



Agency Use

Permit No.: MTR04

Date Rec'd

Amount Rec'd

Check No.

Rec'd By

FORM MS4-AR

**Annual Report Form  
Storm Water Discharges Associated with MS4s  
MTR040000**

This annual report form is to be completed by each permittee authorized under the General Permit for Storm Water Discharges Associated with Small Municipal Separate Storm Water Sewer Systems (MS4s). The completed form must be electronically submitted to DEQ by March 1<sup>st</sup> of each year starting March 1<sup>st</sup>, 2023.

**Reporting Year:**  2023  2024  2025  2026 *(reporting period is for the preceding calendar year, Jan 1<sup>st</sup>- Dec 31<sup>st</sup>)*

**MS4 Information**

Permit Number M T R 0 4 0 0 0 4  
 Small MS4 Name City of Great Falls  
 Contact Person, *(name, title)* Nathan Besich  
 Mailing Address PO Box 5021  
 City, State, and Zip Code Great Falls, MT 59403  
 Phone Number, Email Address 406-727-8390, nbesich@greatfallsmt.net

Authorized as a Co-permittee?  Yes: \_\_\_\_\_  No  
*(If, yes provide Co-permittee MS4 name in the blank provided. Each co-permittee must submit a separate complete annual report form.)*

Is the MS4 sharing responsibility? If yes, attach written acceptance and explanation of shared obligation(s).  Yes  No

Attach an organizational chart identifying the primary SWMP coordinator, positions responsible for implementing requirements of the permit, and contact information for each individual.  Attached  Not Attached

**Minimum Control Measure 1 & 2**

Link to storm water website https://greatfallsmt.net/publicworks/storm-water

List of four key target audiences:	Associated Pollutants:	Outreach strategy:
<u>General Common Education</u>	<u>Varies depending on source</u>	<u>World of Work Expo &amp; College</u>
<u>Hazardous Waste Disposal</u>	<u>Residential haz-waste</u>	<u>Cleanup Days/Events</u>
<u>Post-Construction Facility Owr</u>	<u>Nutrients, TSS, Sediment</u>	<u>Industry Specific Training</u>
<u>Lawn &amp; Garden Care</u>	<u>Nutrients, TSS, Sediment</u>	<u>Social Media</u>

Attach documentation of participation and/or feedback of key target audiences.  Attached  Not Attached

**Minimum Control Measure 3** (attach the following in the order listed)

List of potential non-storm water discharges identified as significant contributors of pollutants (i.e. illicit discharges), associated pollutants, and any local controls or conditions placed on these discharges.  Attached  Not Attached

Have there been updates to the MS4's storm sewer maps?  Yes  No, the map(s) were last updated: \_\_\_\_\_

If yes, submit the maps using one of the following options:

- Electronic GIS shapefiles emailed to [DEQMPDESDataManagement@mt.gov](mailto:DEQMPDESDataManagement@mt.gov)
- Attached Hard copy
- Link to online maps: <https://greatfallsmt.net/publicworks/storm-water>

Summary of investigations and corrective actions taken over the past year per the Illicit Discharge and Corrective Action Plan.  Attached  Not Attached

Number of outfalls inspected during dry weather: 19 \_\_\_\_\_ of 88 \_\_\_\_\_ (total number of outfalls)

Number of high priority outfalls inspected: 19 \_\_\_\_\_ of 19 \_\_\_\_\_ (total number of high priority outfalls)

Attach a summary of any resulting actions taken from screening results.  Attached  Not Applicable

**Year 2023 only, unless updates were made:**

A copy or link to the adopted ordinance, policy, procedure, and/ or regulatory mechanism prohibiting illicit discharges.  Attached or  Link \_\_\_\_\_

**Minimum Control Measure 4** (attach the following in the order listed)

List of construction sites/projects inspected over the last year and any resulting actions.  Attached  Not Attached

**Year 2023 only, unless updates were made:**

A copy of the construction storm water management plan review checklist.  Attached  Not Attached

A copy of the construction site inspection form or checklist.  Attached  Not Attached

A copy or link to the adopted ordinance, policy, procedure, and/or regulatory mechanism requiring construction storm water controls.  Attached or  Link \_\_\_\_\_

**Minimum Control Measure 5** (attach the following in the order listed)

Inventory of regulated projects using offsite treatment for post-construction runoff.  Attached  Not Applicable

Number of high priority post-construction storm water management controls inspected: 1 \_\_\_\_\_

Attach a summary of any resulting actions taken from inspections.  Attached  Not Applicable

**Year 2023 only, unless updates were made:**

A copy of the post-construction storm water management plan review checklist.  Attached  Not Attached

A copy of the post-construction site inspection form or checklist.  Attached  Not Attached

A copy or link to the adopted ordinance, policy, procedure, and/or regulatory mechanism requiring post-construction storm water controls.  Attached or  Link \_\_\_\_\_

**Year 2025 only:** Submit a plan to modify relevant codes, ordinances, policies, and/or programs to implement LID/green infrastructure concepts.  Attached  Not Attached

**Minimum Control Measure 6** (attach the following in the order listed)

Number of SOPs evaluated: 58 \_\_\_\_\_ of 58 \_\_\_\_\_ (total number of SOPs for permittee facilities/activities)

Summary of SOP updates made in the last year.  Attached  Not Applicable

Records of completed trainings in conformance with section II.B. of the General Permit.  Attached  Not Attached

**Year 2023 only, unless updates were made:**

Inventory of permittee facilities/activities with potential to contribute contaminants.  Attached  Not Attached

Summary of inspection procedures for facilities and their structural storm water controls.  Attached  Not Attached

**Storm Water Management Plan (SWMP)**

In the last year, were any public comments received on the SWMP?  Yes  No

If yes, attach a summary of comments received.  Attached  Not Applicable

In the last year, have additional SWMP updates been made other than those listed above?  Yes  No

If yes, attach a summary including the date and description of updates and rationale for decision making.

Attached  Not Applicable

**Monitoring and Reporting** (attach the following in the order listed)

I verify all outfall monitoring has been performed and recorded in conformance with section II.C. and II.D. of the General Permit. (If not able to dependably obtain two samples a year at each monitoring location, attach a summary of rationale. Contact DEQ regarding requests for a change in monitoring locations.)

Attach a summary of implemented BMPs used to target and reduce discharges to impaired waterbodies and a schedule for the following year's BMP implementation.  Attached  Not Applicable

**Year 2023 only, unless updates were made:** Attach an inventory of outfalls discharging to impaired waterbodies including associated pollutants.  Attached  Not Applicable

**MS4s with an approved TMDL:**

**Year 2023 only:** Submit a TMDL-related sampling plan for DEQ review.  Attached  Not Applicable

**Years 2024, 2025, and 2026:** In the last year, were any public comments received on the sampling plan?  Yes  No

If yes, attach a summary of comments received and any resulting actions/modifications.  Attached  Not Applicable

**Certification\***

**All Permittees Must Complete the Following Certification:**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. [75-5-633, MCA].

Name (Type or Print) **Christoff Gaub**

Title (Type or Print) **Director**

Phone Number **406-727-8390**

Signature **Christoff T. Gaub** Digitally signed by Christoff T. Gaub  
Date: 2024.02.28 11:46:04 -07'00'

Date Signed **February 28, 2024**

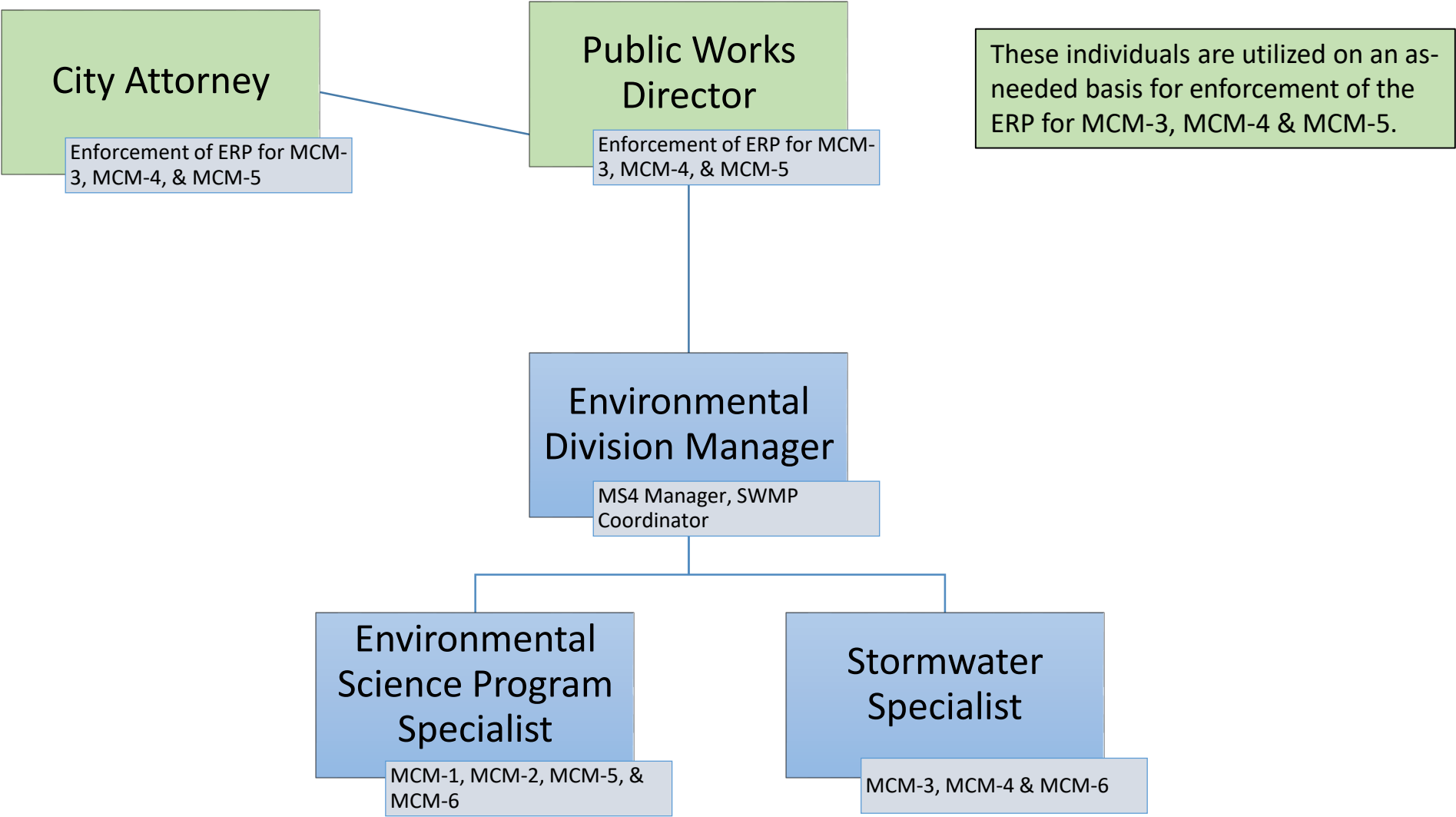
\* This Annual Report Form must be completed, signed, and certified as follows:

- For a corporation, by a principal officer of at least the level of vice president;
- For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
- For a municipality, state, federal, or other public facility, by either a principal executive officer or ranking elected official.

GENERAL ATTACHMENTS



# SWMP Organizational Chart





# StormwaterONE

Certifies that

*Jake Broden*

has successfully completed the required courses of study and is recognized as a

## Certified SWPPP Preparer and Administrator Montana

Completion Date November 13, 2023

Expiration Date November 13, 2026

Certificate Number 6af01aad



PDHs: 18.5 | CEUs: 1.85

A handwritten signature in blue ink, appearing to read "Andrew Demers".

Andrew Demers, President

## Billed From

Endeavor Business Media/ StormCon

1233 Janesville Ave.

Fort Atkinson, WI 53538

## Receipt

Reference Number 28140801

Registered At 8/1/23, 3:27 PM

## Registrant Details

Reference Number	Full Name	Email Address	Registrant Type	Price
28140801	Jack Wang	jwang@greatfallsmt.net (mailto:jwang@greatfallsmt.net)	Attendee Full Conference	\$650.00
28140895	Nate Besich	nbesich@greatfallsmt.net (mailto:nbesich@greatfallsmt.net)	Attendee Full Conference	\$650.00

## Selections

Selection	Quantity	Unit Price	Total
Attendee Full Conference	2	\$650.00	\$1,300.00
		<b>Total</b>	<b>\$1,300.00</b>

## Billed To

Full Name Jack Wang

Line 1 1005 25th Ave NE

Line 2 P.O. Box 5021

City	Great Falls
State/Province/County	MT
Zip/Postal Code	59403-5021
Country	United States
Email Address	jwang@greatfallsmt.net (mailto:jwang@greatfallsmt.net)

## Transactions

Date	Transaction Type	Amount
August 1, 2023	Order Amount	\$1,300.00
August 1, 2023	Online Mastercard Payment (5462)	(\$1,300.00)
	<b>Balance Due</b>	<b>\$0.00</b>

## Payment Information

Credit Card: To pay by credit card, please log back into your record [CLICK HERE \(/2023/sign-in\)](#)

If you would like to pay by wire transfer, please contact [accountsreceivable@endeavorb2b.com](mailto:accountsreceivable@endeavorb2b.com)  
(mailto:accountsreceivable@endeavorb2b.com)  
Subject=StormCon%20Wire%20Transfer%20Request)

Checks: Please make all checks payable to: Endeavor Business Media/StormCon21 and mail to:

Endeavor Business Media LLC

PO Box 306479

Nashville, TN 37230-6479

Please include the Event Name, Reference ID, Registrant's Name and Company with Payment

© 2023 Endeavor Business Media, LLC. All Rights Reserved.

PRIVACY POLICY (<https://www.endeavorbusinessmedia.com/privacy-policy>) | TERMS AND  
CONDITIONS (<https://www.endeavorbusinessmedia.com/endeavor-terms>) | CALIFORNIA DO NOT  
SELL ([https://endeavor.dragonforms.com/loading.do?omedasite=EBM\\_DoNotSell](https://endeavor.dragonforms.com/loading.do?omedasite=EBM_DoNotSell))



(<https://www.facebook.com/StormCon.Events/>)



(<https://twitter.com/StormCon>)



(mailto:wposey@endeavorb2b.com)



# Altitude Training Associates

Awards this Certificate of Completion to

## Jack Wang

Who on October 3 & 4, 2023 Successfully Completed  
the Following Two Day Training Program:

### In Person BMP 301 Conducting Compliance Evaluation Inspections



Instructor  
Altitude Training Associates, LLC





# MS4 STORMWATER MANAGEMENT PLAN (SWMP)

City of Great Falls, Montana

February 2024

City of Great Falls, MT  
PO Box 5021  
Great Falls, MT 59403

## Contents

Definitions / Acronyms .....	ii
Introduction .....	1
Chapter 1: MCMs 1 and 2: Public Education, Outreach, Involvement, and Participation.....	1
1.1: Minimum Measures & Required BMPs .....	1
1.2: Responsible Party.....	4
1.2.1: MCMs 1 and 2: BMP a.i & a.ii.....	4
1.2.2: MCMs 1 and 2: BMP b.i through d.iii .....	4
Chapter 2: MCM 3: Illicit Discharge Detection and Elimination .....	5
2.1: Minimum Measures & Required BMPs .....	5
2.2: Responsible Party.....	8
2.2.1: MCM-3: BMP a.i & a.ii.....	9
2.2.2: MCM-3: BMP b.i through b.iii .....	10
2.2.3: MCM-3: BMP c.i through c.iii .....	11
2.2.4: MCM-3: BMP d.i through d.iii .....	11
2.2.5: MCM-3: BMP e.i through e.ii .....	11
Chapter 3: MCM 4: Construction Site Stormwater Management .....	11
3.1: Minimum Measures & Required BMPs .....	12
3.2: Responsible Party.....	14
3.2.1: MCM-4: BMP a.i .....	14
3.2.2: MCM-4: BMP b.ii through b.iv .....	14
3.2.3: MCM-4: BMP c.i through c.iii .....	15
Chapter 4: MCM 5: Post-Construction Site Stormwater Management.....	15
4.1: Minimum Measures & Required BMPs .....	15
4.2: Responsible Party.....	18
4.2.1: MCM-5: BMP a.i & a.ii.....	18
4.2.2: MCM-5: BMP b.i through b.vi .....	18
4.2.3: MCM-5: BMP c.i through c.ii .....	19
4.2.4: MCM-5: BMP d.i through d.ii .....	19
Chapter 5: MCM 6: Pollution Prevention and Good Housekeeping .....	19
5.1: Minimum Measures & Required BMPs .....	20
5.2: Responsible Party.....	21
5.2.1: MCM-5: BMP a.i through a.iv .....	21

Chapter 6: Training .....	21
Chapter 7: Monitoring Requirements.....	22

## Attachments

- Attachment A: IDDE Corrective Action Plan
- Attachment B: Enforcement & Response Plan
- Attachment C: MCM-4 SWPPP Review Checklist
- Attachment D: MCM-4 Inspection Checklist
- Attachment E: MCM-4 Prioritization Protocol
- Attachment F: MCM-5 Post-Constructin Review Checklist
- Attachment G: MCM-5 Inspection Checklist
- Attachment H: MCM-5 Prioritization Protocol
- Attachment I: Wet Weather Stormwater Sampling & Analysis Plan

## Definitions / Acronyms

- BMPs – Best Management Practices
- COGF – City of Great Falls
- ECP – Erosion Control Permit
- ERP – Enforcement Response Plan
- GP – General Permit
- IDDE – Illicit Discharge Detection and Elimination
- LID – Low Impact Development
- MCM/MCMs – Minimum Control Measure(s)
- MPDES – Montana Pollutant Discharge Elimination System
- MS4 – Municipal Separate Storm Sewer System
- MTDEQ/DEQ – Montana Department of Environmental Quality
- NOV – Notice of Violation
- OCCGF – Official Code of the City of Great Falls
- RECP – Residential Erosion Control Plan
- SOPs – Standard Operating Procedures
- SWMP – Stormwater Management Plan
- SWMT – Stormwater Management Team
- SWPPP – Stormwater Pollution Prevention Plan
- TSS – Total Suspended Solids

## Introduction

This document is the Stormwater Management Plan (SWMP) for the City of Great Falls (COGF) as is required by the Montana Department of Environmental Quality (MTDEQ) under the General Permit for Stormwater Discharges associated with Small Municipal Separate Storm Sewer Systems (MS4s). The SWMP is updated on an annual basis and describes how COGF administers an MS4 program in order to comply with the requirements within the current MTDEQ MS4 permit. The requirements are categorized into the following Minimum Control Measures (MCMs):

- MCM-1 & 2: Public Education, Outreach, Involvement, and Participation
- MCM-3: Illicit Discharge Detection and Elimination
- MCM-4: Construction Site Stormwater Management
- MCM-5: Post-Construction Site Stormwater Management
- MCM-6: Pollution Prevention and Good Housekeeping

*Note: this document does not include any of the requirements for non-traditional MS4s as the City of Great Falls does not have any facilities fall under that classification.*

## Chapter 1: MCMs 1 and 2: Public Education, Outreach, Involvement, and Participation

- Implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and the steps the public can take to reduce pollutants in stormwater runoff.
- Implement a public involvement/participation program to involve key target audiences in the development and implementation of the SWMP that complies with state and local public notice requirements.

