collection	Solid Waste	City, MSU	Citywide	~~2020~~	~~2020~~
5.1	Arena Construction	MSU	MSU	Campus	2021	2021
6.1	Parks Mowing	Parks	City, MSU	Citywide	2021	2021
6.2	Tree Planting, Pruning, Removal	Parks	City, MSU	Citywide	2021	2021

7.5 Training

The MS4 participates in local, state, and national trainings. The following lists completed efforts:

1. Comprehensive Stormwater Training
    - Stormwater Program Coordinator (Kayla Mehrens)
        - 2017: Montana Water Environment Association Conference, Bellevue StormCon Conference
        - 2018: Montana Stormwater Conference, Denver StormCon Conference
        - 2019: n/a
        - 2020: Virtual Designing Successful Stormwater Facilities with Maintenance and Enforcement in Mind, Virtual National Stormwater Symposium Stormwater Digital Conference, Virtual Stormwater Rate Study with FCS Group, Virtual StormCon Conference, Virtual Stormwater Pond Problems Webcast
    - Stormwater Program Specialist (Frank Greenhill)
        - 2017: Montana Water Environment Association Conference
        - 2018: International Erosion Control Association Conference, Montana Stormwater Conference
        - 2019: BMP 101 Introduction to Stormwater Management, BMP 201 Certified SWPPP Administrator/Preparer, WQM 130 Stormwater Management for Industrial Operations
        - 2020: Virtual StormCon Conference
    - Stormwater Project Manager (Adam Oliver)
        - 2020: Virtual Designing Successful Stormwater Facilities with Maintenance and Enforcement in Mind, Virtual ADS/Baysaver BMP Design and Maintenance Workshop, Virtual StormCon Conference
    - Stormwater Program Technician (~~Cody Flammond, Jon Silva~~)
        - 2018:International Erosion Control Association Conference, Montana Stormwater Conference, Phase 1 Leadership Training, Hazardous Waste Training
        - 2019: Weekly meeting, bimonthly meeting, Weftech Chicago, WQM 130 Stormwater Management for Industrial Operations
        - 2020: Virtual StormCon Conference
    - Stormwater Operations Foreman (Mike Dilbeck)
        - 2018: Montana Stormwater Conference
        - 2019: Weftech Chicago
        - 2020: n/a
    - MSU Director, Facilities Services (EJ Hook)
        - 2018: Montana Stormwater Conference
        - 2019: n/a
        - 2020: n/a
2. Stormwater Operations Training:

- Awareness: Training for employees to increase awareness and reduce stormwater pollutants generated from internal operations. Employees receive training every three years. Employees at the Water Reclamation Facility and in the Solid Waste Division receive training annually. MSU employees receive annual FSWPPP and ASWPPP training applicable to their MSU department and assigned tasks. Training is typically combined with seasonal Safety and Risk Management training.

Table 7.5.1: Awareness Training Content

Division	Stormwater In Bozeman Video	Rain Check Chapter 1: Intro	Rain Check Chapter 2: Housekeeping	Rain Check Chapter 3: Spill control	Rain Check Chapter 4: Fueling	Rain Check Chapter 5: Vehicle Maintenance	Rain Check Chapter 6: Vehicle Washing	Rain Check Chapter 7: Materials Management	Rain Check Chapter 8: Waste Management	Rain Check Chapter 9: Facility Maintenance	Rain Check Chapter 12: Landscaping
Water and Sewer	X	X	X	X	X	X	X	X	X	-	X
Code Compliance	X	X	-	X	-	-	-	-	-	-	-
Facilities	X	X	X	X		X	-	X	X	X	X
Forestry	X	X	X	X	X	X	X	X	X	-	X
Parks and Cemetery	X	X	X	X	X	X	X	X	X	-	X
Fire Operations	X	X	X	X	X	X	X	X	X	X	-
Streets	X	X	X	X	X	X	X	X	X	-	X
Solid Waste	X	X	X	X	X	X	X	X	X	X	-
Water Treatment Plant	X	X	X	X	X	X	X	X	X	X	X
Water Rec. Facility	X	X	X	X	X	X	X	X	X	X	-

- ASWPPP and FSWPPP: Training for applicable employees to increase awareness and reduce stormwater pollutants generated from specific operations and facilities. Employees receive training annually. Training content includes:

Table 7.5.2: ASWPPP Training Content

Division	Water Main Breaks	Sanitary Sewer Overflows	Trenching and Excavation	Sidewalk and Curb Construction	Curb Cutting	Traction Sand Application	Solid Waste Collection	Arena Construction	Parks Mowing	Tree Planting
Water and Sewer	X	X	X	X	X	-	-	-	-	-
Facilities	-	-	-	-	-	-	-	-	-	-
Forestry	-	-	-	-	-	-	-	-	-	X
Parks and Cemetery	-	-	-	-	-	-	-	-	-	X
Streets	-	-	-	X	X	X	-	-	-	-
Solid Waste	-	-	-	-	-	-	X	-	-	-
MSU Operations	-	X	-	-	-	X	X	X	X	X

Table 7.5.3: FSWPPP Training Content

Division	MSU Shops Facility	City Shops Complex	Vehicle Maintenance Facility	Laurel Glen Operations Facility	East Gallatin Storage Area	Closed Landfill	Snow Storage Area	MSU Material Storage Area	Water Treatment Plant	Water Reclamation Facility	Public Parking Garage and Lots	MSU Parking Garage and Lots	Bozeman Public Safety Facility	Fire Stations #1-3	Parks and Recreation
Water and Sewer	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-
Facilities	-	X	-	-	-	-	-	-	-	-	X	-	X	X	-
Forestry	-	-	X	-	X	-	-	-	-	-	-	-	-	-	X
Parks and Cemetery	-	X	-	-	X	-	-	-	-	-	-	-	-	-	X
Fire Operations	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-
Streets	-	X	X	-	X	-	X	-	-	-	-	-	-	-	-
Solid Waste	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Water Treatment Plant	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
Water Rec. Facility	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-
MSU Operations	X	-	-	-	-	-	-	X	-	-	-	X	-	-	-

Table 7.5.4: Training Program Summary

Division	2017		2018		2019		2020		2021	
	Awareness Training	FSWPPP and ASWPPP Training	Awareness Training	FSWPPP and ASWPPP Training	Awareness Training	FSWPPP and ASWPPP Training	Awareness Training	FSWPPP and ASWPPP Training	Awareness Training	FSWPPP and ASWPPP Training
Water and Sewer	18	-	7	-	2	-	21	21	-	-
Code Compliance	0	-	0	-	0	-	0	0	-	-
Facilities	0	-	0	-	0	-	0	0	-	-
Forestry	0	-	0	-	0	-	5	5	-	-
Parks and Cemetery	0	-	0	-	14	-	17	17	-	-
Fire Operations	0	-	0	-	0	-	0	0	-	-
Streets	0	-	19	-	9	-	24	24	-	-
Solid Waste*	14	-	17	-	16	-	19	19	-	-
Water Treatment Plant	0	-	10	-	1	-	0	0	-	-
Water Rec. Facility*	13	-	15	-	14	-	14	14	-	-
MSU Operations	0	-	1	-	2	-	23	23	-	-

3. Construction Site Management Program Training

   - Stormwater Program Coordinator (Kayla Mehrens)
     - 2020: Virtual BMP 301 Conducting Stormwater Compliance Evaluation Inspections
   - Stormwater Program Specialist (Frank Greenhill)
     - 2017: BMP 101 Introduction to Stormwater Management Training, BMP 201 SWPPP Administrator Training, BMP 202 SWPPP Preparer Training, BMP 101 Introduction to Stormwater Management Training, BMP 102 Field Academy, BMP 201 SWPPP Administrator Training, BMP 202 SWPPP Preparer Training, BMP 301 Compliance Evaluation Inspection Training
     - 2018: International Erosion Control Association Conference, BMP 101 Introduction to Stormwater Management Training, 201/202 SWPPP Administrator and Preparer Training, BMP 100 Construction Dewatering Training, 102 BMP Field Academy
     - 2019: BMP 101 Introduction to Stormwater Management, BMP 201 Certified SWPPP Administrator/Preparer
     - 2020: Virtual BMP 301 Conducting Stormwater Compliance Evaluation Inspections
   - Stormwater Project Manager (Adam Oliver)
     - 2020: Virtual BMP 301 Conducting Stormwater Compliance Evaluation Inspections
   - Stormwater Program Technician (~~Cody Flammond, Jon Silva~~)
     - 2018: International Erosion Control Association Conference, 101 Introduction to Stormwater Management Training, 201/202 SWPPP Administrator and Preparer Training, 100 Construction Dewatering Training, 102 BMP Field Academy
     - 2019: n/a
     - 2020: Virtual CI241 Qualified Compliance Inspector of Stormwater – Montana, Virtual BMP 301 Conducting Stormwater Compliance Evaluation Inspections
   - MSU Director of Facilities Services (EJ Hook)
     - 2017: BMP 301 Compliance Evaluation Inspection Training
     - 2018: n/a
     - 2019: n/a
     - 2020: n/a

4. Post-Construction Program Training

   - Stormwater Program Coordinator (Kayla Mehrens):
     - 2017: Montana Water Environment Association Conference, Bellevue StormCon Conference
     - 2018: Montana Stormwater Conference (May 1-3), Denver StormCon Conference
     - 2019: n/a
     - 2020: Virtual The Benefits of Third Party Performance Verification: A Better Understanding of NJDEP and WADOE TAPE Webinar, Virtual StormCon Conference, Virtual Stormwater Pond Problems Webcast
   - Stormwater Project Manager (Adam Oliver)

- 2020: Virtual Designing Successful Stormwater Facilities with Maintenance and Enforcement in Mind, Virtual ADS/Baysaver BMP Design and Maintenance Workshop, Virtual StormCon Conference

- Development Review Engineer (~~Anna Russell P.E.~~, Karl Johnson):
  - 2020: Virtual The Benefits of Third Party Performance Verification: A Better Understanding of NJDEP and WADOE TAPE Webinar
- Development Review Engineer (~~Griffin Nielsen P.E.~~, Cody Flammond P.E.):
  - 2020: Virtual The Benefits of Third Party Performance Verification: A Better Understanding of NJDEP and WADOE TAPE Webinar
- Development Review Manager (Lance Lehigh P.E.):
  - 2020: Virtual The Benefits of Third Party Performance Verification: A Better Understanding of NJDEP and WADOE TAPE Webinar

Section 8.0

Sampling and Evaluation Program

Graphic: 8.0.1: In-stream sampling equipment

Graphic 8.0.2: Stormwater runoff nutrient analysis

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8.1 Introduction

The MS4 strives to improve waterway health, protect public safety, and comply with its MS4 Permit through the collection of stormwater and waterway data points that:

- Monitor stormwater and surface water quality over time;
- Evaluate the effectiveness of infrastructure and administrative program investments;
- Generate data that advises policy, capital, and operational decisions; and
- Provide a data-driven performance metric easily communicated to the public.