### 1.1: Minimum Measures & Required BMPs

#### a. Develop and continue to utilize the permittee's stormwater website for public involvement.

- i. Annually review and update a stormwater website that, at a minimum, includes the following:
  - A copy of, or link to, this General Permit (MTR040004)
  - A copy of the Notice of Intent application form submitted to DEQ including all supplemental information
  - Access to outreach strategy information and materials
  - Applicable outreach event information
  - Most current version of the SWMP and any supporting documents
  - At a minimum, five years of most recent annual reports submitted to DEQ
  - A mechanism for providing public input for the SWMP including contact information and directions for comments, questions, and complaints
  - Information regarding how to identify and report illicit discharges
  - Permittee requirements for construction activities and how to submit related complaints
  - The Notice of Intent application form and supplemental application information, the updated General Permit and a minimum of five years of annual reports must be posted on the website within 90 days of the effective dates of this General Permit.

- ii. Provide a minimum of one opportunity annually for the public to provide comments on the SWMP. Document all relevant inputs, responses, and SWMP modifications made as a result.

**b. Determine key target audiences most appropriate for stormwater education and outreach.**

- i. Based on the permittee's local knowledge of stormwater pollutant generating activities within their MS4, document which business types and/or residential behaviors from the list below are common sources of pollutants, illicit discharges, spills, and/or dumping within the permitted MS4 boundaries. Select a minimum of four applicable key target audiences to address pollutant generating behavior through stormwater education and outreach.

**Residential Behaviors:**

- Car Washing/Care
- General Common Education
- Hazardous Waste Disposal
- Home Chemical Care
- Lawn & Garden Care
- Pet Waste

**Business Types:**

- Carpet Cleaning/Restoration Companies
- Construction Industry
- Gas Stations
- Industrial Facilities & Operations
- Landscapers
- Mobile Cleaning/ Pressure Washing
- Post Construction Facility Owners
- Restaurant or Food Trucks

*Note: DEQ may approve or require additional key target audiences*

- ii. Review Key target audiences annually and identify the pollutants associated with each.

**c. Identify and develop outreach formats, distribution channels, and messages for each key target audience and associated stormwater polluting behavior. Include approaches for involving the public in SWMP development and implementation.**

- i. For each key target audience, select a minimum of one outreach strategy listed below. At least two outreach strategies must be active.

**Passive Outreach Strategies:**

- Advertisements
- Brochures/ Fliers
- Business Specific Emails
- Community Artwork/ Murals
- Educational Signage
- Informative Articles or Stories
- Social Media
- Sponsorship of Community Events
- Targeted Door Hangers
- Utility Bill Inserts
- Vehicle Wraps

**Active Outreach Strategies:**

- Cleanup Days/ Events
- Community Meetings/ Presentation
- Community Stormwater Surveys
- Form a Citizen Stormwater Advisory Panel
- Host AmeriCorps Member
- Industry Specific Training
- Participation in Community Events
- Pet Waste Stations
- Public Tours
- Public Workshops
- Rain Garden Adoption/ Building Program
- Storm Drain Adoption Program
- Student Outreach/ Class Work
- Water Quality Monitoring with Citizen Volunteers

*Note: MTDEQ may approve or require additional outreach strategies.*

- ii. Each year, the permittee must implement at least four activities. The activities can be the same or different from year to year. For each key target audience, identify the outreach strategies and planned timeframe for implementation for the upcoming year and include this information in the annual report.

**d. Distribute and/or perform outreach to target audiences and track performance/ public involvement.**

- i. Implement the identified outreach strategies (from Part II.A.1.c.i., above) for each key target audience.

**Performance Tracking Methods:**

- Community Surveys
- Illicit Discharge Events
- Percent of Population Reached
- Performance Audits
- Total Distribution
- Total Event Participants
- Total Weight Collected
- Website Analytics

*Note: MTDEQ may approve or require additional performance tracking methods.*

- ii. For each key target audience and their associated outreach strategy, document participation and feedback using one or more of the performance tracking methods.
- iii. Maintain records on selected key target audiences, outreach strategies, and performance tracking methods. Use the resulting information and/or measurements to direct education and outreach resources most effectively and document modifications in the SWMP.

## 1.2: Responsible Party

The City of Great Falls Environmental Division will be responsible for the implementation of the required BMPs. More specifically, the Environmental Division Manager, the Environmental Program Specialist, and the Stormwater Specialist.

### 1.2.1: MCMs 1 and 2: BMP a.i & a.ii

COGF regularly reviews and updates the City's stormwater website to reflect any program updates and / or modifications.

COGF provides the opportunity for the public to comment on the SWMP once per year by posting a public notice in the Great Falls Tribune. The most current SWMP is available for review on the City's stormwater website as well as in the City's Public Works Admin Building located at 1005 25<sup>th</sup> Ave NE in Great Falls, MT. All relevant feedback is documented along with any modifications to the SWMP resulting from public input and / or responses.

### 1.2.2: MCMs 1 and 2: BMP b.i through d.iii

On an annual basis, COGF reviews data including but not limited to illicit discharge reports / investigations, previous instances of spills / dumping, citizen complaints, etc. to determine applicable key target audiences. Education and outreach activities are then tailored to each target audience in order to address pollutant generating behavior. The following are the key target audiences selected for 2022:

1. General Common Education
  - a. Associated pollutants: Varied depending on source / activity
  - b. Outreach Strategy
    - i. World of Work (WOW) Expo (Active)
      1. Performance Tracking: Number of participants
    - ii. Great Falls College – Science Fun (Active)
      1. Performance Tracking: Number of students
2. Hazardous Waste Disposal
  - a. Associated pollutants: Residential haz-waste (oil based paint, motor oil, etc.)
  - b. Outreach Strategy
    - i. Cleanup Days/Events (Active)
      1. Performance Tracking: Amount of waste collected
3. Post-Construction Facility Owners
  - a. Associated pollutants: Nutrients, TSS, Sediment
  - b. Outreach Strategy
    - i. Industry Specific Training (Active) - Onsite Visit/walk-through & Informational Discussion
      1. Performance Tracking: Number of visits & discussions
4. Lawn & Garden Care
  - a. Associated pollutants: Nutrients, TSS, Sediment
  - b. Outreach Strategy
    - i. Social Media (Passive)
      1. Performance Tracking: Number of interactions



## Chapter 2: MCM 3: Illicit Discharge Detection and Elimination

- Develop, implement, and enforce a program to detect and eliminate illicit discharges into the small MS4.
- Develop and annually update a storm sewer system map showing the location of all outfalls and the names/locations of all receiving waters.
- Through ordinance or other regulatory mechanism to the extent allowable under state or local law, effectively prohibit non-stormwater discharges into the MS4 and implement appropriate enforcement procedures and actions.
- Develop and implement a plan to detect and address non-stormwater discharges, including illegal dumping, to the MS4.
- Inform employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

### 2.1: Minimum Measures & Required BMPs

#### a. Identify categories of non-stormwater discharges or flows that are significant contributors of pollutants to the MS4.

- i. Determine which potential non-stormwater discharges or flows to the Small MS4, including but not limited to a consideration of those listed below, are significant contributors of pollutants.

#### **Non-Stormwater Discharges or Flows:**

- Water Line Flushing
- Landscape Irrigation
- Diverted Stream Flows
- Rising Ground water
- Uncontaminated Ground water Infiltration
- Uncontaminated Pumped Ground water
- Discharges from Potable Water Sources
- Foundation Drains
- Air Conditioning Condensation
- Irrigation Water
- Springs
- Water from Crawl Space Pumps
- Footing Drains
- Lawn Watering
- Individual Residential Car Washing
- Flows from Riparian Habitats and Wetlands
- Dechlorinated Swimming Pool Discharges
- Street Wash Water

*Note: Discharges or flows from firefighting activities are excluded from the effective prohibition against non-stormwater and only need to be addressed where they are identified as significant sources of pollutants to surface waters.*

- ii. In the SWMP, document and update annually:

- A list of potential non-stormwater discharges the permittee has identified as significant contributors of pollutants (i.e., illicit discharges). Include the pollutants associated with each illicit discharge, and any local controls or conditions placed on these discharges.
- A list of potential non-stormwater discharges the permittee has determined as non-significant contributors of pollutants (i.e., occasional incidental discharges) and will not be addressed as illicit discharges, based on the information available to the permittee. Include the pollutants associated with each type of discharge and any local controls or conditions placed on these discharges.

**b. Inventory stormwater sewer infrastructure to track illicit discharges, contain spills, and determine high priority areas.**

- i. Annually review and update a map of the MS4's storm drainage system to accommodate the provisions of a comprehensive Illicit Discharge Detection and Elimination (IDDE) program and SWMP including, but not limited to, the following:
  - Outfall locations
  - Inlets
  - Open channels
  - Subsurface conduits/pipes
  - Dry wells (discharges to ground water directly)
  - Manholes
  - Other similar discrete conveyances
  - Surface waters that receive discharges from outfalls
- ii. Using inspection and screening results, storm sewer maps, and other appropriate data, list, label, or highlight determined high priority outfalls. When determining high priority outfalls, permittees must consider, at a minimum, the following:
  - Industrial areas
  - Areas with previous illicit discharges
  - Known illegal dumping areas
  - Oldest portions of storm sewer infrastructure
  - Areas with onsite sewage disposal systems
  - Areas discharging to an impaired water body

*Note: the permittee must identify a minimum number of high priority outfalls not equaling zero, based on the knowledge of potential illicit discharges in their MS4. High priority outfalls shall be reviewed and updated annually.*

- iii. Update the map annually and make available for review by the Department upon request.

**c. Develop/update an Illicit Discharge Investigation and Corrective Action Plan to consistently and effectively investigate suspected illicit discharges and connections and track subsequent compliance actions.**

- i. Maintain and annually update an Illicit Discharge Investigation and Corrective Action Plan. The plan should describe the processes that will be used to locate the source of an illicit discharge and refer to the permittee's Enforcement Response Plan (in Part II.A.2.d.i, below)

for execution of appropriate enforcement actions. At a minimum, this plan shall include processes to:

- Investigate a suspected illicit discharge within seven calendar days. Document circumstances that prevent this timeframe.
- Prioritize illicit discharges suspected of being sanitary sewage and/or significantly contaminated for investigation first.
- Confirmed illicit discharges must be eliminated within a timeframe of six months from the date of discovery. Where applicable, document circumstances that prevent this timeframe.
- Notify Montana DEQ and appropriate agencies of illicit discharges believed to be an immediate threat to human health or the environment.
- Document that a good faith effort was made to find the source of the illicit discharge and document each phase of the investigation in a case file.
- Resolve and document the conclusion of all investigations.

*Note: The outfall where any illicit discharge is detected shall continue to be considered high priority and should be investigated as required in this permit. If further investigation and corrective action results show the incident was isolated, with no indication of habitual illicit discharge, the outfall may be removed from the high priority list during annual review, as required in section II.A.2.b.ii., above.*

- ii. Implement the Illicit Discharge Investigation and Corrective Action Plan. When an illicit discharge is identified, the permittee must cease, or require the cessation of, the discharge within a timeframe of six months. After the illicit discharge has been eliminated, the permittee must also minimize surface contamination by removing, or requiring the removal of, surface residue or other types of pollutant sources.
- iii. Maintain documentation which describes investigations conducted and corrective actions taken per the Illicit Discharge Investigation and Corrective Action Plan. Submit a summary with each annual report.

d. Through ordinance or other regulatory mechanism to the extent allowable under state or local law, effectively prohibit discharge of non-stormwater into the regulated storm sewer system and implement appropriate enforcement procedures and actions.

- i. Maintain, update, and implement a formal Enforcement Response Plan (ERP) for illicit discharges. At a minimum, the ERP must describe or identify the following:
  - Legal authority (through ordinance, formal policies, or memoranda of understanding) to eliminate and abate illicit discharges
  - Staff with enforcement authority
  - Enforcement actions available
  - An enforcement escalation process
  - A schedule utilized to quickly and consistently eliminate the source of the discharge, abate any damages, and reduce the chance of reoccurrence.

To the extent allowable under local and state law, the ERP must include informal, formal, and judicial responses, such as the following:

**Informal:**

- Telephone Notification

- Verbal/Written Notice
- Meetings

**Formal:**

- Administrative Order
- Compliance Schedule
- Order to Show Cause
- Monetary Penalty (Administrative)
- Suspended Service
- Notice of Violation (NOV)

**Judicial:**

- Injunctive Relief
- Consent Decree
- Civil Penalties
- Criminal Penalties

- ii. Permittees with legal authority must adopt an ordinance or other regulatory mechanisms to prohibit illicit discharges, which shall include a provision prohibiting any occasional incidental non-stormwater discharge event. Review the ordinance or regulatory mechanisms once per permit cycle and update as needed.

Permittees without legal authority to enact an ordinance or other regulatory mechanisms to prohibit illicit discharges must develop and implement written policies and procedures to exert authority (to the extent allowable) over MS4 users, such as employees, the traveling public, contractors, etc... Review these written policies and procedures once per permit cycle and update as needed.

- iii. Solicit assistance from neighboring MS4s, as necessary, to detect and eliminate illicit discharges that may originate within the neighboring MS4 and formalize in cooperative agreements (i.e. memoranda of understanding). Agreements shall specify investigation and enforcement responsibilities and shall be described in each permittee's ERP and Illicit Discharge Investigation and Corrective Action Plan. Formalize cooperative agreements with all neighboring MS4s, as necessary, to implement the IDDE program.

**e. Inspect all outfalls during dry weather to detect illicit discharges and connections into the MS4.**

- i. Inspect and screen **all** the permittee's outfalls during dry weather using the outfall field screening protocol developed by the *Center for Watershed Protection*, or an equivalent process. Using the protocol, if illicit discharge potential is determined, the permittee shall use the procedures identified above for tracing and removing an illicit discharge. **This process shall be completed by the end of the permit cycle.**
- ii. Inspect and screen identified **high priority** outfalls (from II.A.2.b.ii, above) during dry weather **a minimum of once per year** and submit a summary of screening results with each annual report.

## 2.2: Responsible Party

The City of Great Falls Environmental Division will be responsible for the implementation of the required BMPs. More specifically, the Environmental Division Manager, the Environmental Program Specialist, and the Stormwater Specialist.

### 2.2.1: MCM-3: BMP a.i & a.ii

COGF has evaluated the following non-stormwater discharges in order to determine if they are a significant contributor of pollutants to the City's storm drain system and its receiving waters.

1. Water line & hydrant flushing
  - a. Associated pollutant(s): Chlorine, TSS
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): COGF SOPs
2. Landscape Irrigation, Irrigation Water, Lawn Watering
  - a. Associated pollutant(s): Nutrients
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): None; no history of observed issues
3. Discharges from Potable Water Sources
  - a. Associated pollutant(s): Chlorine, nutrients
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): None; no history of observed issues
4. Rising Groundwater, Flows from Riparian Habitats and Wetlands, Diverted Stream Flows, Springs
  - a. Associated pollutant(s): varied depending on location and source of water
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): None; no history of observed issues
5. Untampered Groundwater Infiltration
  - a. Associated pollutant(s): varied depending on location and source of water
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Controls: COGF inspection & maintenance schedule / repairs
6. Untampered Pumped Groundwater
  - a. Associated pollutant(s): varied depending on location and source of water
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): YES
  - d. Local Control(s): COGF requires analytical testing prior to discharge approval
7. Foundation Drains, Water from Crawl Space Pumps, Footing Drains
  - a. Associated pollutant(s): varied depending on location and source of water
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): YES
  - d. Local Control(s): COGF requires analytical testing prior to discharge approval
8. Air Conditioning Condensation
  - a. Associated pollutant(s): none
  - b. Significant contributor of pollutants (yes/no): NO

- c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): None, no history of observed issues
- 9. Individual Residential Car Washing
  - a. Associated pollutant(s): Wash water, soaps, oil & grease, etc.
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): None, no history of observed issues
- 10. Dechlorinated Swimming Pool Discharges
  - a. Associated pollutant(s): Chlorine
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): must infiltrate on property or receive approval from COGF for discharge
- 11. Street Wash Water
  - a. Associated pollutant(s): TSS, nutrients, oil & grease
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): COGF SOPs
- 12. Construction Dewatering
  - a. Associated pollutant(s): TSS, nutrients, etc.
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): YES
  - d. Local Control(s): Required to obtain MT DEQ Construction Dewatering Permit and maintain compliance with associated requirements. COGF reviews permit and approves discharge location prior to discharge approval

### 2.2.2: MCM-3: BMP b.i through b.iii

COGF regularly reviews and updates the City's inventory of the MS4 storm drain system and utilizes the City's asset management software (Cartegraph) to map the components of the storm drain system. COGF utilizes data such as previous incidents of illicit discharges, known areas of concern, areas with large amounts of commercial development, etc. as metrics to determine which outfalls are considered high priority. COGF has identified the following outfalls to be high priority:

1. Outfall #5
2. Outfall #7
3. Outfall #8
4. Outfall #9
5. Outfall #10
6. Outfall #11
7. Outfall #12
8. Outfall #13
9. Outfall #14
10. Outfall #15
11. Outfall #16
12. Outfall #17
13. Outfall #18
14. Outfall #19

15. Outfall #20
16. Outfall #21
17. Outfall #22
18. Outfall #23
19. Outfall #66

These outfalls are inspected on an annual basis during dry weather conditions. Additionally, this list is reviewed and updated annually.

#### 2.2.3: MCM-3: BMP c.i through c.iii

COGF reviews and updates the City's Illicit Discharge Investigation and Corrective Action Plan (Attachment A) on an annual basis. This plan is utilized when an illicit discharge is identified to ensure proper documentation of the event, require cessation of the event and also that any necessary remedial actions are conducted in a timely manner.

#### 2.2.4: MCM-3: BMP d.i through d.iii

COGF has an existing Enforcement and Response Plan (ERP) for illicit discharges. The ERP is reviewed on an annual basis and updated as needed (Attachment B).

Sections 13.2.160, 13.2.170, and 13.2.180 of the Official Code of the City of Great Falls (OCCGF) include provisions prohibiting illicit discharges. These sections of ordinance are reviewed during each permit cycle and updated as needed.

COGF does not rely on assistance from any neighboring MS4s. COGF communicates and coordinates with the neighboring MS4s, however, duties/responsibilities are not shared or relied upon from those MS4s.

#### 2.2.5: MCM-3: BMP e.i through e.ii

COGF inspects and screens all the City's stormwater outfalls during dry weather conditions at a minimum of once per permit cycle. Outfalls determined to be high priority (see 2.2.2 above) are inspected during dry weather conditions at a minimum of once per year. All outfall inspections are conducted utilizing the field screening protocol developed by the Center for Watershed Protection or an equivalent process.