SWMP Section 8.0 details the following components necessary to administer the MS4's Sampling and Evaluation Program, including:

- Targeted Waterways (8.2)
- Regulatory Requirements (8.3)
- Urban Runoff Monitoring (8.4)
- In-stream Wet Weather Monitoring (8.5)
- Sediment Reduction Monitoring (8.6)
- Long-term Trend Monitoring (8.7)
- Evaluation (8.8)
- Discussion (8.9)

8.2 Targeted Waterways

Bozeman Creek, a.k.a. Sourdough Creek, originates in the Gallatin Mountains south of the MS4. Flowing north, Bozeman Creek enters the MS4 at E. Kagy Boulevard and continues until its confluence with the E. Gallatin River at E. Griffin Dr. The Montana DEQ determined that Bozeman Creek contained impairments from natural and anthropogenic sources when preparing the 2013 Lower Gallatin Planning Area TMDL.

Table 8.2.1: Bozeman Creek Impairment Information

Probable Cause	Probable Sources	Associated Uses	TMDL
Alteration in stream-side or littoral vegetative cover	Agricultural grazing, crop production	Aquatic Life	No
Chlorophyll-a	Agricultural grazing and crop production, residential districts, municipal area	Primary Contact and Recreation	No
E.coli	Septic tanks, urban runoff, storm sewers, pet waste, livestock	Primary Contact and Recreation	Yes
Nitrogen (Total)	Agricultural grazing and crop production, residential districts, municipal area	Aquatic Life, Primary Contact, and Recreation	Yes
Sediment	Natural sources, unpaved roads/trails, urban runoff, storm sewers, municipal area	Aquatic Life	Yes

Mandeville Creek, a small spring feed watercourse, originates south of Bozeman. Flowing north, Mandeville Creek enters the MS4 at Alder Creek Dr. and continues until its confluence with the E. Gallatin River. The Montana DEQ determined Mandeville Creek contained impairments from anthropogenic sources when preparing the 2013 Lower Gallatin Planning Area TMDL.

Table 8.2.2: Mandeville Creek Impairment Information			
Probable Cause	**Probable Sources**	**Associated Uses**	**TMDL**
Nitrogen (Total)	Municipal point source discharges, residential districts, municipal area	Aquatic Life, Primary Contact, and Recreation	Yes
Phosphorous (Total)	Municipal point source discharges, residential districts, municipal area	Aquatic Life, Primary Contact, and Recreation	Yes

8.3 Regulatory Requirements

The MS4 General Permit requires that the MS4 perform sampling, testing, and reporting of stormwater discharges annually, including:

1. Monitor stormwater discharges based on residential and industrial land-use types
   - See SWMP Section 8.4 Urban Runoff Monitoring
2. Assess in-stream water quality impacts of stormwater discharges to Bozeman and Mandeville Creeks (Self-Monitoring Requirements: Monitoring Option 2)
   - See SWMP Section 8.5 In-Stream Wet-Weather Monitoring and SWMP Section 8.7 Long-Term Trend Monitoring.
3. Conduct TMDL-related monitoring to evaluate the effectiveness of best management practices (BMPs) implemented to reduce pollutant loading from the MS4 to impaired waters (TMDL Related Monitoring: Monitoring Option 2)
   - See SWMP Section 8.6 Sediment Reduction Monitoring
4. Self-evaluate results relative to long-term medians
   - See SWMP Section 8.8 Evaluation

For each of the monitoring requirements above, the MS4 conducts sampling, testing, and reporting of the following parameters:

1. Total Suspended Solids (TSS), mg/L
2. Chemical Oxygen Demand (COD), mg/L
3. Total Nitrogen (TN), mg/L
4. Total Phosphorus (TP), mg/L
5. Copper (Cu), mg/L
6. Lead (Pb), mg/L
7. Zinc (Zn), mg/L
8. Oils and Greases, mg/L
9. pH, standard units
10. Estimated Flow

8.4 Urban Runoff Monitoring

Introduction: The MS4 collects urban runoff samples from representative watersheds to characterize pollutant loading occurring from various land-use types before system treatment, such as stormwater basins, sumps, infiltration galleries, and mechanical separation. In general, urban runoff pollutant concentrations are variable and dependent on numerous environmental conditions, such as precipitation cycles, wind, tree cover, and human activities.

Sites: The MS4 has a network of four monitoring locations: two within residential drainage basins and two within commercial/industrial drainage basins, including:

1. Site: RES_01
   - Location: Near the intersection of S. Bozeman Ave. and E. Garfield St.
   - Land-use: Residential
   - Drainage Basin: Seven acres
   - Inlet ID: I.F06.00082
     - Latitude: 45.667143
     - Longitude: -111.034474
   - Inlet ID: I.F06.00083
     - Latitude: 45.667143
     - Longitude: -111.034724
   - Parameters: TSS, COD, TP, TN, pH, Copper, Lead, Zinc, Oils and Greases, and Flow
   - Frequency: Two samples per year
2. Site: IND_01
   - Location: Near Commercial Dr. cul-de-sac (west)
   - Land-use: Commercial and Industrial
   - Drainage Basin: 10 acres
   - Inlet ID: I.E01.00184
     - Latitude: 45.703061
     - Longitude: -111.030112
   - Inlet ID: I.E01.00185
     - Latitude: 45.703164
     - Longitude: -111.030428
   - Parameters: TSS, COD, TP, TN, pH, Copper, Lead, Zinc, Oils and Greases, and Flow
   - Frequency: Two samples per year
3. Site: RES_02
   - Location: MSU Campus near the intersection of S. 12th Ave. and W. Garfield St.
   - Land-use: Residential
   - Drainage Basin: Four acres
   - Inlet ID: I.H06.00329
     - Latitude: 45.666911
     - Longitude: -111.054301
   - Inlet ID: I.H06.00259
     - Latitude: 45.666970
     - Longitude: -111.054226
   - Parameters: TSS, COD, TP, TN, pH, Copper, Lead, Zinc, Oils and Greases, and Flow
   - Frequency: Two samples per year
4. Site: IND_02

- Location: MSU Campus near the intersection of S. 6th Ave. and W Garfield St.
- Land-use: Industrial
- Drainage Basin: Two acres
- Inlet ID: I.G06.00603
    - Latitude: 45.664409
    - Longitude: -111.044957
- Inlet ID: I.G06.00630
    - Latitude: 45.664409
    - Longitude: -111.044942
- Parameters: TSS, COD, TP, TN, pH, Copper, Lead, Zinc, Oils and Greases, and Flow
- Frequency: Two samples per year

Methods: The MS4 collects urban runoff samples from storm sewer inlets at each site using Thermo-Scientific Nalgene Samplers (Samplers). Before runoff events, Staff installs each Sampler at the selected inlet grate and positions it to collect the first flush of urban runoff. Once full, the Sampler closes itself prohibiting additional collection or dilution of the original sample.

Analysis: The MS4 collects, transfers, packages, and ships samples to a certified laboratory, which analyzes the following parameters:

1. Total Suspended Solids (TSS), mg/L
2. Chemical Oxygen Demand (COD), mg/L
3. Total Nitrogen (TN), mg/L
4. Total Phosphorus (TP), mg/L
5. Copper (Cu), mg/L
6. Lead (Pb), mg/L
7. Zinc (Zn), mg/L
8. Oils and Greases, mg/L
9. pH, standard units
10. Estimated Flow

The MS4 estimates flow, in gallons per minute (gpm), using the Rational Formula where:

$Q = CiA$ *Equation 1*

1. Q is peak runoff rate (cfs converted to gpm)
2. C is the runoff coefficient (C-Factor, Bozeman Engineering Standards)
3. i is rainfall intensity (in./hr., MSU Rain Gage)
4. A is the drainage area (acres)

Table 8.4.1: Sampling Location Runoff Coefficients (C-Factors)

Location Name	Primary Land Use	Runoff Coefficient (C-Factor)
RES_01	Low to Medium Density Residential	0.35
RES_02	Dense Residential	0.50
IND_01	Industrial	0.80
IND_02	Industrial	0.80

Table 8.4.2: Urban Runoff Monitoring Results * Reporting Limit (RL)										
Site	TSS mg/L	Oil & Grease mg/L	Total Nitro. mg/L	Phosp. mg/L	Zinc mg/L	Lead mg/L	Cop. mg/L	COD mg/L	pH	Flow gpm
RES_01: 2017 (1)	203	2.00	6.20	0.908	0.1160	0.0052	0.0220	251.00	6.7	N/A
RES_01: 2017 (2)	368	5.10 RL	12.00	1.230	0.1790	0.0073	0.0300	175.00	7.0	N/A
RES_01: 2018 (1)	460	4.00	14.00	1.920	0.2720	0.0092	0.0290	708.00	6.4	55.0
RES_01: 2018 (2)	113	1.00 RL	2.30	0.544	0.1220	0.0033	0.0130	129.00	6.5	22.0
RES_01: 2019 (1)	5890	6.00	28.80	8.400	2.0200	0.1750	0.3380	3330.00	7.4	49.5
RES_01: 2019 (2)	206	1.00 RL	5.50	0.680	0.2100	0.0060	0.0240	258.00	6.9	14.3
RES_01: 2020 (1)	2300	3.00	21.50	4.400	0.6200	0.0530	0.0760	1340.00	6.7	110.0
RES_01: 2020 (2)	109	1.00 RL	3.40	0.6400	0.1400	0.0040	0.0200	363.00	6.3	49.5
RES_01: 2021 (1)	-	-	-	-	-	-	-	-	-	-
RES_01: 2021 (2)	-	-	-	-	-	-	-	-	-	-
RES_01 Median	287	2.50	9.10	1.069	0.1945	0.0067	0.0265	310.50	6.7	88.0
RES_02: 2017 (1)	-	-	-	-	-	-	-	-	-	-
RES_02: 2017 (2)	-	-	-	-	-	-	-	-	-	-
RES_02: 2018 (1)	1430	15.00	8.40	2.030	0.6520	0.0367	0.0840	605.00	7.0	18.0
RES_02: 2018 (2)	199	3.00	3.40	0.457	0.2610	0.0081	0.0220	234.00	6.8	18.0
RES_02: 2019 (1)	806	9.00	8.60	1.930	0.5000	0.0410	0.0820	579.00	7.5	40.39
RES_02: 2019 (2)	568	8.00	17.50	2.060	0.7500	0.0220	0.0810	1100.00	6.8	11.7
RES_02: 2020 (1)	1490	3.00	9.80	2.220	0.5100	0.0300	0.0490	487.00	6.8	89.76
RES_02: 2020 (2)	176	3.00	7.40	0.800	0.2900	0.0070	0.0260	382.00	6.4	40.4
RES_02: 2021 (1)	-	-	-	-	-	-	-	-	-	-
RES_02: 2021 (2)	-	-	-	-	-	-	-	-	-	-
RES_02 Median	687	5.50	8.50	1.980	0.5050	0.0260	0.0650	533.00	6.8	71.8
IND_01: 2017 (1)	149	4.00	17.30	1.380	0.5780	0.0160	0.0440	292.00	7.0	-
IND_01: 2017 (2)	1820	5.10 RL	11.68	1.320	33.3500	0.0371	0.0867	151.00	6.9	-
IND_01: 2018 (1)	602	15.00	8.50	1.890	4.7100	0.0371	0.0620	606.00	7.3	179.5
IND_01: 2018 (2)	293	4.00	3.40	0.588	0.1910	0.0081	0.0270	195.00	7.0	71.8
IND_01: 2019 (1)	1470	4.00	4.90	1.960	1.5600	0.1020	0.1620	647.00	7.6	161.6
IND_01: 2019 (2)	333	2.00	10.70	0.940	0.8800	0.0250	0.0700	651.00	7.2	46.7
IND_01: 2020 (1)	2880	2.00	17.10	6.800	2.7200	0.1070	0.2450	1240.00	6.7	359.1
IND_01: 2020 (2)	347	2.00	4.80	0.880	1.7600	0.0280	0.0540	347.00	7.2	161.6
IND_01: 2021 (1)	-	-	-	-	-	-	-	-	-	-
IND_01: 2021 (2)	-	-	-	-	-	-	-	-	-	-
IND_01 Median	474	4.00	9.60	1.350	1.6600	0.0326	0.0660	476.50	7.1	287.3
IND_02: 2017 (1)	-	-	-	-	-	-	-	-	-	-
IND_02: 2017 (2)	-	-	-	-	-	-	-	-	-	-
IND_02: 2018 (1)	899.0	4.00	8.80	1.600	0.5600	0.0158	0.0570	592.00	6.7	14.4
IND_02: 2018 (2)	380.0	5.00	4.40	0.737	0.2450	0.0099	0.0320	271.00	3.4	14.4
IND_02: 2019 (1)	2570	10.00	2.00	4.440	1.3500	0.0780	0.1760	1420.00	7.6	32.3
IND_02: 2019 (2)	301	3.00	10.20	1.440	0.8200	0.0260	0.1000	634.00	6.8	9.3
IND_02: 2020 (1)	1040	3.00	5.20	1.410	0.6200	0.0230	0.0590	730.00	7.0	71.8
IND_02: 2020 (2)	225	2.00	4.00	0.810	0.3000	0.0080	0.0300	248.00	6.2	32.3
IND_02: 2021 (1)	-	-	-	-	-	-	-	-	-	-
IND_02: 2021 (2)	-	-	-	-	-	-	-	-	-	-
IND_02 Median	639.5	3.50	4.80	1.425	0.5900	0.0194	0.0580	613.00	6.8	23.3