## Chapter 3: MCM 4: Construction Site Stormwater Management

- Develop, implement, and enforce a program to reduce pollutants in any stormwater runoff to the MS4 from construction activities that result in a land disturbance of greater than or equal to one acre, including activities that are part of a larger common plan of development or sale that would disturb one acre or more.
- Develop and implement, at a minimum, the following:
  - An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under state and local law;

- Requirements for site operators to implement appropriate erosion and sediment control BMPs, and to control waste;
- Procedures for site plan reviews that incorporate consideration of potential water quality impacts;
- Procedures for receipt and consideration of information submitted by the public; and
- Procedures for site inspection and enforcement control measures.

### 3.1: Minimum Measures & Required BMPs

- a. Require that all regulated construction projects within the Small MS4 submit a construction stormwater management plan (site plan) prior to construction. The plan shall be consistent with state and local requirements and incorporate consideration of potential water quality impacts including stormwater pollution prevention through appropriate erosion, sediment, and waste control BMPs. A stormwater pollution prevention plan (SWPPP) developed pursuant to the MPDES General Permit, MTR100000 for Stormwater Discharges Associated with Construction Activity (MPDES Stormwater Construction GP), may substitute for this site plan.
  - i. Update and implement a construction stormwater management plan review checklist that documents, at a minimum, the requirements described in the Technology-Based Effluent Limitations of the most current MPDES Stormwater Construction GP for all regulated construction projects. The checklist shall be used to ensure consistent review of submitted plans and to determine and document compliance with state and local requirements.
- b. Ensure that all construction stormwater management controls are installed, operated, and maintained to function as designed.
  - i. Update and implement a site inspection form or checklist to complete consistent and thorough regulated project inspections for all regulated construction projects. The checklist shall include, at a minimum, the requirements described in the Technology-Based Effluent Limitations of the most current MPDES Stormwater Construction GP.
  - ii. Maintain a regulated project inventory to include, at minimum, the following:
    - If the project is covered under the most current MPDES Stormwater Construction GP and if so, the associated authorization number
    - The location, size, and topography of the site
    - The proximity of the site to waterbodies for each project
  - iii. Utilize a protocol to determine the priority and minimum routine inspection frequency of construction stormwater management controls. Priority is to be determined using, at a minimum, the following criteria:
    - Project size
    - Proximity to a water body
    - Steepness of the project site slopes
    - Discharge to waterbodies impaired for pollutants expected from construction projects
    - Past record of non-compliance by the operator of the construction site



The protocol shall establish the following minimum routine inspection frequency for all determined high priority projects:

- Once at commencement of construction after BMPs have been implemented
- Once within 48 hours after each rain event of 0.25 inches or greater
- Once within 48 hours after each occurrence of runoff from snowmelt due to thawing conditions that cause visible surface erosion at the site
- Once at the conclusion of the project prior to finalization (i.e. release of bond, issuance of certificate of occupancy, etc.)

In addition, the protocol shall include recidivism reduction and corrective measures at non-compliant sites, such as processes for:

- Additional onsite visits;
- Increased inspection frequency;
- Written notice of violations;
- Stop work orders; and
- Advancement to enforcement via the ERP process, as discussed below in II.A.3.c.iii.

- iv. The permittee must annually identify and inspect a minimum number of projects not equaling zero. Conduct and document inspections using the inspection form and determined routine inspection frequency protocol. If a routine inspection identifies non-compliance, or a failure to implement appropriate control measures that cannot be corrected at the time of initial inspection, the permittee must verify and confirm issues have been corrected within 14 days of documentation of non-compliance. If the illicit discharge has not ceased after 14 days, or control measures are still inadequate, the permittee must advance the non-compliant site through the established ERP process (II.A.3.c.iii).

c. Through ordinance or other regulatory mechanisms to the extent allowable under state and local law, effectively require controls of construction related pollutants (such as sediment and erosion) on regulated construction projects and implement appropriate enforcement procedures/actions.

- i. Adopt and implement an ordinance or other mechanism to require construction stormwater controls on private and permittee-owned regulated projects. At a minimum, the regulatory mechanism must:
- Require the construction stormwater management minimum standards (described as Technology-Based Effluent Limitations in the most current MPDES Stormwater Construction GP) to be implemented on all regulated construction projects.
  - Provide the permittee the authority to inspect privately-owned construction stormwater management controls
- ii. The Enforcement Response Plan (ERP) developed in II.A.2.d.i shall be implemented and maintained to ensure compliance with construction stormwater management regulatory mechanisms on regulated projects including private property. The ERP must include informal, formal, and judicial responses (as listed in II.A.2.d.i.). Additionally, the ERP shall include sanctions and enforcement mechanisms to achieve compliance and must describe or identify, at a minimum, the following:

- How the permittee will eliminate and abate illegal construction discharges
- Staff with enforcement authority
- Enforcement actions available
- Enforcement escalation processes including a schedule to quickly and consistently eliminate the source of the discharge
- How the permittee will facilitate abatement of the damages and reduce the chance of reoccurrence

In addition, the ERP must also include non-monetary construction project-specific penalties such as stop work orders, bonding requirements, and/or permit denials for non-compliance. Review the written ERP once per permit cycle and document updates in the SWMP, as needed.

### 3.2: Responsible Party

The City of Great Falls Environmental Division will be responsible for the implementation of the required BMPs. More specifically, the Environmental Division Manager, the Environmental Program Specialist, and the Stormwater Specialist.

#### 3.2.1: MCM-4: BMP a.i

For any project resulting in one (1) acre or more of disturbance, COGF requires applications to include Stormwater Pollution Prevention Plans (SWPPPs). COGF provides comments/feedback on SWPPP submittals through the City's Development Review Process. SWPPPs must be reviewed and approved by COGF prior to issuance of a Building Permit and/or commencement of any onsite construction activities. SWPPP's are reviewed utilizing the City's SWPPP Review Checklist (Attachment C).

For any project resulting in less than one (1) acre but more than 10,000 square feet of disturbance, COGF requires applications to include a COGF Erosion Control Plan (ECP). COGF provides comments/feedback on ECP submittals during the City's Development Review Process. ECPs must be reviewed and approved by COGF prior to issuance of a Building Permit and/or commencement of any onsite construction activities.

Additionally, for single family residential projects, COGF issues Residential Erosion Control Permits (RECPs). RECPs are completed by COGF staff and included as an attachment to the applicant's Build Permit Application Approval. RECPs include a list of typical BMPs that can/should be utilized at residential construction sites as well as examples of installation specifications.

#### 3.2.2: MCM-4: BMP b.ii through b.iv

At a minimum, COGF conducts final inspections of all projects that fall under the three categories referenced in 3.2.1 above. All onsite inspections are conducted utilizing the City's approved site inspection form and checklist (Attachment D) to ensure inspections are consistent and thorough. The checklist includes the requirements described in the Technology-Based Effluent Limitations of the most current MPDES Stormwater Construction General Permit.

All regulated projects are mapped and inventoried in the City's asset management software (Cartegraph).

All regulated projects are prioritized utilizing the City's prioritization protocol (Attachment E). Projects determined to be high priority have requirements for additional inspection frequency.

Upon receipt of a complaint (phone call, email, internal notification, etc.) for a regulated project, COGF conducts compliance inspections in order to verify the complaint and assist in alleviating any instance of non-compliance. Instances of non-compliance are handled in accordance with the City's ERP.

### 3.2.3: MCM-4: BMP c.i through c.iii

COGF has an Enforcement and Response Plan (ERP) to ensure compliance at regulated project sites. The ERP is reviewed on an annual basis and updated as needed (Attachment B).

Sections 17.16.21 and 17.48 of OCCGF include provisions requiring construction stormwater controls at regulated project sites.

## Chapter 4: MCM 5: Post-Construction Site Stormwater Management

- Develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. Ensure that controls are in place to prevent or minimize water quality impacts.
- Develop and implement strategies that include a combination of structural and non-structural BMPs appropriate for the community.
- Develop and implement an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under state or local law.
- Ensure adequate long-term operation and maintenance of post-construction BMPs.

### 4.1: Minimum Measures & Required BMPs

- a. **Require that all regulated development projects submit a site plan consistent with state and local post-construction requirements, which incorporates consideration of potential water quality impacts including appropriate post-construction stormwater management controls.**
  - i. Update and implement a plan review checklist to ensure consistent review of submitted plans and to determine and document compliance with state and local post-construction requirements.
  - ii. Require that all regulated projects implement post-construction stormwater management controls that are designed to infiltrate, evapotranspire, and/or capture for reuse the post-construction runoff generated from the first 0.5 inches of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation (runoff reduction requirement). For projects that cannot meet 100% of the runoff reduction requirement, the remainder of the runoff from the first 0.5 inches of rainfall must be either:

- Treated onsite using post-construction stormwater management controls expected to remove 80 percent total suspended solids (TSS);
- Managed offsite within the same sub-watershed using post-construction stormwater management controls that are designed to infiltrate, evapotranspire, and/or capture for reuse; or
- treated offsite within the same sub-watershed using post-construction stormwater management controls expected to remove 80 percent total suspended solids (TSS)

Permittees allowing offsite treatment shall do the following:

- Develop and apply criteria for determining the circumstances under which offsite treatment may be allowed. The criteria must be based on multiple factors, including but not limited to technical or logistic infeasibility, such as:
  - Lack of available space
  - High ground water Permit
  - Ground water contamination
  - Poorly infiltrating soils
  - Shallow bedrock
  - Prohibitive costs
  - A land use that is inconsistent with capture and reuse or infiltration of stormwater

*Determinations may not be based solely on the difficulty and/or cost of implementation. The permittee must develop a formal review and approval process for determining projects eligible for offsite treatment. The offsite treatment option is to be used only after available onsite options have been evaluated and documented through the permittee's developed formal review and approval process.*

- Maintain an inventory of regulated projects which utilize offsite treatment for post-construction stormwater runoff. The inventory must include the following information for each approved project:
  - Geographic location of the project
  - Location of offsite treatment
  - Documentation of the rationale for approval of offsite treatment

**b. Ensure that all post-construction stormwater management controls are installed, operated, and maintained to function as designed.**

- i. Update and implement an inspection form or checklist to ensure consistent and thorough inspections of post-construction stormwater management controls.
- ii. Maintain an inventory (including at a minimum, a description and location) of all new permittee-owned and private post-construction stormwater management controls installed since the effective date of this permit.
- iii. Maintain an inventory (including at minimum, a description and location) of all existing permittee-owned and private high priority post-construction stormwater management controls installed prior to the effective date of this permit.

- iv. Utilize a protocol to determine the priority and minimum routine inspection frequency of post-construction stormwater management controls. Priority must be determined based on potential water quality impacts using specific criteria, which at a minimum shall include:
  - Operation and maintenance needs of the practices
  - Proximity to water body
  - Drainage area treated
  - Land use type
  - Location within an impaired waterbody watershed

The permittee must annually identify a minimum number of projects for inspection not equaling zero.

- v. Inspect all **permittee-owned** high priority post-construction stormwater management controls annually and document findings and resulting compliance actions.
  - vi. Develop a program to either conduct inspections of private high priority post-construction stormwater management controls, or to require self-inspection and reporting by owners. Inspect or have inspected all high priority privately-owned post-construction stormwater management controls annually. Document findings and resulting compliance actions.
- c. **To the extent allowable under state or local law, effectively require, through ordinance, or other regulatory mechanism, post-construction stormwater management controls on regulated projects and implement appropriate enforcement procedures and actions.**
- i. Adopt and implement an ordinance or other regulatory mechanism to require post-construction stormwater management controls on regulated projects that, at a minimum, include the performance standard described in Part II.A.4.a.ii, above. Review the ordinance or regulatory mechanism once per permit cycle and update as needed.
  - ii. The ERP developed in II.A.2.d.i shall be implemented and maintained to ensure compliance with installation, operation, and maintenance requirements for post-construction stormwater management controls on regulated projects including private property. The ERP must include informal, formal, and judicial responses (as listed in II.A.2.d.i.). Additionally, at a minimum, the ERP must describe or identify the following:
    - Legal authority to require inspection and maintenance of post-construction stormwater management controls
    - Staff with enforcement authority
    - Enforcement actions available
    - An enforcement escalation processes
    - A schedule to be utilized to quickly and consistently enforce compliance with post-construction requirements.
- d. **Incorporate recommendations and requirements into plans, policies, and ordinances which allow and support the utilization of LID (low impact development) concepts and green infrastructure on public and private property.**
- i. Assess and document existing ordinances, policies, programs, and studies to identify whether the following LID concepts (both structural and non-structural BMPs) have been

implemented to promote protection of stormwater runoff quality associated with new and redevelopment projects:

- Directing growth to identified areas
  - Protecting sensitive areas such as wetlands and riparian areas
  - Maintaining and/or increasing open space
  - Providing buffers along sensitive water bodies
  - Minimizing impervious surfaces
  - Minimizing disturbance of soils and vegetation
- ii. By the end of the third year of the permit cycle, develop and submit a plan outlining any needed modifications to relevant codes, ordinances, policies, and programs to implement LID/green infrastructure concepts. The plan shall include, but is not limited to, the preventative actions identified above that have not yet been implemented and proposed timelines for any needed code, ordinance, policy or programmatic updates. If modifications to codes, ordinances, policies, or programs are not needed, submit a plan/overview of any work scheduled or completed to implement LID/green infrastructure concepts, such as those listed above.

## 4.2: Responsible Party

The City of Great Falls Environmental Division will be responsible for the implementation of the required BMPs. More specifically, the Environmental Division Manager, the Environmental Program Specialist, and the Stormwater Specialist.

### 4.2.1: MCM-5: BMP a.i & a.ii

COGF requires all regulated projects implement post-construction stormwater management controls that are designed to infiltrate, evapotranspire, and/or capture for reuse the post-construction runoff generated from the first 0.5 inches of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation (runoff reduction requirement). COGF reviews, provides comments/feedback, and issues approval of proposed post-construction designs through the City's Development Review Process. The City's post-construction plan review checklist (Attachment F), Storm Drain Design Manual, Design and Construction Standards as well as the Montana Post-Construction Stormwater BMP Design Guidance Manual are utilized when reviewing proposed designs.

All regulated projects are mapped and inventoried in the City's asset management software (Cartegraph).

### 4.2.2: MCM-5: BMP b.i through b.vi

At a minimum, COGF conducts an initial inspection (Certificate of Occupancy Inspection) of all regulated post-construction projects. All onsite inspections are conducted utilizing the City's approved site inspection form and checklist (Attachment G) to ensure inspections are consistent and thorough.

All regulated projects are mapped and inventoried in the City's asset management software (Cartegraph).

All regulated projects are prioritized utilizing the City’s previously developed prioritization protocol (Attachment H). Projects determined to be high priority have requirements for additional inspection frequency.

All permittee-owned post-construction stormwater management controls have been determined to be high-priority and are inspected on an annual basis.

Additionally, COGF has developed/implemented Stormwater Maintenance Agreements that all privately owned regulated projects are required to complete. These agreements are between the private property owner and COGF and are notarized and filed at the Cascade County Clerk & Recorder Office. The language in the agreement requires the private property owner to operate and maintain the onsite post-construction stormwater management controls in accordance with an operation and maintenance manual approved by COGF. The agreements also incorporate inspection requirements, reporting requirements, etc. and grant COGF the authority to conduct maintenance activities if the private property owner fails to do so. The private property owner can then be held responsible to compensate the City for any required maintenance activities they fail to execute.

Upon receipt of a formal complaint (phone call, email, internal notification, etc.) for a regulated project, COGF conducts compliance inspections in order to verify the complaint as well as assist in alleviating any instance of non-compliance. Instances of non-compliance are handled in accordance with the City’s ERP.

#### 4.2.3: MCM-5: BMP c.i through c.ii

COGF has an Enforcement and Response Plan (ERP) to ensure compliance at regulated project sites. The ERP is reviewed on an annual basis and updated as needed (Attachment B).

Sections 17.16.22 and 17.52 of OCCGF include provisions requiring post-construction stormwater controls at regulated project sites.

#### 4.2.4: MCM-5: BMP d.i through d.ii

COGF has begun the process to review and assess the City’s current ordinances, policies and programs to identify whether LID concepts have been implemented to promote protection of stormwater runoff quality associated with new and redevelopment projects.

By the end of 2024 COGF will develop and submit a plan outlining modifications (if needed) to relevant ordinances, policies and programs to implement LID concepts.

## Chapter 5: MCM 6: Pollution Prevention and Good Housekeeping

- Develop and implement an operation and maintenance program that includes a training component and has the goal of preventing or reducing pollutant runoff from municipal operations. The program must include employee training to prevent and reduce stormwater pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and stormwater system maintenance.

## 5.1: Minimum Measures & Required BMPs

- a. Implement an operation and maintenance program to prevent or reduce pollutant runoff from permittee-owned/operated facilities and field activities.
- i. Maintain a written inventory of permittee-owned/ operated facilities and activities that have the potential to contribute contaminants to the MS4. The inventory should include, at a minimum, the following:

### Facilities:

- Maintenance and storage yards
- Waste handling and disposal areas
- Vehicle fleet or maintenance shops with outdoor storage areas
- Salt/sand storage locations
- Snow or dredge material disposal areas operated by the permittee

### Activities:

- Park and open space maintenance
- Parking lot maintenance
- Building maintenance
- Road maintenance/deicing
- Stormwater system maintenance including catch basin cleaning

Organize facilities/activities into labeled categories and list the possible contaminants from each. List the local department(s) and position(s) responsible for pollution prevention of each facility/activity. Update the inventory annually.

- ii. For each category established, maintain written standard operating procedures (SOPs) aimed at preventing or reducing pollutant contributions from municipal operations. Each SOP must contain, at a minimum, the following:
  - Identified stormwater pollution controls (structural and non-structural controls, and operation improvements) installed, implemented, and/or maintained to minimize the discharge of contaminants.
  - Inspection procedures for facilities and their structural stormwater controls, which at a minimum must include:
    - An annual visual inspection of each applicable facility.
    - A verification that the written facility procedures, documentation, and site map are current.
    - Visual observation of locations and areas where stormwater from facilities is discharged off-site, to state waters, or to a storm sewer system that drains to state waters.
    - Visual observation of facility conditions, including pollutant sources and control measures, to identify control measures that are inadequate or needing maintenance. All inadequate control measures shall be modified or replaced as soon as possible, but no later than six months from visual inspection. If a control measure cannot be modified or replaced within the six-month timeframe due to infeasibility (such as financial burden or time



commitment of capital improvement projects), the permittee will provide a written explanation and a schedule for improvement with the following year's annual report. Document facility inspections and communication with relevant department personnel regarding inadequate control measures.

Evaluate/update each SOP at least once over the term of this permit and submit any updates to SOPs with the annual report.