Evaluation: The MS4 enters monitoring results into a local spreadsheet, stores analysis reports for safe record, and analyzes the data using the following Scoring Matrix (Matrix) and protocol to interpret,

evaluate, and communicate the results. The Matrix includes scores ranging from 0 to 4-points, representing a set increase from EPA benchmarks provided in previous MS4 General Permits.

Table 8.4.3: Stormwater Reference Site from MDEQ and EPA

Site	TSS mg/L	Oil & Grease mg/L	Total Nitro. mg/L	Phosp. mg/L	Zinc mg/L	Lead mg/L	Copper mg/L	COD mg/L	pH
Reference	125	10	2	0.4100	0.2100	0.1650	0.0400	80	6 to 9

Example: The TSS Benchmark is 125 mg/L. As such, the 3-Point range is two times that amount (250), the 2-Point range is three times that amount (375), etc.

Table 8.4.4: Urban Runoff Monitoring: Scoring Matrix

Parameter	4-Points	3-Points	2-Points	1-Point	0-Points
TSS (mg/L)	0 – 125	126 - 250	251 - 375	376 - 500	> 500
Oil and Grease (mg/L)	0 - 10	11 - 20	21 - 30	31 - 40	> 41
Total Nitrogen (mg/L)	0 - 2.0	2.1 - 4.0	4.1 - 6.0	6.1 - 8.0	> 8.0
Phosphorus (mg/L)	0 - .41	.42 - .82	.83 - 1.23	1.24 - 1.65	> 1.65
Zinc (mg/L)	0 - .20	.21 - .40	.41 - .60	.61 - .80	> .80
Lead (mg/L)	0 - .10	.11 - .20	.21-.30	.31 - .40	> .40
Copper(mg/L)	0 - .04	.041 - .08	.081 - .12	.121 - .160	> .160
COD	0 - 80	81 - 160	161 - 240	241 – 320	> 320
PH (High End)	7.6 - 9.0	9.1 - 10.0	10.1 - 11.0	11.1 -12.0	12.1 - 14.0
PH (Low End)	6.0 - 7.5	5.0 - 5.9	4.0 - 4.9	3.0 - 3.9	1.0 - 3.0

The MS4 relates results to the Matrix and then populate the appropriate Urban Runoff Monitoring charts with the corresponding point totals.

Example: A 2018 RES_01 sample contained 135 mg/L of TSS. The MS4 assigns and populates the Urban Runoff Monitoring: RES_01 chart TSS box with 3-points. The same approach applies to all sites and parameters.

Table 8.4.5: Urban Runoff Monitoring: RES_01

Parameter	2018		2019		2020		2021	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
TSS	1	4	0	3	0	4	-	-
Oil and Grease	4	4	4	4	4	4	-	-
Total Nitrogen	0	3	0	2	0	3	-	-
Phosphorus	0	3	0	3	0	3	-	-
Zinc	3	4	0	3	1	4	-	-
Lead	4	4	3	4	4	4	-	-
Copper	4	4	0	4	3	4	-	-
COD	0	3	0	1	0	0	-	-
PH	4	4	4	4	4	4	-	-
Event Points:	20	33	11	28	16	30	-	-
Annual Points:	53		39		46		-	

Table 8.4.6: Urban Runoff Monitoring: IND_01								
Parameter	2018		2019		2020		2021	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
TSS	0	2	0	2	0	2	-	-
Oil and Grease	3	4	4	4	4	4	-	-
Total Nitrogen	0	3	2	0	0	2	-	-
Phosphorus	0	3	0	2	0	2	-	-
Zinc	0	4	0	0	0	0	-	-
Lead	4	4	4	4	3	4	-	-
Copper	3	4	0	3	0	3	-	-
COD	0	2	0	0	0	0	-	-
PH	4	4	4	4	4	4	-	-
Event Points:	14	30	14	19	11	21	-	-
Annual Points:	44		33		32		-	

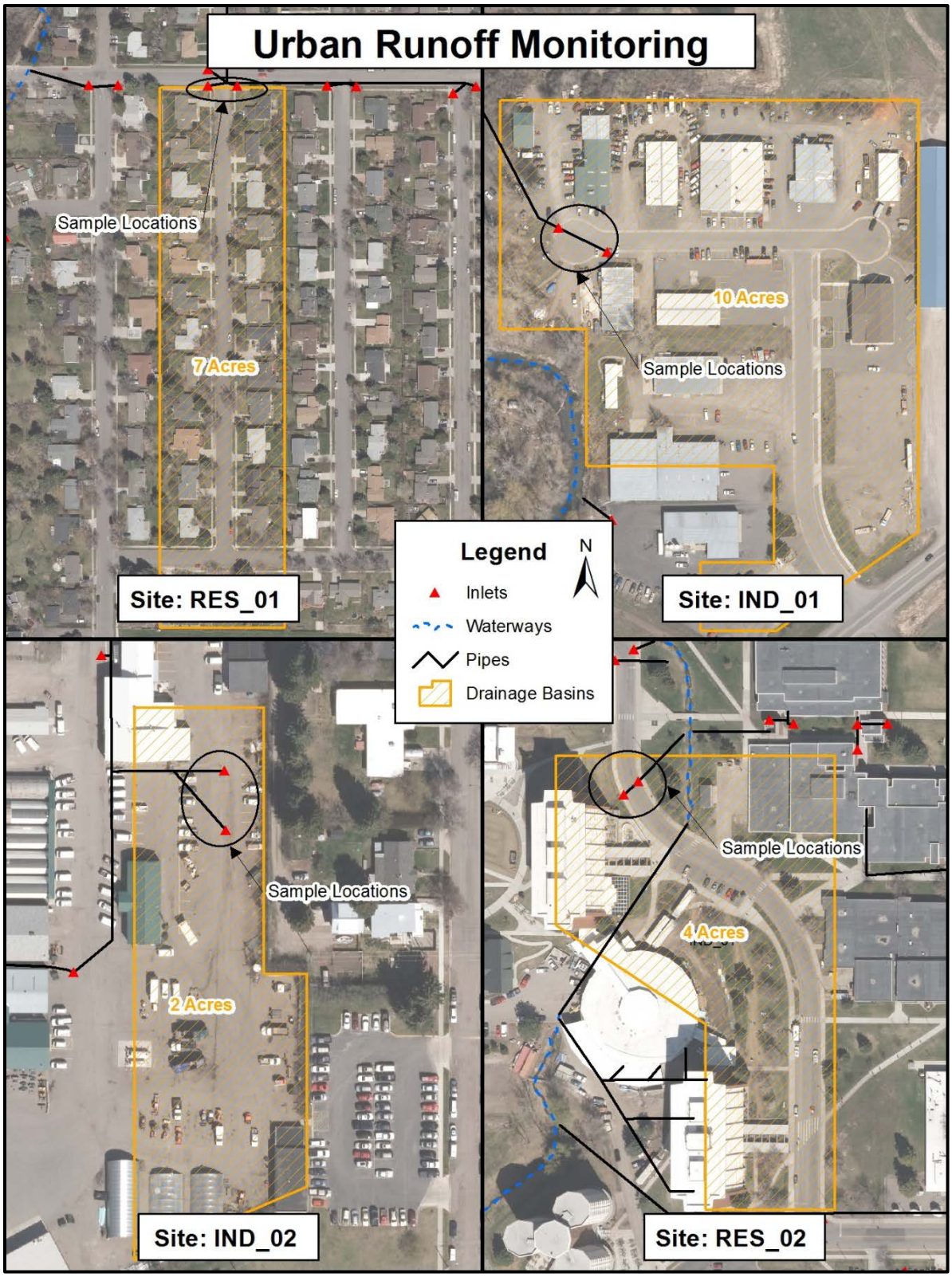
Table 8.4.7: Urban Runoff Monitoring: RES_02								
Parameter	2018		2019		2020		2021	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
TSS	0	3	0	0	0	3	-	-
Oil and Grease	3	4	4	4	4	4	-	-
Total Nitrogen	0	3	0	0	0	1	-	-
Phosphorus	0	3	0	0	0	3	-	-
Zinc	1	3	2	1	2	3	-	-
Lead	1	4	4	4	4	4	-	-
Copper	2	4	2	2	3	4	-	-
COD	0	2	0	0	0	0	-	-
PH	4	4	4	4	4	4	-	-
Event Points:	11	30	16	15	17	26	-	-
Annual Points:	41		31		43		-	

Table 8.4.8: Urban Runoff Monitoring: IND_02								
Parameter	2018		2019		2020		2021	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
TSS	0	1	0	2	0	3	-	-
Oil and Grease	4	4	4	4	4	4	-	-
Total Nitrogen	0	2	4	0	2	3	-	-
Phosphorus	1	3	0	1	1	3	-	-
Zinc	2	3	0	0	1	3	-	-
Lead	4	4	4	4	4	4	-	-
Copper	3	4	0	2	3	4	-	-
COD	0	1	0	0	0	1	-	-
PH	4	1	4	4	4	4	-	-
Event Points:	18	23	16	17	19	29	-	-
Annual Points:	41		33		48		-	

The MS4 sums the individual scores to obtain an Event Point Total, sums both Event Scores to obtain an Annual Point Total, and calculates a Final Score by transferring and summing the Annual Points in the Urban Runoff Monitoring: Results chart. Finally, the MS4 divides the Total Points by the Possible Points to calculate the Final Score and transfers the Final Score to SWMP Section 8.8.