- iii. Maintain a map that identifies the locations of facilities and activities identified. Update the map annually.
- iv. Conduct stormwater pollution prevention training in compliance with section II.B (below) for all permittee staff directly involved with implementing SOPs. Retain records of completed trainings and attendance.

## 5.2: Responsible Party

The City of Great Falls Environmental Division will be responsible for the implementation of the required BMPs. More specifically, the Environmental Division Manager, the Environmental Program Specialist, and the Stormwater Specialist.

### 5.2.1: MCM-5: BMP a.i through a.iv

COGF maintains an inventory of permittee-owned and operated facilities that have the potential to contribute contaminants to the MS4 (see below).

- Central Garage
- Environmental
- Fire Department
- Great Falls Housing Authority
- Great Falls Water
- Park & Recreation
- Sanitation
- Streets
- Traffic
- Utilities

COGF has developed standard operating procedures (SOPs) for each of the facilities listed above. The SOPs are aimed at preventing or reducing pollutant contributions from municipal operations. Each SOP was developed in cooperation with members of each facility in order to ensure they are customized and optimized for that facility's operations. Staff responsible for implementation of the work associated with SOPs are trained during the 1<sup>st</sup> and 4<sup>th</sup> year of this permit term (see Chapter 5). All SOPs are evaluated at least once during the permit cycle and will be modified / updated as needed. Additionally, the locations of these facilities are shown on a map that is updated annually.

## Chapter 6: Training

COGF attends / participates in various local, state and regional training opportunities in order to provide updated / additional knowledge to the individuals responsible for implementing the elements of the City's MS4 program.

1. Stormwater Management Team (SWMT)
  - a. The SWMT attends / participates in trainings on a yearly basis in order to stay up-to-date on constantly evolving stormwater related regulations.
2. Construction Site Personnel
  - a. Construction site personnel attend / participate in trainings on a yearly basis in order to stay up-to-date on evolving stormwater related regulations.
3. Post-Construction Site Personnel
  - a. Post-construction site personnel attend / participate in trainings on a yearly basis in order to stay up-to-date on evolving stormwater related regulations.
4. Field and Facility Personnel
  - a. Field and facility personnel are provided training during the 1<sup>st</sup> and 4<sup>th</sup> year of the permit term or if / when facility SOPs are updated.

## Chapter 7: Monitoring Requirements

COGF conducts, at a minimum, semi-annual stormwater monitoring in order to better understand the overall impact the City may have on the local waterbodies. Samples are collected upstream of the City and downstream of the City on the Missouri River, the Sun River, and the City's outfall into Sand Coulee Creek. Additionally, samples are collected at various location within the City's stormwater collection system. All sampling is conducted in accordance with the City's MS4 Wet Weather Sampling and Analysis Plan (Attachment I).

## *Attachment A*



# ILLICIT DISCHARGE INVESTIGATION AND CORRECTIVE ACTION PLAN WITHIN THE CITY OF GREAT FALLS, MONTANA

November 2023

## Introduction

In accordance with the General Permit for Storm Water Discharge Associated with Small Municipal Separate Storm Sewer System (MS4), issued by the Montana Department of Environmental Quality (DEQ), the City of *Great Falls* is required to develop and implement an illicit discharge investigation and corrective action plan. Illicit discharge as defined in the Administrative Rules of Montana (ARM) 17.30.1102(7) "means any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to an MPDES permit (other than the MPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities." This plan provides guidelines for tracking potential illicit discharges and criteria by which City personnel can determine the most appropriate corrective action to eliminate an illicit discharge. [\*Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments\*](#), developed by the Center for Watershed Protection (CWP), was utilized to guide the development of this plan. The complete document is available at <https://greatfallsmt.net/publicworks> for reference.

This plan has been developed with the following objectives in mind:

- Identify the source of an illicit discharge
- Determine appropriate corrective actions
- Abate damages following detection of illicit discharge
- Prevent recurrence of illicit discharge violations

## 1. Source Detection and Investigation Procedures

Potential illicit discharges can be revealed through various sources such as outfall inspections, reports from staff, or public complaints. If the source of a potential illicit discharge is not immediately clear the City of Great Falls will begin an official illicit discharge investigation to trace the source of the illicit discharge following the procedures outlined in this section.

The City of Great Falls currently has two technicians that respond to suspected violations of the IDDE program. The City maintains a hotline to receive calls that citizens can call during business hours and another line to call if it is after business hours. There is also an alternative method on the website by reporting a discharge via internet complaint form.

Hotline Phone Numbers:

- (406) 727-8390 business hours
- (406) 727-8637 after hours partner hotline

In cases where the source of an illicit discharge is immediately known (e.g. when an illegal dumping or illicit discharge problem is directly observed by a member of the City staff) it is generally not necessary to follow investigation procedures. In such cases the Environmental Division Compliance Technician will complete the steps outlined in Sections 1.1 - 1.4 and will then refer to the corrective action procedures provided in Section 2.

## **1.1 Documentation**

When a potential illicit discharge is identified the Environmental Division Compliance Technician will start an investigation file. An Illicit Discharge Investigation and Corrective Action Form which includes a creation date, case description, and any information related to the observed or suspected problem will be filled out. The Environmental Division Compliance Technician will keep an accurate log of labor, materials and costs associated with the investigation for invoicing the responsible party, if necessary. The form will be started prior to completing any additional field work unless the nature of the discharge necessitates an immediate response. As the investigation proceeds, any field investigations, photographs, corrective actions, or other activities associated with the suspected problem area will be documented and saved on file as this becomes the City's official record of the illicit discharge detection and elimination (IDDE) investigation. Additional documentation may include the following:

- Copy of Outfall Inspection Report
- Photographs
- Additional field notes
- Lab testing results
- Compliance letters sent and responses received
- Correspondence (mail, email, telephone logs)
- Proof of corrected problems (contract and invoice or clean field investigation report)

## **1.2 Site Visit**

In cases where the City's Environmental Division did not discover the potential illicit discharge (e.g. the City was made aware via a public complaint), the Environmental Division Compliance Technician will conduct a site visit to confirm the nature of the problem and determine the prioritization of the investigation.

## **1.3 Prioritization**

Each suspected illicit discharge has the potential to cause damage to the MS4 and receiving waters; however, certain situations may warrant more immediate attention than others and each investigation must be prioritized in order to protect public health and avoid serious threats to the environment or damage to property. The following items will be considered when determining the immediacy of the investigation:

- Discharges posing an immediate threat to human health
- Discharges within 100 feet of a surface or drinking water source
- Discharges containing substances with significant potential to cause immediate damage to the environment
- Large volume (25 gallons) or continuous flow (3 gallons per minute)
- Potential threat of contaminating groundwater

## **1.4 Notification of Appropriate Agencies**

### Threat to Human Health:

Discharges and/or activities which are believed to be an immediate threat to human health or the environment will be reported to Montana DEQ. DEQ's Enforcement Division may assist in the investigation and corrective action process if necessary. The phone number and website to access a Complaint/Spill Form are as follows:

Phone: (406) 444-0379

Website: <http://deq.mt.gov/enf/spill.mcp>

The local health department protects people from health threats such as food-borne illnesses, natural and man-made disasters, toxic exposures, and preventable illness and injury. This includes hazardous spills near drinking water sources, parks with dogs and children, and potential to contaminant soils and groundwater.

The health department phone number is:

Phone: (406) 454-6950

Hazardous Materials:

The City Fire Department will be contacted for situations requiring hazardous materials response. When hazardous materials are suspected the Environmental Division Compliance Technician will be contacted to determine if hazardous materials response is necessary:

Phone: (406) 727-8070

### **1.5 Select Appropriate Investigation Method**

The four investigation methods which may be used to trace and identify the source of a suspected illicit discharge are as follows:

- Storm Drain Network Investigations
- Drainage Area Investigations
- On-Site Investigations
  - Locating the spill/discharge
  - Identifying possible source(s)
  - Identifying substance(s) involved in the spill/discharge
  - Collection of sample and pictures of the spill/discharge
  - Identifying the responsible person
- Septic System Investigations

The Environmental Division Compliance Technician will review available information (e.g. initial documentation, previous investigations conducted in the vicinity, etc.) and select the appropriate method. Each method, as described by the Center for Watershed Protection (CWP), is briefly discussed below. Once the appropriate method is selected Chapter 13 of the CWP's [\*Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments\*](#) will be consulted, which contains detailed guidance on how to efficiently conduct each investigation.

After the appropriate investigation method has been selected, the Environmental Division Compliance Technician will coordinate the appropriate resources to begin the investigation to trace and identify the source of the illicit discharge.

#### **i.) Storm Drain Network Investigations**

City personnel inspect manholes within the area of the suspected illicit discharge and examine the manhole contents for chemical or physical indicators of contaminants in an effort to narrow the illicit discharge location to an isolated pipe segment between two manholes. Indicators may include odor, color, staining, unusual films, floatables, or samples which may be taken for chemical testing in a laboratory. The City's storm drainage system map will be helpful in determining which manholes to visit and inspect. After the pipe segment has been isolated, on-site investigations may be used to locate the exact location of the illicit discharge.

#### **ii.) Drainage Area Investigations**

When there is strong evidence that suggests a specific and known contaminant or if the known contaminant points towards a short list of potential discharge sources, it is often most effective to survey the drainage area and focus on sites which are known to produce and/or contain the contaminant which has been identified within the storm drain network. The primary methods for conducting drainage area investigations include windshield surveys and mapping analyses. While conducting the investigation it is recommended to consult the mapped pipe network and compare this to maps of high priority businesses, land use types and zoning, and on-going construction projects.

#### **iii.) On-Site Investigations**

The on-site investigation diagnoses the exact location and source of an illicit discharge and should be performed after the illicit discharge has been isolated to a specific section of the storm drain network. Techniques such as dye testing the plumbing systems of households and

buildings, video testing, and smoke testing may be necessary for this type of investigation. It is important to understand when a technique would work best for the application and to understand limitations that may deem the technique unusable.

#### **iv.) Septic System Investigations**

Some residential watersheds do not have sanitary sewer systems or stormwater conveyance piping, but rather have septic systems and alternative practices for dealing with stormwater volumes. Stormwater conveyance systems consisting of swales, ditches, and ponds are common in these watersheds and the illicit discharges often come from failing septic systems and illegal dumping. Two separate types of analyses are typically employed in these areas: on-site septic investigations and detailed system inspections. On-site septic investigations typically include homeowner system audits or surface condition analyses. Detailed system inspections are more thorough, typically involve the use of infrared imagery, and are usually appropriate if the on-site investigations are not successful in locating the source of an illicit discharge.

### **1.6 Document Investigation Findings**

Once the source of an illicit discharge has been identified, the Environmental Division Compliance Technician will document the findings and progress towards the corrective action process. Documentation may include but are not limited to:

- Investigation method(s)
- Photographs
- Additional field notes
- Lab testing results
- Attachment A: Illicit Discharge Investigation and Corrective Action Plan Form

## **2. Corrective Action Process and Procedures**

After the source of an illicit discharge has been identified, the Environmental Division Compliance Technician will begin the corrective action process to eliminate the discharge. Where applicable, corrective actions will focus first on education to promote voluntary compliance and escalate to increasingly severe enforcement actions as needed.

### **2.1 Determine Type of Illicit Discharge**

The type of an illicit discharge can be generalized as either behavioral or structural, each of which is discussed below.

#### **i.) Behavioral**

The nature of the illicit discharge is an action, operation, or conduct and the illicit discharge will be eliminated when this behavior is modified.

#### **ii.) Structural**

The illicit discharge is caused by a physical configuration or connection which requires modification of the system in order to eliminate the discharge.

### **2.2 Assign Responsibility**

The party responsible to fix the illicit discharge will be identified based on the nature and location of the illicit discharge.

#### **i.) Private Property Owner**

If an illicit discharge is determined to have originated from private property, the property owner will be responsible to resolve the issue in a timely and effective manner. If the property owner is unable and/or unwilling to resolve the issue, the City of Great Falls will assist the property owner with the resolution, at the owner's expense.

**ii.) Municipality**

If an illicit discharge is determined to have originated from public property owned by the City of Great Falls or as a result of improvements to City owned infrastructure, the City of Great Falls will be responsible to resolve the issue in a timely and effective manner.

**iii.) Other Public Entity**

If an illicit discharge is determined to have originated from public property not owned by the City of Great Falls, the City will work to determine the owner of the property and reasonably determine the party that is responsible to resolve the issue. If a responsible party cannot be determined or the property owner is unable and/or unwilling to resolve the issue, the City of Great Falls will assist the property owner with the resolution, at the owner's expense.

**2.3 Select Appropriate Corrective Action**

If deemed to be safe and within the Environmental Division Compliance Technician authority and capabilities the illicit discharge may be eliminated immediately using appropriate and available methods. For situations requiring proper authorization and/or expertise, a work order will be generated and sent to Environmental Division Compliance Technician for approval.

For cases where a private property owner is responsible the Environmental Division Compliance Technician will coordinate with the Responsible Party to determine an appropriate method to eliminate the illicit discharge. If necessary, enforcement actions such as a compliance schedule will be created to ensure that the illicit discharge is eliminated in a timely manner (refer to the Enforcement Response Plan (ERP) to determine appropriate enforcement actions).

Chapters 8 and 14 of the CWP's [Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments](#) provides a list of methods to remove and eliminate illicit discharges and will be used, if necessary, to determine the appropriate corrective action.

**2.4 Confirm and Document Elimination of Contamination Source**

A site visit may be necessary to confirm the source has been eliminated, the corrected operations are sufficient, and/or the structural problem has been fixed according to the approved corrective action. In other cases, it may be sufficient to allow a verbal confirmation from the property owner, a photograph of the modification, as-built drawings, or simply verify that all signs of the illicit discharge are gone. Once confirmed, the Environmental Division Compliance Technician will close the investigation and correction file by noting the elimination of the discharge within the Illicit Discharge Investigation and Corrective Action Form. The city of Great Falls Environmental Division will take the appropriate steps necessary to document response and closure.

The City will evaluate its IDDE program annually, documenting actions taken to locate and repair illicit discharges. Documentation information includes: complaints received and investigated, number of outfalls inspected, and the number of illicit discharges detected and eliminated. Specific evaluations will include:

- Evaluation of effectiveness of illicit discharge detection and tracing methods,
- Any changes in flow and water quality data at ongoing sampling sites within the areas where illicit discharge have been detected and eliminated,
- The efficiency and feasibility of various procedures or the practical difficulties encountered with a particular approach.

**2.5 Enforcement Actions**

In circumstances where the responsible party does not volunteer compliance, refuses compliance, or disputes responsibility, the City will take enforcement actions consistent with the Enforcement Response Plan in order to ensure that the discharge is eliminated. Note that voluntary compliance in eliminating an illicit discharge may not preclude the responsible party from enforcement actions.



**ATTACHMENT A  
ILLICIT DISCHARGE INVESTIGATION & CORRECTIVE ACTION FORM**

---

City Personnel Involved \_\_\_\_\_ Date \_\_\_\_\_

---

Type of Initial Notification (e.g. Phone call from public, result of City inspection, Dry weather screening, etc.) \_\_\_\_\_

---

Location of Illicit Discharge (Address) \_\_\_\_\_

---

Responsible Party Name/Company \_\_\_\_\_ Telephone ( ) - \_\_\_\_\_    
*Repeat Offender High Priority Site*

---

Street \_\_\_\_\_ City \_\_\_\_\_ Zip \_\_\_\_\_

Description of Investigations Conducted and Investigation Findings:

---

---

---

Description of Corrective Action:

---

---

---

Enforcement Action (if applicable):

---

---

Level of Response \_\_\_\_\_ Selected Remedy \_\_\_\_\_ Date for Follow-Up \_\_\_\_\_

Additional Notes:

---

---

---

---

Confirmation of Resolution:

---

---

City Personnel \_\_\_\_\_ Date \_\_\_\_\_

## *Attachment B*



**Enforcement Response Plan for  
City of Great Falls, MT  
Small Municipal Separate Storm  
Sewer System (MS4) Program**

## I. Introduction

In accordance with the General Permit for Storm Water Discharge Associated with Small Municipal Separate Storm Sewer System (MS4), issued by the Montana Department of Environmental Quality (DEQ), the City of Great Falls is required to develop and implement an Enforcement Response Plan (ERP) to ensure compliance with stormwater regulations. The purpose of this ERP is to specify criteria by which City personnel can determine the enforcement action most appropriate to instances of non-compliance and communicate how the enforcement tools available to City personnel will be used to achieve compliance following violations of the City's stormwater regulations. This document addresses the Montana DEQ MS4 General Permit's ERP requirements for the following Minimum Control Measures (MCM's):

- MCM 3: Illicit Discharge Detection and Elimination
- MCM 4: Construction Site Storm Water Management
- MCM 5: Post-Construction Site Storm Water Management

The enforcement actions and procedures within this plan are generally applicable to each of the three MCMs listed above; however, enforcement actions and procedures which are specific to an individual MCM are addressed within the attachments, listed as follows:

- Attachment A: Illicit Discharge Detection and Elimination
- Attachment B: Construction Site Storm Water Management
- Attachment C: Post-Construction Site Storm Water Management

The procedures within this ERP have been developed with the following objectives in mind:

- Prevent pollutants from entering the MS4 and causing environmental harm.
- Communicate definitions for non-compliance.
- Establish appropriate enforcement action based on the nature and severity of the violation.
- Promote consistent and timely use of enforcement tools.
- Ensure that violators return to compliance in a timely manner.
- Recover costs incurred by the City due to operator non-compliance.
- Promote compliance through education and compliance assistance first and, if necessary, penalties second.

The City of Great Falls Public Works has the authority to enforce stormwater regulations under the following sections of its municipal code:

Illicit Discharge Detection and Elimination: Ordinance Title 13 and 17

Construction Site Storm Water management: Ordinance Title 13 and 17

Post-Construction Site Storm Water Management: Ordinance Title 13 and 17

## II. Abbreviations

<b>DEQ</b>	Department of Environmental Quality
<b>ERP</b>	Enforcement Response Plan

<b>MCM</b>	Minimum Control Measure
<b>MS4</b>	Municipal Separate Storm Sewer System
<b>NOV</b>	Notice of Violation
<b>SWO</b>	Stop Work Order

### III. Personnel Responsibilities

**Environmental Division Supervisor** - The Environmental Division Manager (EDM) and staff will be responsible for the day-to-day implementation and enforcement of the MS4 Program.

EDM responsibilities may include but are not limited to: Issuing Erosion Control Permits and Stormwater Management Permits to applicants that discharge pollutants and assist in adopting policies and procedures for carrying out the provisions of City Ordinance under Title 13 and 17.

Erosion Control Permits and Stormwater Management Permits are issued with approval of the Director of Public Works.

The enforcement responses carried out by the EDM and staff are as follows:

- Warning Notices.
- Notices of Violation.
- Informal meetings.