Table 8.4.9: Urban Runoff Monitoring: Results

Sites	2018	2019	2020	2021
RES_01 Annual Points	53	39	46	-
IND_01 Annual Points	44	33	32	-
RES_02 Annual Points	41	31	43	-
IND_02 Annual Points	41	33	48	-
Total Points:	179	136	169	-
Possible Points:	288	288	288	288
Final Score (decimal):	.62	.47	.59	-



Graphic 8.4.10: Urban Runoff Monitoring Map

8.5 In-Stream Wet-Weather Monitoring

Introduction: The MS4 conducts In-Stream Wet-Weather Monitoring to analyze the impacts of urban runoff to Bozeman and Mandeville Creeks during wet weather. Combined, the Creeks receive urban runoff from over 1,700 acres of dense development at over 100 individual discharge points or outfalls. Non-point source pollution sources exist upstream of the MS4 as identified in the Lower Gallatin Planning Area TMDL. This approach allows the MS4 to take sole responsibility for and mitigate the impacts stemming from urban runoff.

Sites: The MS4 monitors two (2) locations on Bozeman Creek and two (2) locations on Mandeville Creek. Each Creek has one (1) station upstream and one (1) downstream of the MS4 boundary. Sample sites include:

1. Site: UPS_01
   - Location: Bozeman Creek upstream of MS4, near Kagy Blvd.
   - Latitude: 45.657248
   - Longitude: -111.028584
   - Parameters: TSS, COD, TP, TN, pH, Copper, Lead, Zinc, Oils and Greases, and Flow
   - Frequency: Two (2) samples per year
2. Site: DWS_01
   - Location: Bozeman Creek downstream of MS4, near Gold Ave.
   - Latitude: 45.699668
   - Longitude: -111.027347
   - Parameters: TSS, COD, TP, TN, pH, Copper, Lead, Zinc, Oils and Greases, and Flow
   - Frequency: Two (2) samples per year
3. Site: UPS_02
   - Location: Mandeville Creek upstream of MS4, near Campus Blvd.
   - Latitude: 45.656506
   - Longitude: -111.05803
   - Parameters: TSS, COD, TP, TN, pH, Copper, Lead, Zinc, Oils and Greases, and Flow
   - Frequency: Two (2) samples per year
4. Site: DWS_02
   - Location: Mandeville Creek downstream of MS4, near E. Baxter Ln.
   - Latitude: 45.697742
   - Longitude: -111.051959
   - Parameters: TSS, COD, TP, TN, pH, Copper, Lead, Zinc, Oils and Greases, and Flow
   - Frequency: Two (2) samples per year

Methods: The MS4 collects in-stream samples using Thermo-Scientific Nalgene Samplers (Sampler). Before rain events, Staff mounts each Sampler to a metal post driven into the creek bed and positions it to collect a sample as soon as the water levels rise one-half to three-quarters of an inch. The Sampler closes itself and does not allow additional collection or dilution of the original sample once full.

Analysis: The MS4 collects, transfers, packages, and ships samples to a certified laboratory, which analyzes the following parameters:

1. Total Suspended Solids, mg/L

2. Chemical Oxygen Demand, mg/L
3. Total Nitrogen, mg/L
4. Total Phosphorus, mg/L
5. Copper, mg/L
6. Lead, mg/L
7. Zinc, mg/L
8. Oils and Greases, mg/L
9. pH, standard units

The MS4 determines Bozeman Creek's stream-flow using real-time data collected from the Bozeman Creek gaging station. The MS4 estimates flow for Mandeville Creek using historical data collected by Gallatin Local Water Quality District, since no permanent gauging station exists.

Table 8.5.1: In-Stream Wet-Weather Monitoring Results * Reporting Limit (RL)									
Site	**TSS mg/L**	**Oil & Grease mg/L**	**Total Nitro. mg/L**	**Phosp. mg/L**	**Zinc mg/L**	**Lead mg/L**	**Copper mg/L**	**COD mg/L**	**pH**
UPS_01: 2017 (1)	7	5.80 RL	0.41	0.085	0.0054	0.0005	0.0036	11.6	8.2
UPS_01: 2017 (2)	14	1.00 RL	0.50 RL	0.022	0.0100 RL	0.0010 RL	0.0050 RL	15.0	8.1
UPS_01: 2018 (1)	14	1.00 RL	0.50 RL	0.052	0.0100 RL	0.0010 RL	0.0050 RL	10.0	8.1
UPS_01: 2018 (2)	10 RL	1.00 RL	0.60	0.028	0.0090	0.003 RL	0.0020 RL	5.0	8.3
UPS_01: 2019 (1)	30	7.60 RL	2.79	0.147	0.0505	0.0010 RL	0.0017	9.0	7.7
UPS_01: 2019 (2)	72	1.00 RL	1.60	0.160	0.0300	0.0010 RL	0.0050 RL	5.0 RL	8.2
UPS_01: 2020 (1)	74	1.00 RL	0.50 RL	0.260	0.0200	0.0010 RL	0.0050 RL	26.0	8.1
UPS_01: 2020 (2)*	14	1.00	0.50	0.085	0.0100	0.0010	0.0050	10.0	8.1
UPS_01: 2021 (1)	-	-	-	-	-	-	-	-	-
UPS_01: 2021 (2)	-	-	-	-	-	-	-	-	-
UPS_01 Median	14	1.00	0.50	0.085	0.0100	0.0010	0.0050	10.0	8.1
UPS_02: 2017 (1)	-	-	-	-	-	-	-	-	-
UPS_02: 2017 (2)	-	-	-	-	-	-	-	-	-
UPS_02: 2018 (1)	185	1.00 RL	3.10	0.430	0.0330	0.0027	0.0060	49.0	8.2
UPS_02: 2018 (2)	53	1.00 RL	0.50 RL	0.081	0.0180	0.0004	0.0020	16.0	8.1
UPS_02: 2019 (1)	10	6.8 RL	0.74	0.153	0.0422	0.0010 RL	0.0034	6.0	7.9
UPS_02: 2019 (2)	30	1.00 RL	0.80	0.144	0.0300	0.0010 RL	0.0050 RL	5.0	8.1
UPS_02: 2020 (1)	16	1.00 RL	0.80	0.080	0.0100 RL	0.0010 RL	0.0050 RL	11.0	8.3
UPS_02: 2020 (2)	10 RL	1.00 RL	0.60	0.066	0.0200	0.0010 RL	0.0050 RL	5.0	8.4
UPS_02: 2021 (1)	-	-	-	-	-	-	-	-	-
UPS_02: 2021 (2)	-	-	-	-	-	-	-	-	-
UPS_02: Median	23	1.00	0.77	0.113	0.0250	0.0010	0.0050	8.50	8.2
DWS_01: 2017 (1)	10	5.40 RL	0.55	0.088	0.0070	0.0006	0.0036	15.3	8.2
DWS_01: 2017 (2)	134	1.00 RL	1.80	0.264	0.0300	0.0060	0.0060	42.0	8.1
DWS_01: 2018 (1)	34	1.00 RL	0.50 RL	0.082	0.0100 RL	0.0010 RL	0.0005 RL	18.0	8.1
DWS_01: 2018 (2)	17	1.00 RL	0.70	0.057	0.0220	0.0007	0.0002 RL	14.0	8.3
DWS_01: 2019 (1)	100	7.00	3.00	0.238	0.1100	0.0021	0.0045	13.0	7.9
DWS_01: 2019 (2)	350	1.00 RL	3.40	0.645	0.1400	0.0140	0.0210	94.0	8.2
DWS_01: 2020 (1)	58	1.00 RL	0.50 RL	0.141	0.0300	0.0030	0.0050	28.0	8.2
DWS_01: 2020 (2)*	58	1.0	0.70	0.141	0.0300	0.0021	0.0050	18.00	8.2
DWS_01: 2021 (1)	-	-	-	-	-	-	-	-	-
DWS_01: 2021 (2)	-	-	-	-	-	-	-	-	-
DWS_01: Median	58	1.00	0.70	0.141	0.0300	0.0021	0.0050	18.00	8.2
DWS_02: 2017 (1)	-	-	-	-	-	-	-	-	-
DWS_02: 2017 (2)	-	-	-	-	-	-	-	-	-
DWS_02: 2018 (1)	297	1.00 RL	2.80	0.368	0.0700	0.0168	0.0150	53.0	8.2
DWS_02: 2018 (2)	43	1.00 RL	0.80	0.102	0.0280	0.0026	0.0030	18.0	8.2
DWS_02: 2019 (1)	1180	6.80	3.38	1.340	0.1240	0.0222	0.0173	123.0	8.0
DWS_02: 2019 (2)	84	1.00 RL	2.00	0.235	0.0500	0.0040	0.0050 RL	7.0	8.3
DWS_02: 2020 (1)	190	1.00 RL	2.40	0.365	0.0700	0.0100	0.0130	63.0	8.1
DWS_02: 2020 (2)	68	1	2.10	0.191	0.0400	0.0030	0.0080	63.0	8.1
DWS_02: 2021 (1)	-	-	-	-	-	-	-	-	-
DWS_02: 2021 (2)	-	-	-	-	-	-	-	-	-
DWS_02 Median	137	1.00	2.25	0.300	0.0600	0.0070	0.0105	37.00	8.2

* *Unable to obtain sample during the 7/1/2020 - 12/31/2020 timeframe. Additional samples will be collected in 2021, as per MS4 Permit Part IV.6.b. Median concentrations used to calculate 2020 Report Card Grade.*

Evaluation: The MS4 enters data into a local spreadsheet and stores analysis reports for a safe record upon receipt. Further, the MS4 analyzes the data using the following Scoring Matrix (Matrix) and protocol to interpret, evaluate, and communicate the results. The Matrix includes points ranging from 0 to 4-points, which relate to the percent change of pollutants between the upstream and downstream sites.

Example: A percent change of 0-20% equals 4-points, 21-40% equals 3-points, 41-60% equals 2-points, 61-80% equals 1-point, and 81- >100% equals 0-points.

Percent change is determined using the following formula:

$$\% \triangle = ((Y_2 - Y_1) / Y_1) * 100 \qquad \text{Equation 2}$$

For example, TSS: ((200-150)/150) x 100 = 33.3%, resulting in a score of 3-points.

Table: 8.5.2: In-Stream Wet-Weather Monitoring: Scoring Matrix

Parameter	4-Points	3-Points	2-Points	1-Point	0-Points
TSS (% △)	(<0) – (20)	(21) – (40)	(41) – (60)	(61) – (80)	(81) – (>100)
Oil/Grease (% △)	(<0) – (20)	(21) – (40)	(41) – (60)	(61) – (80)	(81) – (>100)
Total Nitrogen (% △)	(<0) – (20)	(21) – (40)	(41) – (60)	(61) – (80)	(81) – (>100)
Phosphorus (% △)	(<0) – (20)	(21) – (40)	(41) – (60)	(61) – (80)	(81) – (>100)
Zinc (% △)	(<0) – (20)	(21) – (40)	(41) – (60)	(61) – (80)	(81) – (>100)
Lead (% △)	(<0) – (20)	(21) – (40)	(41) – (60)	(61) – (80)	(81) – (>100)
Copper (% △)	(<0) – (20)	(21) – (40)	(41) – (60)	(61) – (80)	(81) – (>100)
COD (% △)	(<0) – (20)	(21) – (40)	(41) – (60)	(61) – (80)	(81) – (>100)
PH (% △)	(<0) – (20)	(21) – (40)	(41) – (60)	(61) – (80)	(81) – (>100)

The MS4 relates results to the Matrix and then populates the appropriate Urban Runoff Monitoring charts with the corresponding scores.

Example: A 2018 Bozeman Creek UPS_01 and DWS_01 TSS percent change equaled 35%. The MS4 assigns and populates the In-Stream Wet-Weather Monitoring: Bozeman Creek UPS_01 and DWS_01 chart TSS box with 3-points. The same approach applies to all sites and parameters.

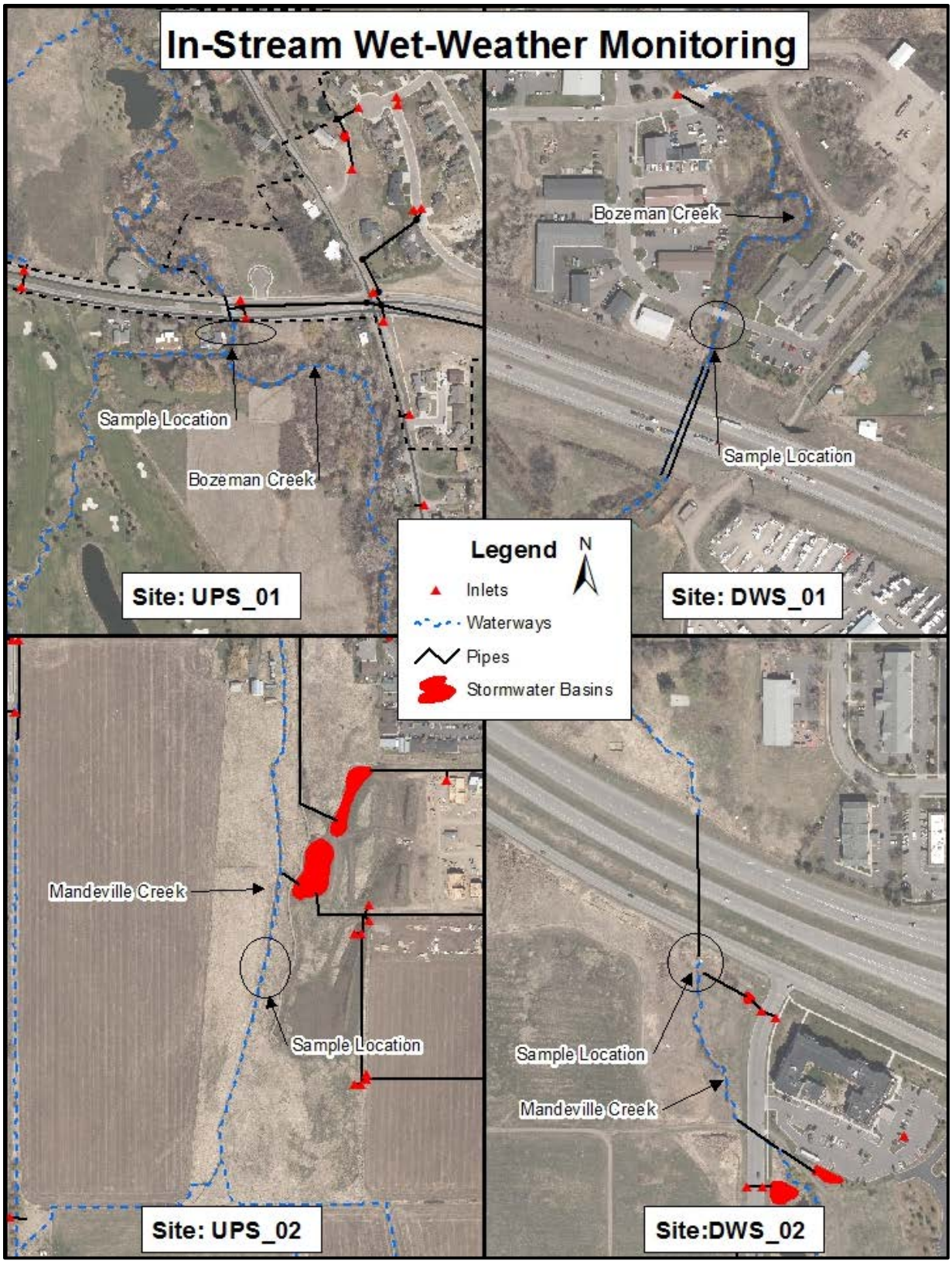
Table 8.5.3: In-Stream Wet-Weather Monitoring: Bozeman Creek UPS_01 and DWS_01

Parameter	2018		2019		2020		2022	
	Event 1	Event 2	Event 1	Event 2	Event 1	Event 2	Event 1	Event 2
TSS	0	1	0	0	4	0	-	-
Oil and Grease	4	4	4	4	4	4	-	-
Total Nitrogen	4	4	4	0	4	3	-	-
Phosphorus	2	0	1	0	4	1	-	-
Zinc	4	0	0	0	2	0	-	-
Lead	4	0	0	0	0	0	-	-
Copper	4	4	0	0	4	4	-	-
COD	2	0	2	0	4	1	-	-
PH	4	4	4	4	4	4	-	-
Event Points:	28	17	15	8	30	17	-	-
Annual Points:	45		23		47		-	

Table 8.5.4: In-Stream Wet-Weather Monitoring: Mandeville Creek UPS_02 and DWS_02								
Parameter	2018		2019		2020		2022	
	Event 1	Event 2	Event 1	Event 2	Event 1	Event 2	Event 1	Event 2
TSS	1	4	0	0	0	0	-	-
Oil and Grease	4	4	4	4	4	4	-	-
Total Nitrogen	4	2	0	0	0	0	-	-
Phosphorus	4	3	0	1	0	0	-	-
Zinc	0	2	0	1	0	0	-	-
Lead	0	0	0	0	0	0	-	-
Copper	0	2	0	0	0	2	-	-
COD	4	4	0	3	0	0	-	-
PH	4	4	4	4	4	4	-	-
Event Points:	21	25	8	13	8	10	-	-
Annual Points:	46		21		18		-	

The MS4 sums the individual scores to obtain an Event Point Total, sums both Event Scores to obtain an Annual Point Total, and calculates a Final Score by transferring and summing the Annual Points in the In-Stream Wet-Weather Monitoring: Results chart. Finally, the MS4 divides the Total Points by the Possible Points. The MS4 transfers the Final Score to SWMP Section 8.8.

Table 8.5.5: In-Stream Wet-Weather Monitoring: Results				
Parameter	2018	2019	2021	2022
Bozeman Creek Annual Points	45	23	47	-
Mandeville Creek Annual Points	46	21	18	-
Total Points:	91	44	65	-
Possible Points:	144	144	144	144
Final Score (decimal):	.63	.31	.45	-



Graphic 8.5.6: In-Stream Wet-Weather Monitoring Map

8.6 Sediment Reduction Monitoring

Introduction: The MS4 conducts Sediment Reduction Monitoring to comply with the Montana DEQ's sediment load reduction requirements detailed in the 2013 Lower Gallatin Planning Area TMDL. The MS4 tracks tons captured in BMPs detailed in SWMP Section 2.3 and SWMP Section 2.4.

Table: 8.6.1: Bozeman Creek Sediment Waste Load Reduction

Sediment Source	Estimated Load	Waste Load Allocation	Required Load Reduction	Load Reduction
MS4	218 tons/year	137 tons/year	37%	81 tons/year **DEQ Imposed**

Table 8.6.2: Mandeville Creek Sediment Waste Load Reduction

Sediment Source	Estimated Load	Waste Load Allocation	Required Load Reduction	Load Reduction
MS4	None	None	None	10 tons/year **Self Imposed**

Sites: Stormwater treatment units described in SWMP Section 2.5.

Methods: Measurement process described in SWMP Section 2.5.

Analysis: The MS4 analyzes the following parameter:

- Total Sediment Captured (tons)

Evaluation: The MS4 enters data into a local spreadsheet for safe record upon receipt. Further, the MS4 incorporates the data into the following Scoring Matrix (Matrix) to interpret, evaluate, and communicate the results. The Matrix includes scores ranging from 0 to 4-points, which relate to total annual sediment capture. For example, a load reduction for Bozeman Creek of ≥ 81 tons equals 4-points, 60 – 80 tons equals 3-points, 40 – 59 tons equals 2-points, 20 – 39 tons equals 1-point, and 0 – 19 equals 0-points.

Table 8.6.3: Sediment Reduction Monitoring: Scoring Matrix (Bozeman Creek)

Parameter	4-Points	3-Points	2-Points	1-Point	0-Points
Sediment Captured (tons)	≥81	60 – 80	40 – 59	20 – 39	0 – 19

Table 8.6.4: Sediment Reduction Monitoring: Scoring Matrix (Mandeville Creek)

Parameter	4-Points	3-Points	2-Points	1-Point	0-Points
Sediment Captured (tons)	≥10	7.5 – 9.9	5.0 – 7.4	2.5 – 4.9	0 – 2.4

Results: The MS4 relates results to the Matrix and then populate the Sediment Reduction Monitoring: Results chart with the corresponding scores. The MS4 weighs Bozeman Creek more heavily than Mandeville Creek because of DEQ's imposed reduction requirements.

- 2018 Totals:
  - Bozeman Creek: 45.7 tons
  - Mandeville Creek: 1.0 tons
- 2019 Totals:
  - Bozeman Creek: 44.8 tons
  - Mandeville Creek: 5.8 tons

- 2020 Totals:
    - Bozeman Creek: 41 tons
    - Mandeville Creek: 8 tons

The MS4 calculates a Final Score by summing the weighted Annual Points in the Sediment Reduction Monitoring: Results chart and dividing by the Possible Points to calculate the Final Score. Finally, the MS4 transfers the Final Score to SWMP Section 8.8.

Table 8.6.5: Sediment Reduction Monitoring: Results

Waterway	2018	2019	2021	2022
Bozeman Creek Annual Points	(2) x (1.5) = 3	(2) x (1.5) = 3	(2) x (1.5) = 3	-
Mandeville Creek Annual Points	(0) x (.5) = 0	(2) x (.5) = 1	(3)x (.5) = 1.5	-
Total Points:	3	4	4.5	-
Possible Points:	8	8	8	8
Final Score (decimal):	0.38	0.50	0.56	-

8.7 Long-Term Trend Monitoring

Introduction: Aquatic macroinvertebrate assemblages respond predictably to sedimentation by shifting from sediment-intolerant to sediment-tolerant taxa. Changes in macroinvertebrate assemblages are quantified using the Observed:Expected (O:E) ratio biological index model, which compares the observed taxa at a site with the expected taxa that would be present at a site under a variety of environmental conditions. Using the percent difference in O:E ratios between upstream and downstream sites the MS4 is able to assess stormwater discharge impacts to macroinvertebrate assemblages. A positive percent difference in O:E ratios indicate that stormwater discharges are not negatively impacting macroinvertebrate community assemblages. Conversely, negative percent differences in O:E ratios indicate that stormwater discharges are negatively impacting macroinvertebrate community assemblies. Sedimentation affects macroinvertebrates community assemblages by:

- Filling interstitial voids in gravel substrate
- Reducing gravel attachment sites
- Altering stream morphology
- Increasing stream temperature

Sites: The MS4 monitors benthic macroinvertebrates on Bozeman and Mandeville Creeks at the In-Stream Wet-Weather Monitoring Sites (SWMP Section 8.5).