**Director of Public Works** - The Director of Public Works has the responsibility to monitor the EDM actions and to initiate the following enforcement actions at the recommendation of the EDM:

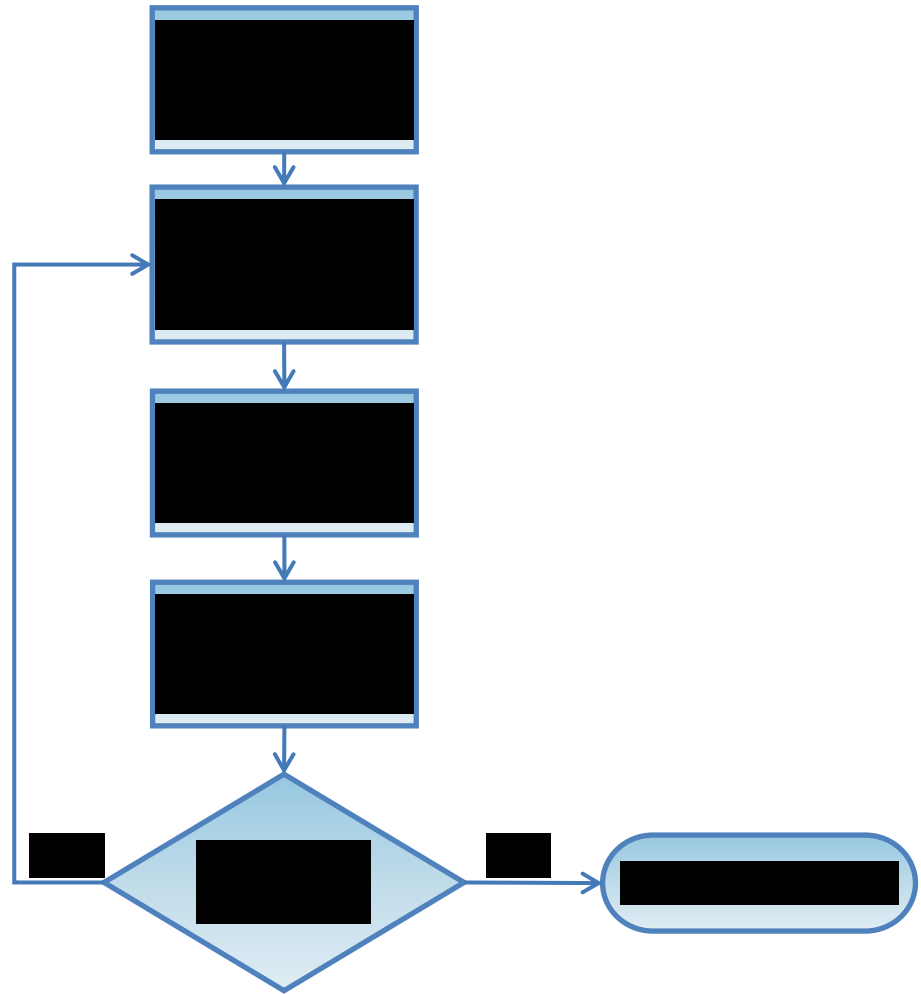
- Show cause hearings.
- Administrative Compliance Orders.
- Consent Orders.
- Administrative Fines.
- Suspension of Service.
- Referrals to the City Attorney for Judicial Enforcement Remedies.
- Referrals to the state or EPA for additional enforcement action.

**City Attorney** – The City Attorney will provide legal consultation as requested by the Public Works Director on enforcement actions and will take the lead on all referrals for Judicial Enforcement Remedies and storm drain system initiated investigations.

### IV. Enforcement Response Plan Overview

The enforcement process consists of six basic steps beginning with identification of a violation and concluding with closing the complaint. The overall process is shown within the flowchart below and is further explained within the following sections.

**Enforcement Response Flowchart for the  
City of Great Falls Stormwater Management Program**



## **V. Identify & Investigate**

The Environmental Division Manager (EDM) and/or Environmental/Stormwater Specialist may prepare monitoring and inspection plans, identify and investigate instances of violation, track/monitor and record results from stormwater sampling events, evaluate and categorize high priority sites, QA/QC and analytical laboratory analysis results, screen all data including compliance history, day to day operations to assess the compliance status of each person, or conduct periodic inspections.

The EDM and/or Environmental/Stormwater Specialist under the direction of the EDM will perform inspections at high priority sites. The inspection may include but is not limited to verifying and documenting existing site conditions, sampling discharges, reviewing records, establishing compliance patterns, and evaluating if changes have been made relative to the applicable approved plan, design, Code prohibition, or other relative compliance threshold.

The EDM and/or Environmental/Stormwater Specialist will prepare a formal report of the inspection and provide a copy to the person that was inspected. It will be the goal to provide this report within 30 days following the inspection. If violations are discovered during the inspection appropriate actions will be initiated according to the Enforcement Response Guide section of this plan.

The EDM and/or Environmental/Stormwater Specialist will periodically review types of projects, areas of the City, specific industries, etc. to determine which of these may need to become higher priorities. The EDM may require specific monitoring and reporting responsibilities of Permittees. These responsibilities will be determined by the EDM on a case-by-case basis.

## **VI. Description of Enforcement Actions**

### **Administrative Enforcement Actions**

#### **1. Warning Notice**

A Warning Notice is an informal enforcement response and, as such, is not discussed in City Ordinance. Warning Notices may be verbal or written – or verbal initially, followed up with a written communication. A Warning Notice will include a description of the violation and a request for continued cooperation. The person will be notified that the violation is minor in nature and continued violations will result in more severe enforcement actions. If appropriate, the Warning Notice may require a response within five (5) working days explaining actions that the person will take to correct the violation or prevent recurrence. All Warning Notices, verbal or written will be properly documented.

Warning notices are generally used in response to a Level 1 Violation as described in the Enforcement Response Guide section of this ERP. A Warning Notice may be sent by First Class mail.

## **2. Notice of Violation (NOV)**

An NOV is an Administrative Enforcement Action described in City Ordinance Section 13.9.150.B.1. as follows (see City Ordinance for exact requirements): When the City finds a person has violated, or continues to violate, any provision of City Ordinance Title 13, an Erosion Control Permit, Stormwater Management Permit, the City of Great Falls Storm Drainage Design Manual, or order issued hereunder, the City may serve upon the person a written Notice of Violation. Within five (5) working days of the receipt of such notice, an explanation of the violation and a plan for the satisfactory correction or prevention thereof, to include specific required actions, shall be submitted by the person to the City. The person may also request a meeting with the Director to present further information and explanation. Submission of such a plan in no way relieves the person of liability for any violations occurring before or after receipt of the Notice of Violation. Nothing in this section shall limit the authority of the City to take any action, including emergency actions or any other enforcement action, without first issuing a Notice of Violation.

The issuance of an NOV is generally the initial response for any violation above Level 1 as described in the Enforcement Response Guide section of this ERP, unless emergency action is required. An NOV will include:

- A statement detailing the City legal authority under which the City issued the NOV.
- A description of the Violation(s) including the date(s) that the violation occurred.
- A requirement that the Stormwater User respond within five (5) working days with an explanation of the violation and a plan including specific actions to be taken by the Stormwater User to correct and prevent the recurrence of future violations.
- A statement that compliance with the requirements of the letter does not excuse the violation.
- A requirement that the response must be signed by the Authorized Representative. and include the following certification statement (the NOV may reference a section of a permit issued to the Stormwater User that includes this requirement):
  - “I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or the persons directly responsible for gathering the information, the information submitted is, to the best



of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations."

An NOV may also be used to notify the Stormwater User of additional enforcement actions such as the assessment of an Administrative Fine. The NOV will be sent by Registered or Certified Mail (Return Receipt Requested) or hand delivered. The NOV may be followed up with additional enforcement actions depending on the severity of the violation and the response by the Stormwater User.

### **3. Administrative Compliance Order**

An Administrative Compliance Order is an Administrative Enforcement Action described in City Ordinance Section 13.9.150.B.2. as follows (see City Ordinance for exact requirements): When the City finds that a person has violated, or continues to violate, any provision of Title 13 of City Ordinance, an Erosion Control Permit, a Stormwater Management Permit, or order issued hereunder, or any other standard or requirement, the City may issue an order to the person to come into compliance within a specific time. A compliance order does not relieve the person of liability for any violation, including any continuing violation. Issuance of a compliance order shall not be a bar against, or a prerequisite for, taking any other action against the responsible party.

An Administrative Compliance Order would generally be issued when a responsible party's actions or failure to take action has resulted in noncompliance of City Ordinance resulting in level 3 or level 4 enforcement. The decision to proceed with an Administrative Compliance Order would normally be made by the Director of Public Works and will typically be issued when:

1. A discharge to the MS-4 that results in interference with City operation of the storm drain system (including endangering utility workers) or results in a discharge from the MS-4 that exceeds 1.4 times the applicable water quality standards.
2. Any discharge of a pollutant that has caused imminent endangerment to human health, welfare or the environment or has resulted in City exercise of its emergency authority to halt or prevent such a discharge.
3. Failure to meet, within ninety (90) days after the schedule date a compliance schedule milestone contained in a SMP, or enforcement order, or within fifteen (15) days after the scheduled date a compliance schedule milestone date contained in an ECP, or inspection or enforcement order thereto, for starting construction, completing construction or attaining final compliance.
4. Failure to provide, within thirty (30) days after the due date, required reports such as monitoring reports, compliance reports, periodic self-monitoring reports and reports on compliance with compliance schedules.

5. Failure to accurately report non-compliance.
6. Any other violation or group of violations, which may include a violation of Best Management Practices, which the City determines will adversely impact the operation and implementation of the MS-4 program.

Administrative Compliance Orders will include:

- A statement detailing the City legal authority under which the City issued the Order.
- A description of the Violation(s) including the date(s) that the violation occurred, the specific permit conditions violated and any damages attributable to the violation.
- The activity the person is being ordered to perform such as installation of treatment technology or BMP, additional monitoring, discontinuing discharge from certain sources, appearance at a formal meeting, etc.
- Compliance schedule with milestone date(s) for corrective actions as required.
- A statement that compliance with the terms and conditions of the order will not be construed to relieve the user of its obligation to comply with applicable Federal, State or local law.
- A statement that violation of the order may subject the user to all penalties available under City Ordinance.
- A statement that issuance of a compliance order shall not be a bar against, or a prerequisite for, taking any other action against the Stormwater User.
- A statement that the provisions of the order shall be binding upon the user, its officers, directors, agents, employees, successors, assigns, and all persons, firms, and corporations acting under, through, or on behalf of the user.

The Administrative Compliance Order will be sent by Registered or Certified Mail (Return Receipt Requested) or hand delivered.

#### **4. Consent Order**

A Consent Order is an Administrative Enforcement Action described in City Ordinance Section 13.9.150.B.3. as follows (see City Ordinance for exact requirements): The City may enter into Consent Orders, assurances of compliance, or other similar documents establishing an agreement with any person responsible for noncompliance. Such documents shall include specific actions to be taken by the person to correct the noncompliance within a time period specified by the document. A consent order may include penalties, supplemental environmental projects, or other conditions and requirements as agreed to by the City and the person.

Consent Orders are generally used in Level 3 and 4 violations as discussed in the Enforcement Response Guide section of this ERP where the person assumes responsibility for its noncompliance and is willing to correct its cause(s) in good faith. The terms of a Consent Order would be negotiated after the person has responded to a Notice of Violation and met with the City to explain the causes of the violation and has developed a plan for compliance. In determining the terms to include in the Consent Order, the City may take a user's extenuating circumstances (e.g. financial difficulties, technical problems, and other impediments to necessary corrective action) into consideration. The decision to proceed with a Consent Order would normally be made by the Director of Public Works in consultation with the City Attorney.

The Consent Order will include:

- A statement detailing the City legal authority under which the City issued the Order.
- The activity the person is being ordered to perform such as installation of treatment technology, additional monitoring, discontinuing discharge of a certain waste stream, appearance at a formal meeting, etc.
- Compliance schedule with milestone date(s) for corrective actions as required.
- Penalties, supplemental environmental projects, or other conditions and requirements (optional).
- Signatures of City and the person.

A Consent Order is an agreement between the City and the Stormwater User and as such must be approved by the City Manager and/or City Commission in accordance with the policies of the City.

## **5. Show Cause Hearing**

A Show Cause Hearing is an Administrative Enforcement Action described in City Ordinance Section 13.24.150 C.4. as follows (see City Ordinance for exact requirements):

- a. The City may order any person who has violated, or continues to violate any provisions of Title 13 Chapter 1, 9-13 of City Ordinance to show cause before an ad hoc committee appointed by the City Manager why the proposed enforcement action should not be taken. A notice shall be served on the person specifying the time and place of a hearing to be held by the ad hoc committee regarding the violation, the reasons why the proposed action is to be taken, and directing the person to show cause before the ad hoc committee why the proposed enforcement action should not be taken. The notice of the hearing shall be served personally or by registered or certified mail (return receipt requested) at least ten (10) days before the hearing.

Service may be made on any agent or officer of a corporation or other Authorized Representative of the person.

- b. At any hearing held pursuant to Title 13 Chapter 9 of City Ordinance, testimony taken must be under oath and recorded. The transcript of testimony will be made available to any member of the public and any party to the hearing upon payment of charges for the preparation thereof. The hearing may be suspended or continued at the discretion of the presiding officer, provided all evidence is received and the hearing is closed within sixty (60) days after it is commenced.
- c. After the ad hoc committee has reviewed the evidence, it shall issue an order to the person responsible directing that, following a specified time period, penalties will be implemented unless the violation is corrected. Further orders and directives as are necessary and appropriate to correct the violation may be issued.

The Show Cause Hearing is generally used in the case of Level 4 violations as described in the Enforcement Response Guidance section of this ERP where permit revocation, significant Administrative Fines, termination of service as a result of escalating enforcement (where a person has failed to respond satisfactorily to other enforcement actions), or Judicial Enforcement Remedies are being considered. The decision to proceed with a Show Cause Hearing should be made by the Director of Public Works in consultation with the City Attorney.

A Notice will be served on the discharger by personal service, certified or registered mail, return receipt requested, specifying the time and place of a hearing, the proposed action and the reasons for that action. An ad hoc committee will be appointed by the City Manager to hear the person's case and make a decision on the City's behalf. The committee's decision will be in the form of an order. If agreement cannot be reached between the person and City regarding violations, the City will terminate the user's services as outlined in City Ordinance Section 13.6.100.

Unless directed otherwise by the City Attorney, any order resulting from the Show Cause Hearing will be issued in the form of an Administrative Compliance Order under City Ordinance Section 13.9.150.B.2.

## **6. Administrative Fines**

An Administrative Fine is an Administrative Enforcement Action described in City Ordinance Section 13.9.150.B.5. as follows (see City Ordinance for exact requirements):

- a. When the City finds that a person has violated, or continues to violate, any provision of Title 13 Chapters 1, 9-13 of City Ordinance, an Erosion Control Permit, Stormwater Management Permit, the City of Great Falls Storm Drain Design Manual, or order issued hereunder, the City may fine such person in

an amount not to exceed one thousand dollars (\$1,000) per day per violation. Such fines shall be assessed on a per-violation, per day basis.

- b. A lien against the person's property shall be sought for unpaid charges, fines, and penalties.
- c. Issuance of an administrative fine shall not be a bar against, or prerequisite for, taking any other action against the person.

Administrative Fines are recommended as an escalated enforcement response, particularly when NOVs or Administrative Compliance Orders have not prompted a return to compliance. Whether Administrative Fines are appropriate responses to noncompliance also depends greatly on the circumstances surrounding the violation. When considering a fine, the City will consider the following factors:

- The type and severity of the violation.
- The number of violations cited.
- The duration of the noncompliance
- The impacts of the violation on the City's storm drain system and the environment.
- Whether the violation threatened human health.
- Whether the person derived any economic benefit or savings from the noncompliance.
- The compliance history of the user.
- Whether the user is making good faith efforts to restore compliance.

## **Judicial Enforcement Remedies**

Judicial Enforcement Remedies are compliance or enforcement actions normally undertaken through a City petition to the District Court. City Ordinance Section 13.9.150.C discusses four alternatives (see City Code for exact requirements):

### **1. Injunctive Relief**

When the City finds that a person has violated, or continues to violate, any provision of Title 13 Chapters 1, 9-13 of City Ordinance, an Erosion Control Permit, Stormwater Management Permit, the City of Great Falls Storm Drain Design Manual, or order issued hereunder, the City may petition the District Court for the issuance of a temporary or permanent injunction, as appropriate, which restrains or compels a specific activity of the person. The City may also seek such other action as is appropriate for legal and/or equitable relief, including a requirement for the person to conduct environmental remediation. A petition for injunctive relief shall not be a bar against, or a prerequisite for, taking any other action against a Stormwater User.

## **2. Civil Penalties**

- a. A person who has violated, or continues to violate, any provision of Title 13 Chapters 1, 9-13 of City Ordinance, an Erosion Control Permit, Stormwater Management Permit, the City of Great Falls Storm Drain Design Manual, or order issued hereunder shall be liable to the City for a maximum civil penalty not to exceed one thousand dollars (\$1,000) per day per violation.
- b. The City may recover reasonable attorneys' fees, court costs, and other expenses associated with enforcement activities, including sampling, monitoring and laboratory expenses, and the cost of any actual damages incurred by the City.
- c. In determining the amount of civil liability, the Court shall take into account all relevant circumstances, including, but not limited to, the extent of harm caused by the violation, the magnitude and duration of the violation, any economic benefit gained through the person's violation, corrective actions by the person, the compliance history of the person, and any other factor as justice requires.
- d. Actions for civil penalties shall be civil actions brought in the name of the City. The City must prove alleged violations by a preponderance of the evidence.
- e. Filing a suit for civil penalties shall not be a bar against, or a prerequisite for, taking any other action against a person.

## **3. Civil Fine Pass Through**

In the event that a person discharges such pollutants which cause the City to violate any condition of its MPDES permit and the City is fined by the EPA or the State for such violation, then such person shall be fully liable for the total amount of the fine and/or supplemental environmental project that results from such action by the EPA and/or the State.

## **4. Criminal Prosecution**

A person who purposely, knowingly or negligently violates any provision of Title 13 Chapters 1, 9-13 of City Ordinance, or willfully or negligently introduces any substance into the storm drain system which causes personal injury or property damage, or knowingly makes any false statements, representations, or certifications in any application, record, report, plan, or other documentation filed or required to be maintained pursuant to an Erosion Control Permit or Stormwater Management Permit, or order issued hereunder, shall, upon conviction, be guilty of a misdemeanor, punishable by a fine not to exceed one thousand dollars (\$1,000) per day per violation and be subject to imprisonment for not more than six (6) months, or both. In addition, these penalties may be sought for any person who maliciously, willfully, or negligently breaks, destroys, uncovers, defaces, tampers with, or otherwise destroys, or who prevents access to any structure, appurtenance or equipment, or any part of the storm drain system.

Judicial Enforcement Remedies will be implemented by the City Attorney in consultation with the Director of Public Works.