Methods: The MS4 derives macroinvertebrate biological index monitoring protocols from MDEQ Sample Collection, Sorting, and Taxonomic Identification of Benthic Macroinvertebrate Communities Standard Operating Procedures (*one sample taken per location per year*).

Analysis: The MS4 collects and preserves macroinvertebrate samples and then delivers to an accredited lab, which completes the analysis of the following parameters:

- Taxonomic Sorting and Identification
- Species Abundance
- Species Diversity
- Observed / Expected Ratios
- Percentage of Sediment Tolerant Species

Upon receiving macroinvertebrate analysis results, the MS4 enters the calculated O:E ratios in the table below and then calculates the percent change between upstream and downstream sites.

Graphic 8.7.1: Monitoring Results: UPS_01 & DWS_01			
Year	**O:E Ratio: UPS_01**	**O:E Ratio: DWS_01**	**O:E Ratio (% △)**
2018	0.20	0.37	+85%
2019	0.33	0.20	-39%
2020	0.29	0.33	+14%
2021	-	-	-

Table 8.7.2: Monitoring Results: UPS_02 & DWS_02			
Year	**O:E Ratio: UPS_02**	**O:E Ratio: DWS_02**	**O:E Ratio (% △)**
2018	0.29	0.16	-45%
2019	0.29	0.25	-14%
2020	0.12	0.20	+67%
2021	-	-	-

Evaluation: The MS4 enters data into a local spreadsheet and stores analysis reports for a safe record upon receipt. Further, the MS4 analyzes the data using the following Scoring Matrix and protocol to interpret, evaluate, and communicate the results. The Scoring Matrix includes scores from 0 to 4-points, which relate to percent change in O:E ratios between the upstream and downstream sites for each creek.

Example: An O:E ratio percent change of 0-(-20%) equals 4-points,- 21-(-40%) equals 3-points,- 41-(-60%) equals 2- points, -61-(-80%) equals 1-point, and >-80% equals 0-points.

Percent change is determined using *Equation 2* found in SWMP Section 8.3.

Example: An upstream Bozeman Creek sample has an O:E ratio of 1.1, and the downstream sample has an O:E ratio of 0.8. The MS4 finds the difference and divides by the original to arrive at a percentage ((0.8 - 1.1)/1.1) x 100 = -30%, resulting in a score of 3-points.

Table 8.7.3: Long-Term Trend Monitoring: Scoring Matrix					
O:E Ratio	**4-Points**	**3-Points**	**2-Points**	**1-Point**	**0-Points**
O:E Ratio (% △)	>0 – (-20)	-21 – (-40)	-41 – (-60)	-61 – (-80)	-81 – (-100)

The MS4 relates results to the Matrix and then populates the Long-Term Trend Monitoring: Results chart with the corresponding scores, and calculates a Final Score by summing the Event Points in the Long-Term Trend Monitoring: Results chart and dividing by the Possible Points. Finally, the MS4 transfers the Final Score to SWMP Section 8.8.

Table 8.7.4: Long-Term Trend Monitoring: Results				
Waterway	**2018**	**2019**	**2020**	**2021**
Bozeman Creek Event Points	4	3	4	-
Mandeville Creek Event Points	2	4	4	-
Total Points:	6	7	8	-
Possible Points:	8	8	8	-
Final Score (decimal):	.75	0.88	1.0	-

8.8 Evaluation

The MS4 calculates a Final Grade to determine the overall effectiveness of its programs and initiatives detailed in SWMP Section 1.0 to 7.0 by transferring scores from each protocol (SWMP Sections 8.4 - 8.7) to the Programmatic Evaluation: Final Points chart, and utilizes a weighted sum calculation to make the four scores comparable.

Table 8.8.1: Programmatic Evaluation: Final Points (2018)

Evaluation Type	Final Scores	Weight	Weighted Total	Weighted Total (%)
Urban Runoff Monitoring	.62	.25	.155	15.5%
In-Stream Wet-Weather Monitoring	.63	.25	.16	16.0%
Sediment Reduction Monitoring	.38	.25	.10	10.0%
Stream Health Monitoring	.75	.25	.19	19.0%
			Final Weighted Total (%):	60.5%

Table 8.8.2: Programmatic Evaluation: Final Points (2019)

Evaluation Type	Final Scores	Weight	Weighted Total	Weighted Total (%)
Urban Runoff Monitoring	0.47	.25	0.1175	11.75%
In-Stream Wet-Weather Monitoring	0.31	.25	0.0775	7.75%
Sediment Reduction Monitoring	0.50	.25	0.1250	12.50%
Stream Health Monitoring	0.88	.25	0.2200	22.00%
			Final Weighted Total (%):	54.0%

Table 8.8.3: Programmatic Evaluation: Final Points (2020)

Evaluation Type	Final Scores	Weight	Weighted Total	Weighted Total (%)
Urban Runoff Monitoring	0.59	.25	0.1475	14.75%
In-Stream Wet-Weather Monitoring	*0.45	.25	*0.1125	11.25%
Sediment Reduction Monitoring	0.56	.25	0.1400	14.00%
Stream Health Monitoring	1.0	.25	0.25	25.00%
			Final Weighted Total (%):	65.0%

Table 8.8.4: Programmatic Evaluation: Final Points (2021)

Evaluation Type	Final Scores	Weight	Weighted Total	Weighted Total (%)
Urban Runoff Monitoring	-	.25	-	-
In-Stream Wet-Weather Monitoring	-	.25	-	-
Sediment Reduction Monitoring	-	.25	-	-
Stream Health Monitoring	-	.25	-	-
			Final Weighted Total (%):	-

The MS4 relates the Final Weighted Total (%) to the following equally distributed ranges (100-percent scale) and their associated Final Grades, and populates the Stormwater Report Card with a Final Grade for the corresponding year.

Table 8.8.5: Grading Matrix

Grade	A	B	C	D	F
Score (%)	90 - 100%	80 - 89%	70 - 79%	60 - 69%	0 - 59%

Table 8.8.6: Stormwater Report Card

2018 Final Grade	2019 Final Grade	2020 Final Grade	2021 Final Grade
D	**F**	**D**	**-**
61%	**54%**	**65%**	

The MS4 utilizes its empirical knowledge, performance measures, and data to continually evaluate and optimize its programmatic workloads detailed in this SWMP. Also, the MS4 compares its Final Grades to the criteria below and, as necessary, works to implement the following improvement strategies:

1. Grade = A: No stormwater impact on receiving waters, allowing for a continuation of administrative programs and reduction of TMDL Action Plan investment to maintain grade.
2. Grade = B: Low stormwater impact to receiving waters, requiring continuation of administrative programs and TMDL Action Plan investment to increase grade.
3. Grade = C: Moderate stormwater impact on receiving waters, requiring an expansion of administrative programs and continuation of TMDL Action Plan investment to increase grade.
4. Grade = D: Significant stormwater impact on receiving waters, requiring an expansion of administrative programs and TMDL Action Plan investment to increase grade.
5. Grade = F: Major stormwater impact on receiving waters, reassessment of administrative programs and TMDL Action Plan investment strategy required.

8.9 Discussion

1. 2017 Result: The MS4 did not document sampling efforts using the scoring matrices described above because Staff had not developed the evaluation. Implementation begins with the first sampling event of 2018.

   Preliminary analysis of available 2017 data indicates that the developed evaluation methodology is effective at tracking program performance, and likely would have resulted in an F. The MS4 expects a positive trend over the MS4 Permit Term as Staff implements the content of this SWMP.

2. 2018 Results: The MS4 received a Stormater River Impact Report Card grade of D. The MS4 has analyzed data, compiled point scores, and developed strategies to improve its grade for 2019, including:

   - <u>Residential Urban Runoff Monitoring</u>

- Problem Statement: Residential urban areas generally yield TSS, total nitrogen, phosphorus, and COD levels that result in suboptimal point scores. Conversely, oil, grease, zinc, lead, and copper concentrations generally result in satisfactory levels.
- Hypothesis: Grass clippings are primarily responsible for elevated levels of TSS, total nitrogen, phosphorus, and COD.
- Rationale: Elevated pollutant levels coincide directly with the growing season, providing justification for the MS4's hypothesis. Fall samples traditionally yield optimal point scores due to growing season subsidence. Organic matter in stormwater runoff:
    - Increases TSS concentrations
    - Increases total nitrogen and phosphorus via decomposition
    - Increases COD via organic matter decomposition
- Action Plan: Increase outreach and education program described in SWMP Section 3.0 and complete capital projects described in SWMP Section 2.3.

➢ <u>Industrial Urban Runoff Monitoring</u>

- Problem Statement: Industrial urban areas generally yield TSS, total nitrogen, phosphorus, zinc, lead, copper, and COD levels that result in suboptimal point scores. Conversely, oil and grease concentrations generally result in satisfactory levels.
- Hypothesis: Gravel parking lots, outdoor equipment storage, and heavy commercial traffic are primarily responsible for elevated levels of TSS, total nitrogen, phosphorus, zinc, copper, lead, and COD.
- Rationale: The MS4 documented these pollutant generating activities and site conditions at both industrial monitoring areas, resulting in:
    - Increased offsite TSS migration (TSS adsorbs and transports pollutants)
    - Increased nutrient levels originating from erosive landscapes
    - Increased metal levels from corrosion, combustion, and brake-dust
    - Increase COD levels via organic and inorganic particle decomposition
- Action Plan: Enforce development regulations described in SWMP Section 6.0, construct capital projects described in SWMP Section 2.3, maintain good housekeeping performance levels described in SWMP Section 7.0, and implement the outreach and education program described in SWMP Section 3.0.

➢ <u>Instream Wet-Weather Monitoring</u>

- Problem Statement: Instream wet-weather samples generally yield TSS, total nitrogen, phosphorus, zinc, lead, copper, and COD levels that result in suboptimal point scores. Conversely, oil and grease concentrations generally result in satisfactory levels.
- Hypothesis: Stormwater discharges from urban areas with a direct connection to aquatic systems negatively affect instream water quality.
- Rationale: Documented increases in pollutant levels between all upstream and downstream instream-monitoring locations, resulting from developments constructed pre-1980 lacking on-site stormwater treatment.
- Action Plan: Enforce development regulations described in SWMP Section 6.0, construct capital projects described in SWMP Section 2.3 and implement administrative programs described in SWMP Sections 3.0, 4.0, 5.0, 6.0, and 7.0.

- Sediment Reduction Monitoring
    - Problem Statement: Remove 81 tons/year of sediment from stormwater discharges to Bozeman Creek and 10 tons/year to Mandeville Creek.
    - Hypothesis: Achieve MDEQ and self-imposed sediment reduction requirements by 2023.
    - Rationale: Quantified sediment removal totals by treatment units as detailed in SWMP Section 2.5 and calculated sediment-loading totals of 0.14 tons/acre.
    - Action Plan: Continue TMDL Action Plan described in SWMP Section 2.2, construct capital projects described in SWMP Section 2.3, and maintain utility operations goals described in SWMP Section 7.0.
- Long-Term Trend Monitoring
    - Problem Statement: Macroinvertebrate O:E ratios decreased in Mandeville Creek, resulting in suboptimal point scores. Conversely, macroinvertebrate O:E ratios increased in Bozeman Creek, resulting in optimal point scores.
    - Hypothesis: Physical habitat characteristics and stream origination points impact macroinvertebrate O:E ratios in addition to stormwater discharges.
    - Rationale:
        - 85% improvement in Bozeman Creek O:E ratios between upstream and downstream sites.
        - 45% reduction in Mandeville Creek O:E ratios between upstream and downstream sites.
    - Action Plan: Continue TMDL Action Plan described in SWMP Section 2.2, construct capital projects described in SWMP Section 2.3, maintain utility operation goals described in SWMP Section 7.0, and implement administrative programs described in SWMP Sections 3.0, 4.0, 5.0, 6.0, and 7.0.

3. 2019 Results: The MS4 received a grade of F (54.0%), which is 6.5% lower than the 2018 grade. Various factors influenced this score and are further described below:
    - Residential Urban Runoff Monitoring
        - Analysis:
            - Spring Samples: Collected on April 20, 2019. Record 2019 snowfall resulted in increased traction sand application and delayed street sweeping cycles, yielding pollutant concentrations above long-term medians for TSS, Oil and Grease, Total Nitrogen, Total Phosphorous, Zinc, Lead, Copper, and COD.
            - Fall Samples: Collected on August 22, 2019. Reoccurring street sweeping and implementation of SWMP programs resulted in a reduction in the number of pollutants exceeding long-term medians. Total Nitrogen, Total Phosphorus, Zinc, and COD concentrations were above the long-term medians, likely resulting from organics, such as grass clippings.
        - Action Plan: Increase outreach and education programs described in SWMP Section 3.0, maintain good housekeeping performance levels described in SWMP Section 7.0, and complete capital projects described in SWMP Section 2.3.
    - Industrial Urban Runoff Monitoring

- Analysis:
  - ❖ Spring Samples: Collected on April 20, 2019. Record 2019 snowfall resulted in increased traction sand application and delayed street sweeping cycles, yielding pollutant concentrations above long-term medians for TSS, Oils and Grease, Total Phosphorous, Zinc, Lead, Copper, and COD.
  - ❖ Fall Samples: Collected on August 22, 2019. Reoccurring street sweeping and implementation of SWMP programs resulted in a reduction of the number of pollutants exceeding long-term medians. Total Nitrogen, Zinc, Lead, Copper, and COD concentrations were above the long-term medians, resulting from heavy commercial traffic, equipment storage, and historical development practices.
- Action Plan: Enforce development regulations described in SWMP Section 6.0, construct capital projects described in SWMP Section 2.3, maintain good housekeeping performance levels described in SWMP Section 7.0, and implement the outreach and education program described in SWMP Section 3.0.

➢ <u>Instream Wet-Weather Monitoring</u>

- Analysis:
  - ❖ Spring Samples: Collected on June 13, 2019 during a non-typical high intensity and short duration storm (greater than 1" per hour) that resulted in suboptimal percent change scores for TSS, Total Nitrogen, Total Phosphorous, Zinc, Lead, Copper, and COD. Bozeman Creek flow at the time of collection was 63 cfs (221 cfs max daily flow). Non-typical storms result in increased erosion and mobilization of pollutants.
  - ❖ Fall Samples: Collected on September 6, 2019 during low base-flow conditions that resulted in suboptimal percent change scores for TSS, Total Nitrogen, Total Phosphorous, Zinc, Lead, Copper, and COD. Bozeman Creek flow at the time of collection was 27 cfs (38 cfs max daily flow).
- Action Plan: Enforce development regulations described in SWMP Section 6.0, construct capital projects described in SWMP Section 2.3, and implement administrative programs described in SWMP Sections 3.0, 4.0, 5.0, 6.0, and 7.0.

➢ <u>Sediment Reduction Monitoring</u>

- Analysis: Sediment loading within the various treated urban basins averaged .13 tons/acre, .01 tons/acre less than the previous year. Sediment collection totals increased from 46.7 in 2018 to 50.6 tons in 2019. The MS4 installed five new treatment structures in 2019, resulting in increased sediment collection totals.
- Action Plan: Continue TMDL Action Plan described in SWMP Section 2.2, construct capital projects described in SWMP Section 2.3, and maintain utility operations goals described in SWMP Section 7.0.

➢ <u>Long-Term Trend Monitoring</u>

- Analysis: Data showed a 39% decrease in Bozeman Creek and a 14% decrease in Mandeville Creek O:E ratios. Bozeman Creek's macroinvertebrate community did not show an improvement based on the prior year's data. Mandeville Creek's macroinvertebrate community did improve based on the prior year's data. More

sampling events are required to show a trend in this data set, as two data points for each location are not adequate to assess stream health. O:E ratios for both Creek's upstream sample locations are well below the reference streams benchmark and appear to be impacted by other pollution sources originating outside of MS4 limits.

- Action Plan: Continue TMDL Action Plan described in SWMP Section 2.2, construct capital projects described in SWMP Section 2.3, maintain utility operation goals described in SWMP Section 7.0, and implement administrative programs described in SWMP Sections 3.0, 4.0, 5.0, 6.0, and 7.0.

4. 2020 Results: The MS4 received a grade of D (65%), which is 11% higher than the 2019 grade, 4% higher than the 2018 grade, and the highest score recorded to date. The increase in the score may suggest the various structural and administrative BMPs implementd in this SWMP are having a positive impact, providing justification to contiue its planned efforts. Various factors influenced this score and are further described below:

   - <u>Residential Urban Runoff Monitoring</u>
     - Analysis:
       - Spring Samples: Collected on June 24, 2020. A high intensity-short duration storm event and an abundance of grass clippings in the RES_01 sample yielded pollutant concentrations above long-term medians for TSS, Oils and Greases, Total Nitrogen, Total Phosphorous, Zinc, Lead, Copper, and COD. TSS concentration was 700% above it long-term median, likely a result of grass clippings. The RES_02 sample yielded pollutant concentrations above long-term medians for TSS, Total Nitrogen, Total Phosphorus, Zinc, and Lead. Oils and Greases, Copper, and COD concentrations were below long-term medians. High intensity - short duration storm events are known to have increased pollutant concentrations in the first flush of runoff.
       - Fall Samples: Collected on October 13, 2020. Reoccurring street sweeping and implementation of SWMP programs resulted in pollutant concentration below the long-term median for all parameters, except for COD (RES_01), which was 16.9% above the long-term median.
     - Action Plan: Increase outreach and education programs described in SWMP Section 3.0, maintain good housekeeping performance levels described in SWMP Section 7.0, and complete capital projects described in SWMP Section 2.3.
   - <u>Industrial Urban Runoff Monitoring</u>
     - Analysis:
       - Spring Samples: Collected on June 24, 2020. Gravel parking lots, metal buildings, lack of street sweeping, observed outdoor industrial operations and storage, and a high intensity – short duration storm event yielded pollutant concentrations above long-term medians for TSS, Total Nitrogen, Total Phosphorous, Zinc, Lead, Copper, and COD at IND_01. Oils and Greases concentration at IND_01 were below long-term median concentrations. IND_02 results yield pollutant concentrations above long-term medians for TSS, Total Nitrogen, Zinc, Lead, Copper, and COD, likely due to storm event characteristics and the surrounding industrial land use. Oils and Greases and

Total Phosphorus concentrations were below their long-term medians at IND_02.

- ❖ Fall Samples: Collected on October 13, 2020. Zinc was the only pollutant to exceed its long-term median at IND_01. Elevated levels of Zinc may be the result from surrounding metal buildings, lack of street sweeping, and observed outdoor industrial operations and storage. IND_01 TSS, Oils and Greases, Total Nitrogen, Total Phosphorus, Lead, Copper, and COD concentrations were all below long-term median concentrations, possibly because of the low intensity nature of the storm event sampled. Pollutant concentrations for all parameters at IND_02 were below long-term medians.

- o Action Plan: Enforce development regulations described in SWMP Section 6.0, construct capital projects described in SWMP Section 2.3, maintain good housekeeping performance levels described in SWMP Section 7.0, and implement the outreach and education program described in SWMP Section 3.0.

➢ <u>Instream Wet-Weather Monitoring</u>

- o Analysis:
  - ❖ Spring Samples: Collected on June 28, 2020 during a high intensity - short duration storm that resulted in suboptimal percent change scores for only Zinc and Lead. Bozeman Creek flow at the time of collection was 48 cfs (54 cfs max daily flow). Minimal impacts to Bozeman Creek resulting from stormwater discharges. On Mandeville Creek, the sampling event led to suboptimal point scores for all parameters except for Oils and Greases and pH. Stormwater discharges had significant impacts to Mandeville Creek.
  - ❖ Fall Samples: The MS4 was unable to collect a fall sample from UPS_01/DWS_01 due to sampling equipment malfunction at UPS_01. The long-term medians for both UPS_01 and DWS_01 were used to calculate the point score. A substitute sample will be collected as per General Permit Sec. IV.6.b. Sampling results, point score, and Report Card grade will be updated upon analysis of the substitute sample. On Mandeville Creek, the sampling event led to suboptimal point scores for all parameters except for Oils and Greases and pH. Stormwater discharges had significant impacts to Mandeville Creek.
- o Action Plan: Collect UPS_01/DWS_01 substitute samples, enforce development regulations described in SWMP Section 6.0, construct capital projects described in SWMP Section 2.3, and implement administrative programs described in SWMP Sections 3.0, 4.0, 5.0, 6.0, and 7.0.

➢ <u>Sediment Reduction Monitoring</u>

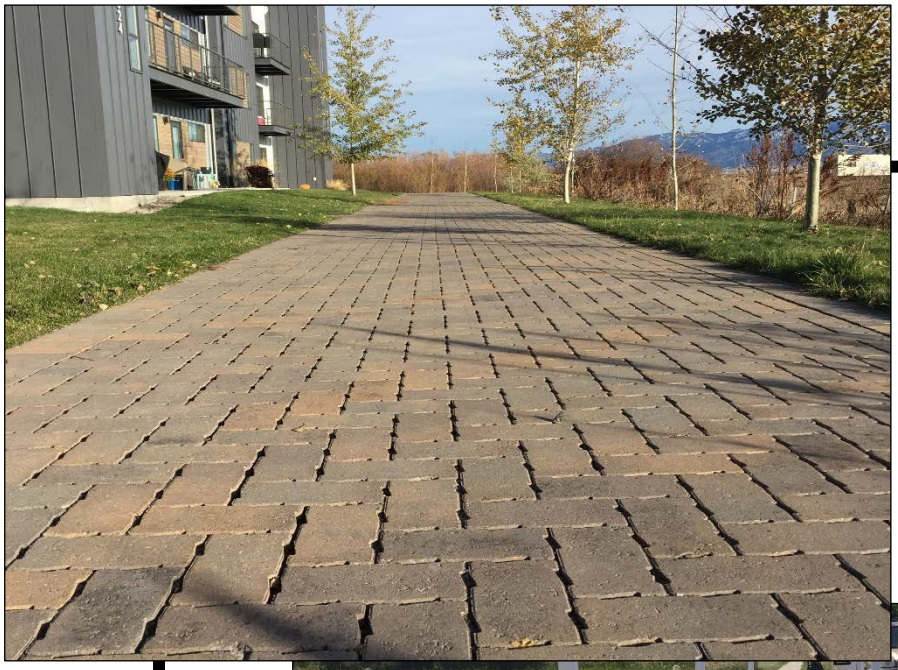
- o Analysis: Sediment loading within the various treated urban basins averaged .09 tons/acre, .04 tons/acre less than the previous year. Sediment collection totals increased from 50.6 in 2019 to 54.6 tons in 2020. The MS4 installed eight new treatment structures in 2020, however the new structures' sediment capture totals are not included due to the timing of installation.