### **Remedies Nonexclusive**

The remedies provided in Title 13 Chapter 9 are not exclusive of any other remedies that the City may have under the provisions of Montana law. The City may take any, all, or any combination of these actions against a noncompliant person. Enforcement of violations will generally be in accordance with the Enforcement Response Plan. However, the City may take other action against any person when the circumstances warrant and may take more than one (1) enforcement action against any noncompliant person.

### **Public Nuisance**

Any violation of this Chapters 1, 9-13, an Erosion Control Permit, Stormwater Management Permit, the City of Great Falls Storm Drainage Design Manual, is hereby declared a public nuisance and may be corrected or abated by the Director or his designee. Any person creating such a public nuisance may be subject to the provisions of the Great Falls Municipal Code governing nuisances, including the provisions requiring reimbursement to the City for its costs of abatement. Action taken by the City to abate any nuisance shall not be a bar to criminal or other civil enforcement of this Code. The Director may initiate, on behalf of the City, an action in any court of competent jurisdiction concerning the abatement of any public nuisance created or caused by a violation Title 13 Chapters 1, 9-13. In any such action, the Director may request any legal or equitable relief, including injunctive relief and civil damages, as provided by applicable law.

## **VII. Enforcement Response Guide:**

When a violation is discovered during monitoring activities the Environmental Division Manager (EDM) will decide which enforcement action is appropriate. The available responses are divided into four escalating levels of enforcement. The appropriate level will be chosen in accordance with the following guidelines.

### Escalation of Enforcement Responses:

After the EDM has determined that a violation has occurred, a choice must be made between the four levels of enforcement - Level 1, Level 2, Level 3 and Level 4. In making this decision, the EDM should take the following factors into consideration:

- **Magnitude of the violation:** In choosing the proper enforcement level, the EDM should consider the degree to which a standard or requirement has been exceeded and whether the magnitude is a result of carelessness, negligence or disregard of the person's responsibilities.
- **Duration of the violation:** Violations (regardless of severity) which continue over prolonged periods of time, including required reporting that is significantly overdue,

should subject the person to escalated enforcement actions. One of the goals of the ERP is to prevent extended periods of noncompliance from recurring.

- **Effect of the violation on the receiving water:** Violations that have greater potential to cause or allow increased pollutant loading to the river should be escalated to a higher level of enforcement. For any violation where evidence of actual damage to the receiving water exists, Level 4 enforcement action should be considered.
- **Effect of the violation on the storm drain system:** The degree to which the violation has a direct impact on the storm drain system should be considered in determining the proper enforcement level. Effects on the storm drain system considered should include the structures, pipes, including any effect on the ability to operate the facilities and the cost of operating the facilities. Also included should be the ability of the City to efficiently and effectively perform the duties of the MS4 program.
- **Compliance history of the person:** Escalating enforcement response will be used for recurring violations, repeat offenders, and failure to achieve compliance subsequent to informal or formal enforcement. A recurring violation is one where: the same type of violation occurs on consecutive reporting periods or projects; the violation occurs seasonally; or any other pattern of noncompliance – even if each instance involves a different program requirement - is shown.
- **Good faith of the person:** The person's good faith in correcting its noncompliance is a factor in determining which enforcement response to invoke. Good faith may be defined as the person's honest intention to remedy its noncompliance coupled with actions which give support to this intention. Generally, a person's demonstrated willingness to comply should predispose the EDM to select less stringent enforcement responses. Good faith does not eliminate the necessity of an enforcement action. Good faith is typically demonstrated by cooperation and completion of corrective measures in a timely manner.

#### Violations Falling Under More Than One Category:

Violations that fall under more than one category in the Enforcement Response Plan will be addressed through the more severe enforcement response. All alleged violations will be included in the more severe response.

#### Timeframes for Enforcement Responses:

The EDM will respond to all instances of violations in a timely manner. It is recognized that there may be times where responses are delayed due to lack of sufficient information to make a final judgment, circumstances that result in protracted or complex investigation, competing resource requirements or similar factors, however, the EDM will meet the following guidelines once a violation is confirmed:

- All violations will be identified and documented within five (5) working days of receiving compliance information.
- Initial enforcement responses (informal or formal) will be taken within fifteen (15) days of identifying/verifying a violation.



- Follow up actions for continuing or recurring violations will be taken within sixty (60) days of the initial enforcement response.
- Violations which threaten health, property or the environmental quality are considered emergencies and will receive immediate response such as halting the discharge or terminating services.

The EDM will be responsible for performing all enforcement tasks or recommending enforcement actions to the Director of Public Works, unless that duty is specifically assigned to another individual. All enforcement actions must be consistent with the requirements of City Ordinance. City Ordinance should be consulted prior to initiating any enforcement response.

**Level 1 violation:**

Level 1 is characterized by minor violations requiring informal response. Violations appropriate for Level 1 enforcement action are minor in nature, short in duration and do not cause a direct discharge to or directly affect operations of the storm drain system. The violation will be an isolated incident, not part of a pattern of non-compliance. The person will generally have shown good faith efforts to meet requirements and have a good compliance history. Examples of a Level 1 violation are:

- Isolated event of a stormwater and/or non-stormwater discharge that leaves the property and has the potential to enter the storm drain system.
- Submitting a required response late, where it is within 30 days or less late and shows no violations and there is no evidence of intent or deception.
- Failure to implement Best Management Practices (BMPs) where there is no indication of intent.

The response to a Level 1 violation will typically be a Warning Notice.

If the person should respond in a negative manner or refuse to cooperate with the City requests/requirements, the EDM may implement Level 2 enforcement response.

**Level 2 violation:**

Level 2 is characterized by relatively minor violations that need to be formally acknowledged by the person. Violations appropriate for Level 2 enforcement will be more serious than Level 1 or may be a series of Level 1 violations. This enforcement level should be used in cases of violations more serious than Level 1 where the person has generally shown good faith efforts to meet discharge requirements, or other relatively minor violations. The violations will generally be short duration and/or isolated incidents that may cause a direct discharge to the storm drain system but may not cause major impacts to the system. Examples of a Level 2 violation are:

- Isolated event of a stormwater and/or non-stormwater discharge that leaves the property and has entered the storm drain system but has no major impact to the storm drain system.

- Unpermitted discharges to the storm drain system.
- Failure to submit an application within 30 days of due date or the application is substantially complete (i.e. missing non-critical information only).
- Failure to report discharges or changes at the facility affecting discharges where there is no major impact to the storm drain system.
- Inadequate record keeping where compliance status cannot be fully determined (i.e. incomplete files or missing records).
- Failure to properly install and maintain BMPs.
- Failure to implement Best Management Practices (BMPs) where the event is not beyond person's control.

The response to a Level 2 violation will typically be a Notice of Violation (NOV) explaining the violation and possible penalties and requiring a response within 5 working days from the person explaining actions they will take to correct the violation or prevent recurrence.

After considering the person's response to the NOV the City may decide that additional actions are required to address the cause of the violation.

If the person does not respond adequately to the NOV, enforcement action will escalate to Level 3.

**Level 3 violation:**

Level 3 is characterized by serious violations that do not require emergency action. These violations may be long duration or chronic in nature. Level 3 enforcement also may be a reaction to violations that remain uncorrected after attempts are made through lower levels of enforcement action. Examples of Level 3 violations are:

- Isolated event of a stormwater and/or non-stormwater discharge that leaves the property, has entered the storm drain system and has caused a major impact to the storm drain system.
- Uncorrected continuous violations causing minor effects to the storm drain system where the discharge is not causing a major impact but the person has not corrected the discharge after a Level 2 violation was issued.
- Discharging that has caused damage to the storm drain system or caused a MPDES permit violation where the event was beyond the reasonable control of the person.
- Inadequate or no response to NOV issued as a Level 2 violation.
- Entry denied or consent withdrawn or copies of records denied.
- Failure to submit an application within 30 days of due date or application is substantially incomplete (i.e. missing critical information) and the violation was not beyond reasonable control of person.
- Failure to accurately report noncompliance.

The response to a Level 3 violation will typically be issuance of an NOV and an Administrative Compliance Order requiring the person to cease the activity causing the violation. Action will be in accordance with one of the following:

- The Administrative Compliance Order will set a date for a formal meeting with a committee chosen by the Director of Public Works. A plan to correct the violation must result from the meeting. The plan will be put in the form of either an Administrative Compliance Order or a Consent Order. The order will include a compliance schedule as necessary. The committee will decide whether further action such as a fine, may be appropriate.
- Where the person has taken immediate corrective measures that are appropriate to correct the violation and are approved, or would be approved, by the City and has pursued such corrective measures with due diligence, the City shall have the option of either:
  - 1) Executing a Consent Order with the person that includes a schedule for them to implement the corrective measures and return to compliance; or
  - 2) Issuing an Administrative Compliance Order with a reasonable schedule for the person to implement the corrective measures and return to compliance.

If satisfactory compliance is achieved the City may decide that additional actions are required to address the cause of the violation including but not limited to modification of SMP, ECP, and SWPPP. Monitoring and reporting, inspection and sampling frequencies may be increased. If satisfactory compliance is not achieved, enforcement action will increase to Level 4.

Violations that occur while a compliance order is in effect:

Violations that occur during the term of a compliance schedule for causes that are dealt with in the compliance schedule may be addressed without an Administrative Compliance Order if all of the following are true:

- The person is in full compliance with the terms of the compliance schedule,
- The person is acting in good faith to limit the frequency, duration and magnitude of the violations, and
- The violations do not cause major damage or create imminent endangerment to the storm drain system, general health, safety and welfare of the citizens residing within the City and connecting jurisdictions.

The person must respond by investigating the violation and confirming the cause of the violation is being remedied through the actions prescribed in the compliance schedule. Nothing in this paragraph shall prevent the City from escalating enforcement or choosing a higher level of enforcement if appropriate.

**Level 4 violation:**

Level 4 is characterized by violations that are serious or require immediate response on the City's part to prevent or stop damage to the storm drain system or MPDES discharge violations. The EDM will consult with the Director of Public Works when a situation exists that may require

Level 4 action. The Director of Public Works will decide whether to proceed with enforcement action at this level. Consultation with the City Attorney may be necessary to guide the implementation of enforcement actions under this level. Violations in this category will be chronic in nature or will be damaging to the storm drain system or be causing, or capable of causing, MPDES discharge violations. Examples of Level 4 violations are:

- Continued non-compliance with lower level enforcement actions.
- Failure to comply with an order of the City.
- A discharge that causes a major impact or damages the storm drain system where the event was not beyond the reasonable control of the person.
- A discharge resulting in known environmental damage.
- A continuing discharge that is causing a significant discharge of pollutants to the receiving water.
- Chronic violations of Erosion Control Permit or Stormwater Management Permit requirements that remain uncorrected after lower level enforcement actions.

If the violation does not require emergency action, the person will be issued a NOV and an Administrative Compliance Order. The City will consider additional enforcement including Administrative Fine and/or Judicial Remedies.

If appropriate, a Show Cause Hearing will be scheduled.

If appropriate, the City will enter into a Consent Order with the person.

## *Attachment C*



**CITY OF GREAT FALLS**  
**PUBLIC WORKS - ENVIRONMENTAL DIVISION**  
**SWPPP Review Form Checklist**  
*(ENV STAFF USE ONLY)*

GENERAL INFORMATION		Y/N ?	N/A	COMMENTS
1	Project location description (address, parcel, etc?)			
2	Project activity description (general)			
3	Description of area of impact? (Total disturbed area, impervious surface, etc.)			
4	Information on construction schedule/sequence			
<b>Site narrative/map including the following (but not limited to) information</b>		<b>Y/N ?</b>	<b>N/A</b>	<b>COMMENTS</b>
5	>Project limits			
	>Clearing/Grading limits			
	>Existing vegetation			
	>Existing and proposed topography			
	>Existing and proposed runoff direction			
	>Surface waters and SW system w/in 200' of project			
	>Description of outfalls and receiving surface waters			
	>Measures to protect waterways, receiving surface waters, and natural resources			
	>Constr. sw mgmt plan is phased w/ construction			
	>Stockpile location, staging area, and access points			
	>All areas of constr., including but not limited to: structures, ret. walls, roads, utilities, trenches, etc.			
	>Geotech report/site soil information			
6	Specs/Maintenance plan for SW BMPs & control facilities			
7	Documentation of any design waivers/variances			
8	Copies of NOI and SWPPP document as submitted to DEQ			
9	Construction Stormwater Management Plan include BMP phasing plan and steps necessary for the transition of temporary storm BMPs to permanent BMPs			

## ADDITIONAL CONSIDERATIONS AND CONSTRUCTION DETAILS

### ***Technology-Based Effluent Limitations***

	Y/N ?	N/A	Comments
Does submittal meet Technology-based effluent limitation guideline as specified in MTDEQ permit MTR100000 (1/23-12/27) - Stormwater Discharges Associated with Construction Activities? Specifically Section Parts 2.1 & 3?			

### ***Univesal Requirements for Best Management Practices***

<b>Does the submittal address the following for the construction site: (If Applicable)</b>	Y/N ?	N/A	COMMENTS
Amount, frequency, intensity, and total duration of precipitation			
Qunatity and quality of storm runoff including peak flow rates and total SW volume			
Site specific soil properties			
Timeframe and season in which the project will complete			
Permittee responsibilities as outlined in MTR100000 2.1.1b			

### ***Erosion and Sediment Controls***

<b>Does the submittal address the following for the construction site: (If Applicable)</b>	Y/N ?	N/A	COMMENTS
Proposed ditches, swales, channels, outlets, etc. are clearly labeled on site plans and supported with maitenance narrative/specs			
Inclusion of sediment removal BMPs and applicable locations on construction site			
Proposed SW retention/detention facilities include specs, locations, and maintenance narrative			
Affected inlets, outlets, and conveyance channels on and offsite are labeled			
Maintenance narrative for all affected inlets, outlets, and conveyance channels on and offsite			
Plans include measures to stabilize and remove accumulated sediment from areas of disturbance			
Measures for traffic control, equipment laydowns, and material storage			

## ADDITIONAL CONSIDERATIONS AND CONSTRUCTION DETAILS

### ***Erosion and Sediment Controls cont.***

Does the submittal address the following for the construction site: (If Applicable)	Y/N ?	N/A	COMMENTS
Runoff are directed to natural buffers/applicable vegetative area within the construction site			
Natural buffers around "State Waters" as outlined in MTR100000			
Topsoil maintenance with efforts to minimize/limit site disturbance			

### ***Erosion and Sediment Controls cont.(Steep Slopes) - equal or greater than 15%***

Does the submittal address the following for the construction site: (If Applicable)	Y/N ?	N/A	COMMENTS
Design and construct cut-and fill slopes to minimize erosion			
Divert off site stormwater or groundwater away from slopes and disturbed areas			
Prevent stormwater run-ons from impacting sediment removal BMPs			

### ***Soil Stabilization***

Does the submittal address the following for the construction site: (If Applicable)	Y/N ?	N/A	COMMENTS
Stabilization of disturbed areas immediately for any portion of the construction project that will remain inactive for 14 or more calendar days with erosion control BMPs			
Use erosion control BMPs (including post construction BMPs) to stabilize disturbed areas within any portion of the project that have completed clearing, grading, excavation, or other earth disturbing activities			

### ***Dewatering***

Does the submittal address the following for the construction site: (If Applicable)	Y/N ?	N/A	COMMENTS
Does the proposed plan have authorization under the Construction Dewatering GP or individual permit prior to discharge of dewatering effluent to state surface waters			
Does the proposed plan include measures to control ground water, surface water, and/or accumulated stormwater dewatering activities			



## ADDITIONAL CONSIDERATIONS AND CONSTRUCTION DETAILS

### ***Pollution Prevention Measures***

<b>Does the submittal address the following for the construction site: (If Applicable)</b>	<b>Y/N ?</b>	<b>N/A</b>	<b>COMMENTS</b>
Include protection and containment for all construction activities related chemicals/products			
Proposed plan include spill prevention measures for vehicle maintenance and fueling, utilization of spill kit, and measures for reporting minor/major spills			
Proposed plan include measures to prevent discharge of concrete washout, cleaning fluids, and and general wash water			
Inclusion of information regarding safe handling/application of fertilizers/herbicides (per manufacturing standards)			

### ***Surface Outlets***

<b>Does the submittal address the following for the construction site: (If Applicable)</b>	<b>Y/N ?</b>	<b>N/A</b>	<b>COMMENTS</b>
Proposed retention facilities must have a surface outlet installed for active construction			
Proposed detention facilities must be designed to prevent discharges from bottom outlets during active construction			
When discharging from impoundments such as sediment basins and traps, outlet structures must be utilized that withdraw water from the surface			

### ***Prohibited Discharges***

<b>Does the submittal address the following for the construction site: (If Applicable)</b>	<b>Y/N ?</b>	<b>N/A</b>	<b>COMMENTS</b>
Proposed plan include narrative detailing expected discharge and demonstrate understanding of all prohibited discharges (Outlined in Construction General Permit 2.1.7)			

## *Attachment D*



**CITY OF GREAT FALLS  
PUBLIC WORKS - ENVIRONMENTAL DIVISION  
CONSTRUCTION SITE INSPECTION CHECKLIST  
(ENV STAFF USE ONLY)**

**General Information**

Project Name:			
Address/Location:			
Date of Inspection:	Start/End Time:		
Inspector Name(s):			
Inspector Title(s):			
Inspector Contact Info:			
Describe current phase of Construction:			

**Type of Inspection**

- Beginning of Construction     
  Project Wrap Up     
  During Rain Event     
  General Checkup  
 Response to Violations or Complaint     
  Pre-Storm Event     
  Post-Rain Event

**Weather Information**

Has it rained since the last inspection? (Y/N)	Yes
--	-----

If Yes, please provide:

Storm Start Date & Time:			
Storm Duration (hrs)		Approximate Rainfall (in.)	

Weather at time of this inspection:

- CLEAR     
  CLOUDY     
  RAINING     
  SLEET/HAIL     
  HIGH WINDS  
 SNOWING     
  FOG     
 OTHER:     
 TEMP:

Do you suspect any discharge may have occurred since the last inspection? If Yes, please provide date, time, and type of discharge:

## Weather Information Cont.

Are there any stormwater discharges at the time of inspection? (Y/N):

If Yes, provide location(s) and a description of stormwater discharged from the site (e.g. suspended sediment, turbid water, discoloration, and/or oil sheen):

## Prohibited Discharges

ARE THERE ANY PROHIBITED DISCHARGES AT THE TIME OF INSPECTION AND/OR ANY SIGNS OF PROHIBITED DISCHARGES SINCE THE LAST INSPECTION?       YES       NO

IF YES, PROVIDE LOCATIONS AND A DESCRIPTION:

	BMP/Activities	Applied?	Maintained?	Corrective Action Needed & Notes
--	----------------	----------	-------------	----------------------------------

### Erosion and Sediment Control(s)

1	Are stormwater volume and velocity controls being used to minimize soil erosion within the site? (e.g. check dams, fiber rolls, etc.)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
2	Are stormwater volume and velocity controls being used to minimize soil erosion at discharge locations? (e.g. stilling basins, fiber rolls, etc.)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
3	Are efforts being made to minimize the amount of soil exposed throughout the site?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
4	Are efforts being made to minimize the disturbance of steep slopes?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
5	Are perimeter controls and sediment barriers (e.g. silt fence) adequately installed (keyed into substrate) and maintained?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	

	<b>BMP/Activities</b>	<b>Applied?</b>	<b>Maintained?</b>	<b>Corrective Action Needed &amp; Notes</b>
<b>Erosion and Sediment Control(s) cont.</b>				
6	Are Storm drain inlets properly protected? (Off and onsite)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
7	Are discharge points and receiving waters free of sediment deposits? If no, provide locations.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
8	Is there evidence of sediment being tracked onto the street/roads?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
9	Are natural resource areas (e.g. streams, wetlands, trees, etc.) protected by natural buffers, barriers, or similar BMPs?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
10	Are efforts being made to minimize soil compaction and preserve topsoil?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
<b>Soil Stabilization</b>				
11	Are all slopes and disturbed areas not actively being worked on properly stabilized?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
<b>Dewatering</b>				
12	Are discharges from dewatering activities being managed by appropriate controls?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	

	<b>BMP/Activities</b>	<b>Applied?</b>	<b>Maintained?</b>	<b>Corrective Action Needed &amp; Notes</b>
<b>Pollution Prevention Measures</b>				
13	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
14	Are materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
15	Is trash/litter from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
16	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
17	Are vehicle and equipment fueling, cleaning, material storage, and maintenance areas free of spills, leaks, or other harmful materials?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
<b>Surface Outlets and Miscellaneous Items</b>				
18	When discharging from basins and impoundments, are outlet structures that withdraw water from the surface being used?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
19	Are there locations where additional BMPs appear to be necessary	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
Describe any incidents of non-compliance not described above:				

**Assessment**

Follow up needed? (Y/N) If yes, please provide any time frame:

Inspector Signature

Date

## *Attachment E*





DATE RECEIVED \_\_\_\_\_

**CITY OF GREAT FALLS  
CONSTRUCTION SITE STORMWATER INSPECTION  
FREQUENCY DETERMINATION PROTOCOL**

NAME OF PROJECT:		PROJECT FILE NUMBER:	PROJECT ADDRESS:
TOTAL ACRES:	DISTURBED ACRES:	LATITUDE:	LONGITUDE:
OWNER:		ADDRESS:	PHONE NUMBER:

**CONSTRUCTION SITE RATING TABLE**

CRITERIA	RATING SYSTEM	YES / NO	COMMENTS
Project Size	Greater than 1 acre	n	
Proximity to a surface water	Less than 1,000' or direct discharge	n	
Steepness of project site slopes	Slopes of 12% or greater	n	
Discharge to a impaired waterbody impaired	Pollutants of impairment expected at active construction site	n	

**INSPECTION FREQUENCY DETERMINATION TABLE**

TOTAL RATING VALUE	PRIORITY	INSPECTION FREQUENCY
1	LOW	1. Once upon receipt of a complaint
		2. Once at the conclusion of the project prior to final stabilization
2-3	MEDIUM	1. Once upon receipt of a complaint
		1. Once at the commencement of construction after BMPs have been implemented
4	HIGH	2. Once at the conclusion of the project prior to final stabilization
		1. Once at the commencement of construction after BMPs have been implemented
		2. Once w/in 48 hrs after rain event of 1/4" or greater
		3. Once w/in 48 hrs after each occurrence of runoff from snowmelt
		4. Once at the conclusion of the project prior to final stabilization

**INSPECTION FREQUENCY FOR CONSTRUCTION SITE**

TOTAL RATING	SITE PRIORITY
0	LOW

## *Attachment F*



Public Works Department  
 Environmental Division  
 1025 25th Ave NE  
 Great Falls, MT 59404  
 406-727-8390

Initial Submittal Date:
Resubmittal Date:
Resubmittal Version:

## Post- Construction MS4 Stormwater Management Review Checklist

(ENV Staff Use Only)

### General Project Information

Site Address:	
Project Name:	
Type of Work:	

### General Submittal Information

<u>DOCUMENTS</u>	<u>STATUS</u>	<u>COMMENTS</u>
Stormwater Management Permit Application		
SWPPP report (if ≥ 1 acre disturbed)		
ECP report (1 acre > disturbed area > 10,000 SF)		
MCM-5 Stormwater Drainage Report		
Geotech/Hydrogeology Report		
Industrial Pretreatment (IPT) Survey		
Waivers or Variances		

### Drainage Plans/Civil Drawings

<u>REQUIREMENTS</u>	<u>ADDRESSED</u>	<u>COMMENTS</u>
Project Name	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Developer and landowner information	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Preparation Date	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Name of preparer (e.g. name of company)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
North arrow and Scale	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Pervious and Impervious area label	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Municipal boundaries	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Roads	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Property boundaries (e.g. bearings)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Easements/right-of-ways	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Drainage basin boundaries	<input type="checkbox"/> Yes <input type="checkbox"/> No	

**Drainage Plans/Civil Drawings Continued**

<u>REQUIREMENTS</u>	<u>ADDRESSED</u>	<u>COMMENTS</u>
Existing and proposed buildings/structures within 150' of project area	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Existing and proposed utilities (type/location)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Irrigation Canals with diversion points	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Wildlife Habitat disturbance	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
FEMA floodplain disturbance	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Environmentally sensitive feature disturbance (e.g. wetlands)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Water resources (rivers, ponds, etc.) within 500' of project area	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Existing and proposed site topography (2' maximum contour intervals)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Existing and proposed permanent stormwater facilities (stormdrain, inlets, manholes, etc.)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Invert elevations, slopes, and lengths of stormdrain facilities	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Location of permanent stormwater control(s)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Plan and profile of each permanent stormwater control	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Discharge points clearly labeled	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	

**Maintenance Agreement and associated O&M manuals for each permanent Stormwater Management Control**

<u>REQUIREMENTS</u>	<u>ADDRESSED</u>	<u>COMMENTS</u>
A copy of the recorded M.A. with COGF ENV		
M.A. includes a schedule for routine and non-routine maintenance/inspections		
O&M manual addressing proper performance requirement(s) for each control(s)		
Contact information of responsible party for long term management (cell, email, etc.)		
Owner of stormwater management control(s) - usually the property owner		

## *Attachment G*



**CITY OF GREAT FALLS  
PUBLIC WORKS - ENVIRONMENTAL DIVISION  
POST-CONSTRUCTION SITE VISIT CHECKLIST  
(ENV STAFF USE ONLY)**

**GENERAL INFORMATION**

<i>Project/Site Name</i>			
<i>Type of Post-Construction Control(s)</i>			
<i>Site Address:</i>			
<i>Site Owner:</i>		<i>Site Owner Contact:</i>	
<i>Responsible Party(ies)</i>		<i>Responsible Party Contact:</i>	
<i>Date of Inspection:</i>		<i>Duration:</i>	
<i>Inspector(s):</i>		<i>Inspector Contact:</i>	

**TYPE OF INSPECTION**

ROUTINE, DRY WEATHER
  ROUTINE, WET WEATHER
  COMPLAINT RESPONSE

Other: \_\_\_\_\_

**WEATHER INFORMATION**

CLEAR     CLOUDY     RAINING     SLEET/HAIL     HIGH WINDS  
 SNOWING     FOG    OTHER: \_\_\_\_\_    TEMP: \_\_\_\_\_

ARE THERE ANY STORMWATER DISCHARGED AT TIME OF INSPECTION?     YES     NO

IF YES, PROVIDE LOCATION(S) AND A DESCRIPTION OF STORMWATER DISCHARGED FROM THE SITE (PRESENCE OF SUSPENDED SEDIMENT, TURBID WATER, DISCOLORATION, AND/OR OIL SHEEN, ODOR, ETC/

\_\_\_\_\_

## WEATHER INFORMATION CONT.

DO YOU SUSPECT THAT ANY PHYSICAL CHANGES OR DAMAGES TO THE STORMWATER MANAGEMENT CONTROL MAY HAVE OCCURRED SINCE THE LAST INSPECTION:

YES

NO

## PROHIBITED DISCHARGES

ARE THERE ANY PROHIBITED DISCHARGES AT THE TIME OF INSPECTION AND/OR ANY SIGNS OF PROHIBITED DISCHARGES SINCE THE LAST INSPECTION?  YES  NO

IF YES, PROVIDE LOCATIONS AND A DESCRIPTION:

	DESIRED CONDITIONS	FINDINGS	CORRECTIVE ACTIONS NEEDED & NOTES
1	Are the approved structural BMPs present?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
2	Are the structural BMPs sized in accordance with approved plans?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
3	Presence of excessive sediment deposition?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
4	Slopes are well stabilized and are not contributing sediment to the stormwater control(s)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
5	Absence of scour in swales or other vegetated areas	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
6	Trash racks, inlets, outlets, and low flow orifices are free of trash, debris, and sediment	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
7	Absence of woody vegetation impeding the performance of stormwater control(s)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
8	No signs of settling, cracking, bulging, misalignment, or other structural damages on outfalls	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
9	No signs of erosion in embankments, spillways, side slopes, inlet/outlet	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
10	Pipes going into and/or out of any stormwater control(s) are unclogged and unobstructed	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	

	DESIRED CONDITIONS	FINDINGS	CORRECTIVE ACTIONS NEEDED & NOTES
11	Absence of animal burrows	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
12	Absence of trash or debris in the stormwater control(s)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
13	There are no encroachments on the stormwater control(s)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
14	All necessary repairs to safety devices such as fences, gates, covers, or locks are complete	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
15	Absence of algae or overgrown vegetation in the pond/ditch	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
16	The ground surface stabilization is retaining any highly erosive or unstable soils	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
17	Seed germination practice is properly facilitated with blankets and/or netting	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
18	Stormwater control(s) appear to function properly	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
19	Are there location where additional stormwater control(s) are needed?	<input type="checkbox"/> YES	
		<input type="checkbox"/> NO	
		<input type="checkbox"/> N/A	
20	Additional items	<input type="checkbox"/> YES	
		<input type="checkbox"/> NO	
		<input type="checkbox"/> N/A	
Describe any incidents of non-compliance or maintenance needs that were not covered above			
Follow up inspection required? <input type="checkbox"/> YES <input type="checkbox"/> NO			
Inspector signature			Date



## *Attachment H*



PROJECT RECEIVED DATE \_\_\_\_\_

**CITY OF GREAT FALLS  
POST-CONSTRUCTION STORMWATER MANAGEMENT CONTROL  
INSPECTION FREQUENCY DETERMINATION PROTOCOL**

NAME OF PROJECT:		PROJECT ADDRESS:	
Post-Construction Acreage	# of BMPs	SIGNED M.A.* DATE	
<u>LAND OWNER*:</u>	<u>OWNER ADDRESS:</u>	<u>OWNER CONTACT:</u>	
PRIMARY RESPONSIBLE PARTY CONTACT INFORMATION:			
CONTACT NAME:	CONTACT NUMBER:	CONTACT EMAIL:	
CONSTRUCTION SITE RATING TABLE			
CRITERIA	RATING SYSTEM	YES / NO	COMMENTS
Drainage Area Treated	Greater than 1 acre		
Proximity to Major Waterbody	Less than 500' or direct discharge		
Land Use Type	Industrial		
Discharge to a Imparied Waterbody	Pollutants of impairment expected at property		
O&M Requirements	Difficult and/or complicated O&M requiring specialty personnel		
INSPECTION FREQUENCY DETERMINATION TABLE			
TOTAL RATING VALUE	PRIORITY	INSPECTION FREQUENCY	
0-3	LOW	Upon receipt of complaint	
4	MEDIUM	Once per permit cycle	
5	HIGH	Annually	
INSPECTION FREQUENCY FOR CONSTRUCTION SITE			
TOTAL RATING	SITE PRIORITY		
0	LOW		

MA\*: Maintenance Agreement

LAND OWNER\*: May be different than primary contact and operating business

*Attachment I*



# MS4 Wet Weather Sampling and Analysis Plan

---

City of Great Falls, Montana  
Stormwater Management Plan  
February 2024



*This page intentionally left blank*

## Table of Contents

### Contents

<b>1</b>	<b>Introduction .....</b>	<b>4</b>
1.1	Background .....	4
1.2	Purpose .....	4
<b>2</b>	<b>Great Falls’ MS4 Receiving Waterbodies .....</b>	<b>4</b>
2.1	Receiving Waterbody Overview .....	4
<b>3</b>	<b>Monitoring Design.....</b>	<b>5</b>
3.1	In-Stream Monitoring.....	5
3.2	Stormwater System Monitoring .....	7
3.3	TMDL-Related Monitoring .....	9
<b>4</b>	<b>Monitoring Methods .....</b>	<b>9</b>
4.1	Field Sampling Methods.....	9
4.2	Sampling Parameters and Analytical Methods .....	10
4.3	Sample Handling and Documentation.....	11
4.4	Storm Events and Sample Frequency .....	11
4.5	Quality Assurance/Quality Control .....	12
4.6	Analysis of Results .....	13
<b>5</b>	<b>Records.....</b>	<b>14</b>
<b>6</b>	<b>References.....</b>	<b>14</b>

### Appendices

- Appendix A – Supplemental Figures
- Appendix B – Sample Collection Container Requirements
- Appendix C – PCB Sampling Protocol
- Appendix D – Field Blanks and Field Duplicates Protocol
- Appendix E – Data Qualifiers

# 1 Introduction

## 1.1 Background

The City of Great Falls (City) operates its storm drainage system under the authorization of the Montana Pollution Discharge Elimination System (MPDES) General Permit for Stormwater Discharges Associated with Small Municipal Separate Storm Sewer Systems (MS4s), hereafter referred to as the MS4 General Permit. The current MS4 General Permit, issued by the Montana Department of Environmental Quality (MDEQ), is effective from April 1, 2022 through March 31, 2027.

In accordance with Part II of the MS4 General Permit, the City is required to perform semi-annual wet weather sampling, testing, and reporting of stormwater discharges from their MS4. Additionally, Appendix A of the MS4 General Permit instructs the City to evaluate potential impacts to impaired receiving waters and utilize monitoring to implement an adaptive management approach to minimize pollutant loads.

## 1.2 Purpose

The purpose of this sampling and analysis plan is to describe the City’s wet weather monitoring program for the current permit term. Additional specific details relating to the purpose of this plan are as follows:

- This plan will be implemented to identify and describe the selected monitoring locations associated with the self-monitoring requirements set forth in the MS4 General Permit.
- This plan describes how the City will use monitoring to evaluate potential impacts to impaired receiving waters, as required in Appendix A of the MS4 General Permit.
- This plan describes how the City will use monitoring to evaluate the effectiveness of BMPs implemented by the City.
- This document fulfills all monitoring requirements presented in the MS4 General Permit.

# 2 Great Falls’ MS4 Receiving Waterbodies

## 2.1 Receiving Waterbody Overview

Four surface waterbodies (three of which are impaired) receive stormwater discharges from the City’s MS4 outfalls (Montana Department of Environmental Quality, 2016). The receiving waterbodies and associated pollutants of impairment are identified in Table 2-1. Figure A.1 (Appendix A) provides a map of the City’s outfalls and associated receiving waterbodies.

**Table 2-1. Summary of Great Falls’ MS4 Receiving Waterbodies**

Waterbody	Location	Impaired	Approved TMDL	MS4 WLA	Pollutants of Impairment
Missouri River	Sheep Creek to Sun River	Yes	No	No	<ul style="list-style-type: none"> <li>▪ Sedimentation/siltation</li> </ul>

Missouri River	Sun River to Rainbow Dam	Yes	No	No	<ul style="list-style-type: none"> <li>▪ Chromium (total)</li> <li>▪ Mercury</li> <li>▪ Physical substrate habitat alterations</li> <li>▪ Polychlorinated biphenyls (PCBs)</li> <li>▪ Sedimentation/siltation</li> <li>▪ Selenium</li> <li>▪ Turbidity</li> </ul>
Sand Coulee Creek	Confluence with Cottonwood Creek to the mouth (Missouri River)	Yes	No	No	<ul style="list-style-type: none"> <li>▪ Lead</li> <li>▪ Salinity</li> <li>▪ Zinc</li> </ul>
Sun River	Muddy Creek to mouth (Missouri River)	Yes	Yes	No	<ul style="list-style-type: none"> <li>▪ Flow regime modification</li> <li>▪ Nitrogen (total)</li> <li>▪ Phosphorus (total)</li> <li>▪ Sedimentation/siltation</li> <li>▪ Total suspended solids</li> </ul>

Table 2-1 shows that the Sun River is the only receiving waterbody with an approved total maximum daily load (TMDL) and that none of the receiving waterbodies have an MS4 assigned WLA.

### 3 Monitoring Design

The City will employ in-stream monitoring, stormwater system monitoring, and BMP monitoring, each of which is discussed in the following sub-sections. Analyses will be conducted for all MS4 General Permit Self-Monitoring required parameters (see Table 1 of Part II.C in the MS4 General Permit) and all feasible listed pollutants of impairment for receiving waterbodies. A map that displays all monitoring locations is provided in Figure A.2 (Appendix A).

#### 3.1 In-Stream Monitoring

In-stream sample collection consists of obtaining samples from the MS4’s receiving waterbodies during wet-weather conditions. The goals of in-stream monitoring are to help the City understand:

- The ambient wet weather water quality status of the receiving waterbodies (Missouri River and Sun River)
- The trends in water quality observed for the receiving waterbodies
- How stormwater runoff is contributing pollutant loads to receiving waterbodies during representative storm events (evaluate how in-stream water quality changes from upstream of the MS4 to downstream of the City’s regulated MS4 area)

In-Stream Monitoring Applicable Permit Sections	
<input checked="" type="checkbox"/>	Part II.C: Self-Monitoring
<input checked="" type="checkbox"/>	Appendix A: TMDL Actions

##### 3.1.1 In-Stream Sample Collection Methods

Collection of in-stream samples will be used to evaluate water quality entering the MS4 (in accordance with Self-Monitoring requirements) and to evaluate potential impacts to receiving waterbodies (in accordance with Appendix A requirements).

Grab samples will be collected during wet weather events. City staff members will safely wade into the stream and/or use an extension pole from the stream bank to obtain samples 10 to 15 feet from the edge of water. If collected in locations where the river is adequately mixed, grab samples will provide a reasonable representation of in-stream conditions<sup>2</sup>. This approach is consistent with DEQ sampling procedures throughout the State of Montana (Kron, 2018).



Selection of sample locations is discussed in Section 3.1.2 and grab sample collection procedures are discussed in Section 4.1.1.

### 3.1.2 In-Stream Monitoring Locations

In-stream monitoring will be conducted at four locations in two of the City’s receiving waterbodies. The specific monitoring strategy associated with each waterbody is discussed below and a summary of the monitoring locations is provided in Table 3-1.