- Action Plan: Continue TMDL Action Plan described in SWMP Section 2.2, construct capital projects described in SWMP Section 2.3, and maintain utility operations goals described in SWMP Section 7.0.

- Long-Term Trend Monitoring
  - Analysis: Data showed a 14% increase in Bozeman Creek and a 67% increase in Mandeville Creek O:E ratios. Bozeman Creek's macroinvertebrate community showed a 53% improvement based on the prior year's data. Mandeville Creek's macroinvertebrate community showed an 81% improvement based on the prior year's data. More sampling events are required to show a trend in this data set, as three data points for each location are not adequate to assess stream health. O:E ratios for both Creek's upstream sample locations are well below the reference streams benchmark and appear to be impacted by other pollution sources originating outside of the MS4.
  - Action Plan: Continue TMDL Action Plan described in SWMP Section 2.2, construct capital projects described in SWMP Section 2.3, maintain utility operation goals described in SWMP Section 7.0, and implement administrative programs described in SWMP Sections 3.0, 4.0, 5.0, 6.0, and 7.0.

Section 9.0

Stormwater Management Plan Updates



Graphic: 9.0.1: Permeable Paver Walkway

Graphic 9.0.2: Boulevard Infiltration Gallery

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9.1 Introduction

The MS4 updates the information in this SWMP annually, and tracks change specific to each section. This SWMP requires changes to meet operation and policy adjustments that occur in local government.

9.2 Program Administration (SWMP Section 1.0)

January/February 2020:

- Section 1.1: Updated and simplified MS4 objective language.
- Section 1.2: Completed minor grammar updates.
- Section 1.3: Removed ERU total of "$3.23" as the fee changes annually with rate increases.
- Section 1.3: Updated the description of the utility rate model workflow to improve clarity.
- Section 1.3: Updated the 2019 total impervious area and total site plan performance measure.
- Section 1.3: Added the FY20 Approved Budget information.
- Section 1.3: Added Graphic 1.3.1 to show budget and staffing changes over time.
- Section 1.4: Updated project information and staff hours, added FY20 Budget information.
- Section 1.5: Added new Stormwater Infrastructure Specialist, clarified organizational structure, added SWMP Support Divisions, removed future positions, and changed meeting frequencies.
- Section 1.5: Updated Graphic 1.5.1.
- Section 1.5: Updated Graphic 1.5.2 to include 2019 numbers, recalculated totals.
- Section 1.6: Added mechanical separation unit, added responsibilities related to the Post Construction Program.
- Section 1.7: Updated Gallatin Watershed Council's name.
- Section 1.10: Updated 2019 and 2020 SWMP advertisement dates, and added public comments.

January/February 2021:

- Sections 1.1-1.10: Streamlined sections, removed excess language, reformatted duplicate information into charts, and corrected grammatical errors.
- Section 1.1: Added puctuation and removed language referencing "Master Plan".
- Section 1.2: Completed minor grammar updates and clarified language.
- Section 1.2: Removed language regarding an MOU requirement between the City and MSU.
- Section 1.3: Updated the 20 total impervious area and total site plan performance measure.
- Section 1.3: Added the FY21 Approved Budget information.
- Section 1.3: Updated Graphic 1.3.1 and 1.3.2.
- Section 1.3: Added Graphics 1.3.3 -1.3.6.
- Section 1.3: Removed excess language, clarified content, and reformatted.
- Section 1.4: Added the FY21 Approved Budget information.
- Section 1.4: Removed excess language, clarified content, and reformatted.
- Section 1.5: Updated and clarified language for all positions.
- Section 1.5: Updated Graphic 1.5.1 to include 2020 numbers, recalculated totals.
- Section 1.6: Completed minor language edits.
- Section 1.7: Updated section title and completed wording edits.
- Section 1.8: Removed two permit references.
- Section 1.10: Updated 2021 SWMP advertisement dates, and updated Graphic 1.10.1.

9.3 Capital Project Program (SWMP Section 2.0)

January/February 2020:

- Section 2.1: Removed language related to specialized equipment, updated subprogram goals

- Section 2.2: Added “over” before $650,000 and updated vitrified clay pipe total
- Section 2.2: Completed numerous grammar updates
- Section 2.3: Updated performance metrics, clarified some language, relocated completed projects and added new projects
- Section 2.4: Updated Ongoing and Completed projects, clarified some names and categories
- Section 2.4.2 and 2.4.3: Updated graphics
- Section 2.5: Updated pollutant reduction totals
- Section 2.6: Updated performance measures

January/February 2021:

- Sections 2.1-2.6: Streamlined sections, removed excess language, reformatted duplicate information into charts, and corrected grammatical errors.
- Section 2.2: Revised the Total Maximum Daily Load Action Plan.
- Section 2.3: Updated performance metrics and projects.
- Section 2.4: Updated projects and graphics, and clarified some names and categories.
- Section 2.5: Updated pollutant reduction totals.
- Section 2.6: Updated performance measures.

9.3 Public Education Program (SWMP Section 3.0)

January/February 2020:

- Section 3.2: Clarified language under passive and active engagement sections
- Section 3.3: Updated group to include MSU Students
- Section 3.4: Clarified existing activities, added new activities, updated performance measures, added tasks, goal, and notes for each item per year
- Section 3.5: Removed Adopt A Rain Garden and moved it into the ongoing initiatives section

January/February 2021:

- Sections 3.1-3.4: Streamlined sections, removed excess language, reformatted duplicate information into charts, and corrected grammatical errors.
- Section 3.3: Improved formatting.
- Section 3.4: Updated intiative information.

9.4 Illicit Discharge Detection and Elimination Program (SWMP Section 4.0)

January/February 2020:

- Section 4.4: Added 2019 events and updated Graphics 4.4.1 and 4.4.2
- Section 4.6: Updated total outfall numbers per each waterway, updated high priority outfall information and 2019 inspection results, and updated 2019 ORI inspection totals
- Section 4.7: Added 2019 infrastructure totals and updated Graphic 4.7.1

January/February 2021:

- Sections 4.1-4.8: Streamlined sections, removed excess language, reformatted duplicate information into charts, and corrected grammatical errors.
- Section 4.3: Changed Response Protocol to Corrective Action Plan. Expanded and added detail to contained sections to provide additional detail regarding the MS4’s process.
- Section 4.4: Improved language related to the MS4’s Enforcement Response Plan.
- Section 4.5: Added 2020 events and updated Graphics

- Section 4.6: Updated controls for hot tub and pool discharge and remove construction dewatering, which is covered under SWMP Section 5.0.
- Section 4.7: Updated graphics provided more information regarding the MS4's ORI Inspection Plan, and updated high-priority outfall inspection information.
- Section 4.8: Updated storm sewer infrastructure totals.

9.5 Construction Site Management Program (SWMP Section 5.0)

January/February 2020:

- Section 5.1: Updated #3 to include the mention of inspection
- Section 5.3: Added final occupancy and infrastructure approval section
- Section 5.3: Added 2019 totals and updated Graphic 5.3.1
- Section 5.4: Added 2019 performance totals and audit results, updated Graphic 5.4.1
- Section 5.5: Removed timeline for item #1

January/February 2021:

- Sections 5.1-5.8: Streamlined sections, removed excess language, reformatted duplicate information into charts, and corrected grammatical errors.
- Section 5.3: Updated to be specific to the MS4's permitting program and account for operational changes made during 2020.
- Section 5.4: Added section to better aling with the requirments of the MS4 Permit, including a flow chart and description of the MS4's enforcement process.
- Section 5.5: Added section to include more detailed information regarding high-priority sites and rain events, added 2020 totals, reformatted tables, and updated Graphic.
- Section 5.6: Added 2020 performance totals and audit results and updated the chart.
- Section 5.8: Updated document names.

9.6 Post-Construction Program (SWMP Section 6.0)

January/February 2020:

- Section 6.3: Updated Graphic 6.3.1
- Section 6.4: Added 2019 performance totals, updated Graphic 6.4.1, added 2019 audit results, and updated Graphic 6.4.2

January/February 2021:

- Sections 6.1-6.9: Streamlined sections, removed excess language, reformatted duplicate information into charts, and corrected grammatical errors.
- Sections 6.1-6.9: Revised the entire section to account for programmatic changes and improve alignment with the MS4 Permit.

9.7 Good Housekeeping Program (SWMP Section 7.0)

January/February 2020:

- Section 7.2: Clarified language and added 2019 performance totals
- Section 7.3: Clarified Facility Minimum Standards, updated Facility Stormwater Pollution Prevention Plan protocols, updated Graphic 7.3.1, updated completion performance metric, and removed performance metric related to standard violations

- Section 7.4: Clarified Activity Minimum Standards, updated Activity Stormwater Pollution Prevention Plan protocols, updated completion performance metric, and removed performance metric related to standard violations
- Section 7.5: Updated 2019 training activities and totals

January/February 2021:

- Sections 7.1-7.5: Streamlined section, removed excess language, reformatted duplicate information into charts, and corrected grammatical errors.
- Section 7.2: Adjusted infrastructure maintenance frequencies and updated performance totals.
- Section 7.3: Modified Facility Minimum Standards, updated Facility Stormwater Pollution Prevention Plan protocols, added tables and updated map, and removed performance metric.
- Section 7.4: Modified Activity Minimum Standards, updated Activity Stormwater Pollution Prevention Plan protocols, and removed completion performance metric.
- Section 7.5: Developed training section to include tables and updated strategies, updated participation numbers, and updated training events.

9.8 Sampling and Evaluation Program (SWMP Section 8.0)

January/February 2020:

- Section 8.4: Added 2019 raw data and updated point scores
- Section 8.5: Added 2019 raw data and updated point scores
- Section 8.6: Added 2019 raw data and updated point scores
- Section 8.7: Added 2019 raw data and updated point scores
- Section 8.8: Calculated 2019 score and updated Graphic 8.8.5
- Section 8.9: Added 2019 Results

January/February 2021:

- Sections 8.1-8.9: Streamlined section, removed excess language, reformatted duplicate information into charts, and corrected grammatical errors.
- Section 8.4: Added 2020 raw data and updated point scores.
- Section 8.5: Added 2020 raw data and updated point scores.
- Section 8.6: Added 2020 raw data and updated point scores.
- Section 8.7: Added 2020 raw data and updated point scores.
- Section 8.8: Calculated 2020 score and updated Graphic 8.8.5.
- Section 8.9: Added 2020 Results.