#### MISSOURI RIVER

Samples will be collected on the Missouri River upstream and downstream of the MS4 to evaluate the MS4’s impacts to the river. The Whitebear site, located upstream of MS4 outfalls, will assess water quality data for Missouri River flows prior to potential impacts from the MS4. The Black Eagle site is located downstream of all MS4 outfalls on the Missouri. It is anticipated that the MS4’s stormwater discharge flows will be adequately mixed with Missouri River prior to reaching the Black Eagle sample site, largely due to influence from Black Eagle Dam. The two outfalls located downstream of the Black Eagle Dam are on the same bank of the river as the sample site; therefore, samples gathered at this site should incorporate any influence that MS4 discharges have on Missouri River water quality.

#### SUN RIVER

Samples will be collected on the Sun River upstream and within the MS4 area to evaluate the MS4’s impacts to the river. The Sun site, located upstream of MS4 outfalls, will assess water quality data for Sun River flows prior to impacts from the MS4. The Sun River Downstream site is located just before the Sun River’s confluence with the Missouri River. Sample data from these two sites will be compared to evaluate changes in water quality that may be a result of MS4 discharges.

**Table 3-1. In-Stream Monitoring Sample Collection Locations**

Site ID	Waterbody	Location	Collection Method	Sample Parameters	Strategy
Whitebear	Missouri River	47.462576°N -111.305712°W	Grab	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Chromium, Mercury, Selenium	Assess the water quality on the Missouri River before entering the MS4 area
Black Eagle	Missouri River	47.536038°N -111.212400°W	Grab	TSS, COD, PCBs, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Chromium, Mercury, Selenium	Sample downstream of the MS4 to assess the MS4s impacts to the Missouri River (if any)
Sun	Sun River	47.509350°N -111.376159°W	Grab	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease	Assess the water quality on the Sun River before entering the MS4 area

Sun River Down-stream	Sun River	47.491989°N -111.325089°W	Grab	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease	Sample in the MS4 area before the confluence with the Missouri River, to assess the Sun River water quality in the MS4 area
-----------------------	-----------	------------------------------	------	--	---

### 3.2 Stormwater System Monitoring

Stormwater system monitoring consists of collection of samples in the City’s stormwater network (including samples at outfall locations). The goals of stormwater system monitoring are to:

- Understand how pollutant concentrations vary by land use (residential vs commercial)
- Evaluate reduction in pollutant loading over time as upstream BMPs are installed

Stormwater System Monitoring Applicable Permit Sections	
<input checked="" type="checkbox"/>	Part II.C: Self-Monitoring
<input checked="" type="checkbox"/>	Appendix A: TMDL Actions

#### 3.2.1 Stormwater System Sample Collection Methods

Wet weather stormwater system monitoring efforts will collect sample data from selected locations representing drainage from both residential and commercial land use categories. Collection of stormwater system samples will facilitate the identification of pollutant sources, characterization of stormwater (based on land use), and indication of the effects that stormwater runoff may have on receiving water quality when compared with in-stream water quality data. Samples will be collected as grab samples during wet weather events for all parameters. Grab sample collection procedures are discussed in Section 4.1.1.

#### 3.2.2 Stormwater System Wet Weather Monitoring Locations

Stormwater system monitoring will be conducted at five locations in drainage areas that discharge to the Missouri River and Sand Coulee Creek. The specific monitoring strategy associated with each sample location is discussed below and a summary of the monitoring locations is provided in Table 3-2.

##### EXPO

The Expo monitoring site is located in a drainage area that discharges to the Missouri River (Sun River to Rainbow Dam section). The drainage area is approximately 500 acres, comprised mostly of commercial land use. The City plans to use the monitoring data results from this site to evaluate how runoff from the City’s commercial areas may be affecting receiving waterbodies.

##### LOAF N JUG

The Loaf N Jug monitoring site is located in a drainage area that discharges to the Missouri River (Sun River to Rainbow Dam section). The drainage area is approximately 200 acres, comprised mostly of residential land use. The City plans to use the monitoring data results from this site to evaluate how runoff from the City’s residential areas may be affecting receiving waterbodies.

##### SAND COULEE 2

The Sand Coulee 2 sample site is at an outfall located within an open ditch downstream of the Mountain View pond. The pond has historically captured and retained the majority of runoff draining from the 350 acre drainage area. The primary goal associated with this sample location is to gather data that will be used to help the City evaluate the MS4’s potential impact to the water quality in Sand Coulee Creek. It is probable that during frequent storm events there will be no stormwater that discharges to Sand Coulee Creek. In such cases, this will be noted on the sample collection data sheet. Over time, the City may be able to develop an understanding of the storm event frequency which causes stormwater runoff to discharge to Sand Coulee Creek.

**Table 3-2. Stormwater System Monitoring Sample Collection Locations**

Site ID	Receiving Waterbody	Location	Collection Method	Sample Parameters	Strategy
Expo	Missouri River	47.510721°N -111.320415°W	Grab	TSS, COD, PCBs, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Chromium, Mercury, Selenium	Evaluate runoff from a representative commercial drainage area
Loaf N Jug	Missouri River	47.525436°N -111.300061°W	Grab	TSS, COD, PCBs, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Chromium, Mercury, Selenium	Evaluate runoff from a representative residential drainage area
Sand Coulee 2	Sand Coulee Creek	47.462997°N -111.246522°W	Grab	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Salinity	Assess the MS4 pollutant loading to Sand Coulee Creek

### 3.2.3 Stormwater System PCB Monitoring Locations

PCB monitoring will be conducted in areas that discharge to the Missouri River because the Missouri River is impaired for PCBs. DEQ’s listed probable causes include permitted industrial point source discharge and permitted industrial-commercial site stormwater discharge. The MS4 is not anticipating to be a contributor of PCBs. However, if future wet weather sampling events indicate elevated levels of PCBs, the sampling protocol outlined in Appendix C will be implemented.

#### BMP Monitoring

BMP monitoring consists of collection of samples immediately upstream and downstream of one of the City’s structural BMP’s. The goals of BMP monitoring are to:

- Assess the performance of the BMP for removal of a variety of pollutants in stormwater runoff
- Evaluate the effectiveness of the BMP to understand whether the BMP implementation is reducing the discharge of pollutants of concern from the MS4

#### BMP Monitoring Applicable Permit Sections

- Part II.C: Self-Monitoring
- Appendix A: TMDL Actions

### 3.2.4 BMP Sample Collection Methods

BMP monitoring efforts will collect sample data from points located immediately upstream and downstream of a structural BMP. Samples will be collected as grab samples during wet weather events. Grab sample collection procedures are discussed in Section 4.1.1.

### 3.2.5 BMP Monitoring Locations

The City has a hydrodynamic separator installed in Verde Park. This area drains to the Missouri River (Sheep Creek to Sun River section). The City will conduct monitoring immediately upstream and downstream of the hydrodynamic separator in order to evaluate its effectiveness at removing sediment from MS4 wet weather discharges. Additional parameters will also be analyzed in accordance with Table 1. Small MS4 Monitoring Requirements, of Part II.C in the MS4 General Permit.

The results of this evaluation will be used to assist the City in making informed decisions about whether to install a hydrodynamic separator in other locations. A summary of the monitoring locations is provided in Table 3-4.

**Table 3-4. BMP Monitoring Sample Collection Locations**

Site ID	Receiving Waterbody	Location	Collection Method	Sample Parameters	Strategy
Verde Up	Missouri River	47.484702°N -111.310451°W	Grab	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease Chromium, Mercury, Selenium	Evaluate the effectiveness of the hydrodynamic separator BMP (in correlation with Verde Down site)
Verde Down	Missouri River	47.484682°N -111.310499°W	Grab	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease Chromium, Mercury, Selenium	Evaluate the effectiveness of the hydrodynamic separator BMP (in correlation with Verde Up site)

### 3.3 TMDL-Related Monitoring

In accordance with requirements presented in Part II of the MS4 General Permit, the City will evaluate its contribution to impairments during wet weather events and implement BMPs targeted at reducing discharges contributing to impairments for the pollutants identified in Table 2-1. The City will utilize the two (2) sampling locations on the Missouri River (see above) as well as the two (2) sampling location on the Sun River (see above) as its four (4) specific TMDL-related monitoring locations. However, sampling results from all locations will be utilized to evaluate the overall contribution to impairments. Results will be analyzed in accordance with this document (see Section 4.6)

Additionally, the results of wet weather monitoring conducted as described in this plan will be used to inform the City’s assessment of BMP performance and future BMP implementation plans. The City continues to develop and implement its MS4 program that encompasses all required minimum control measures (MCM-1 through MCM-6). Implementation of the MS4 program will target pollutants of impairment by evaluating potential impacts/sources to receiving waterbodies and determining the best course of action to address those impacts/sources. The City utilizes both administrative (implementation of the MS4 program) and structural (ponds other physical features, etc.) BMPs to specifically target removal of Total Phosphorous (TP), Total Nitrogen (TN), and Sediment. For example, the primary purpose for the temporary BMPs required in MCM-4 as well as permanent BMPs required in MCM-5 is to minimize erosion and discharge of sediment. Removal of sediment can also potentially aide in the removal of other types of potential pollutants (i.e. TN, TP, metals, etc.).

## 4 Monitoring Methods

Quality Assurance/Quality Control (QA/QC) is critical for accurate sampling. This section provides details of sampling methods, laboratory analytical methods, and QA/QC procedures to be used in sampling.

### 4.1 Field Sampling Methods

The City will use manual sample collection techniques to conduct monitoring activities at each site in the immediate future. In the coming years, automated samplers may be used to collect grab samples at locations yet to be determined (the City will evaluate which sites are best suited for use of automated samplers over the coming year). Each of these methods are discussed below.

#### 4.1.1 Manual Sample Collection

Manual grab techniques will be used to collect samples at most sites. The samples will be collected by field personnel during measurable runoff events (that is, any rainfall or snow melt events that produce any volume of runoff flowing past/through the monitoring location that will allow a sample to be collected). Rainfall events will be monitored by weather surveillance radar so that field personnel can determine when to be present in the watershed during active events to obtain manual samples.<sup>3</sup> Samples will be collected in clean, labeled bottles provided by the laboratory. If necessary, an extension pole, rope or other apparatus can be used to aid the field crew in safe sample collection, especially during high flow conditions.

#### 4.1.2 Automated Sample Collection

The City owns two Teledyne ISO automated sampler devices. These devices may be used to collect grab samples in certain in-system (not in-stream) locations through the duration of this permit term. Locations will be selected based on applicability and access. The samplers will be programmed to collect a sample when flows at the site are at adequate depth to obtain a full sample.

#### 4.1.3 Sampling Equipment Decontamination

Decontaminated sample collection bottles and lids will be provided by Energy Laboratories Inc. in Billings. The City will use various tools and equipment during sampling events, summarized as follows:

- Beaker
- Catch pole
- Rubber gloves
- pH meter
- Manhole pick
- Coolers
- AA Batteries

All sampling equipment will be decontaminated after each sample is collected. This will prevent cross contamination between monitoring sites and it will help improve the accuracy and reliability of the data. Any equipment that comes in contact with raw surface water will be washed with Liquinox™ cleaning detergent and rinsed with distilled water.

#### 4.1.4 PCB Sediment Sample Collection

PCB sediment sample collection protocol is provided in Appendix C.

## 4.2 Sampling Parameters and Analytical Methods

The water quality samples collected will be analyzed for the listed pollutants of impairment in the specific receiving waterbody as well as the parameters listed in Table 1 of Part IV.A in the MS4 General Permit (Small MS4 Monitoring Requirements). Table 4-1 shows the parameters and standard analytical methods to be used.

**Table 4-1. Analytical Methods**

Parameter	Analytical Method	Required Reporting Limit (mg/L)	Volume Required & Sample Container (mL)	Preservative	Holding Time (days)
-----------	-------------------	---------------------------------	---	--------------	---------------------

Chemical Oxygen Demand	E410.4	5	50 mL plastic or glass	H <sub>2</sub> SO <sub>4</sub> to pH<2 Cool, ≤ 6°C	28
Chromium	E200.8	0.001	200 mL plastic or glass	HNO <sub>3</sub> to pH<2	6 months
Copper	E200.8	0.001	250 mL plastic or glass	HNO <sub>3</sub> to pH<2	6 months
Estimated Flow	N/A	N/A	N/A	N/A	N/A <sup>2</sup>
Lead	E200.8	0.0003	250 mL plastic or glass	HNO <sub>3</sub> to pH<2	6 months
Mercury	E245.1	0.000005	100 mL plastic or glass	HNO <sub>3</sub> to pH<2	28
Total Nitrogen (Persulfate method)	A 4500 N-C	0.04	50 mL plastic or glass	Cool, ≤ 6°C	N/A
Nitrogen – Kjeldahl, total <sup>1</sup>	E351.2	0.225	500 mL plastic or glass	H <sub>2</sub> SO <sub>4</sub> to pH<2 Cool, ≤ 4°C	28
Nitrate & Nitrite, total <sup>1</sup>	E353.2	0.01	50 mL plastic or glass	H <sub>2</sub> SO <sub>4</sub> to pH<2 Cool, ≤ 6°C	28
Oil and Grease	E1664A A 5520 B	1	1 L glass (2)	H <sub>2</sub> SO <sub>4</sub> to pH<2 Cool, ≤ 6°C	28
pH	E150.1	0.1 unit	N/A	N/A	Analyze immediately <sup>2</sup>
Total Phosphorus	E365.1	0.003	250 mL plastic or glass	H <sub>2</sub> SO <sub>4</sub> to pH<2 Cool, ≤ 6°C	28
Selenium	E200.8	0.001	250 mL plastic or glass	HNO <sub>3</sub> to pH<2	6 months
Total Suspended Solids	A 2540 D	4	1 L plastic or glass	Cool, ≤ 6°C	7
Zinc	E200.7	0.008	250 mL plastic or glass	HNO <sub>3</sub> to pH<2	6 months

<sup>1</sup>Total Nitrogen is calculated from Nitrogen – Kjeldahl, total and Nitrate & Nitrite, total.

<sup>2</sup>The City analyze for estimated flow and pH onsite.

### 4.3 Sample Handling and Documentation

Automatic samplers will be serviced immediately following a storm event. Chain of custody forms will accompany all samples. A field log will be kept for each sampling site with details of the date, time, personnel, purpose of visit, weather/field conditions observed, samples collected, and actions performed.

### 4.4 Storm Events and Sample Frequency

Monitoring will be conducted every year throughout the General Permit cycle. Sampling will be attempted for any measurable runoff events (that is, any rainfall or snow melt events that produce any volume of runoff flowing past/through the monitoring location that will allow a sample to be collected). In accordance with Part II.C.1.b of the MS4 General Permit, a minimum of one sample will be collected at each site between January 1<sup>st</sup> and June 30<sup>th</sup> and a minimum of one sample will be collected at each site between July 1<sup>st</sup> and December 31<sup>st</sup> of each year. The City will attempt to collect four samples annually at each site. Four annual samples will provide greater assurance that data is representative. The monitoring plan and schedule will likely be revisited at the end of this General Permit term, based on permit requirements.

Precipitation will be monitored using a combination of on-site or web-based rain gauges<sup>4</sup>, and the radar managed by the National Oceanic and Atmospheric Administration’s Nation Weather Service.

This data may be used to delineate storm characteristics, if necessary (timing, duration, intensity, relative total rainfall, etc.).

## 4.5 Quality Assurance/Quality Control

Samples will be analyzed using the designated EPA Method or Standard Method as defined in Table 4-1. Chain-of-custody procedures will be followed for samples sent to the laboratory. All data should meet the precision, recovery, and accuracy requirements specified in the laboratory method used. The laboratory used for these analyses will maintain internal quality assurance/quality control procedures as documented in their laboratory quality assurance manual. The laboratory will use a combination of blanks, laboratory control matrix spikes, surrogates, and duplicates to evaluate the analytical results.

During each sampling event, the quality of the primary sample results will be evaluated in terms of sensitivity, precision, bias, and accuracy. Field duplicates and field blanks will be collected randomly for a minimum of 10% of all water quality grab samples. Instructions for collection of field blanks and field duplicates are provided in Appendix D.

These data quality indicators are quantitative criteria established for the data acquired within this design to assure it is of sufficient quality for its intended use. Descriptions of data qualifiers and common QC terms and acronyms are included in Appendix E.

### 4.5.1 Sensitivity

Sensitivity refers to the limit of a measurement to reliably detect a characteristic of a sample. For analytical methods, sensitivity is expressed as the method detection limit (MDL). Laboratories must determine their MDLs annually and routinely check each method's ability to achieve this level of sensitivity using negative controls (e.g., method blanks, calibration blanks, and laboratory reagent blanks). Sensitivity quality controls for laboratory methods will follow the frequency and criteria specified in the analytical method or as described in the laboratory's quality assurance plan (LQAP). The criteria used to assess field method sensitivity for water samples shall be:

$$\text{Field method controls (Field Blanks)} < \text{Reporting Limit}$$

**Corrective Action:** If analytical method controls fail the specified limit, check with the laboratory to see how they addressed the non-conformance and qualify data as necessary. If field blanks fail, qualify all associated project data < 10x the detected value with "B" flags.

### 4.5.2 Precision

Precision refers to the degree of agreement among repeated measurements of the same characteristic. Analytical and field duplicates will be used to assess precision based on their relative percent difference (RPD).

$$\text{RPD (\%)} = \frac{D1 - D2}{(D1 + D2)/2} \times 100$$

Where:

D1 is first replicate result

D2 is second replicate result

#### LABORATORY PRECISION

Precision quality control for all laboratory methods will follow the frequency specified in the analytical method or as described in the LQAP. The precision laboratory goals are:

- 10% RPD for analytical controls
- 20% RPD for method batch controls

#### OVERALL PRECISION (FIELD DUPLICATES)

Frequency of field duplicates will be 10% of samples collected in the field. The criteria used to assess overall precision for these water samples shall be:

- 25% RPD for duplicate results > 5 times the RL

**Corrective Action:** If laboratory duplicates fail the above limit, check with the laboratory to see how they addressed or qualified the data and add additional qualifiers and notes as needed. If the field duplicates fail the above limit, qualify all associated results < 5x the concentration in the duplicate pair's parent sample with a "J".

A method validation process including precision and accuracy performance evaluations and method detection limit studies are required of all lab standard operating procedures. Method performance evaluations include quality control samples analyzed with a batch to ensure sample data integrity. Internal laboratory spikes and duplicates are all part of each laboratory's quality assurance program. Laboratory QA/QC results generated from these programs is provided with the analytical results.

#### 4.5.3 Bias and Accuracy

Bias is directional error from the true value. In this context, it is an extension of the representativeness concept applied to an individual sample. Bias can occur either at sample collection or during measurement.

Accuracy is the combination of high precision and low bias. Accuracy of individual measurements will be assessed by reviewing the analytical method controls (i.e., laboratory control sample, continuing calibration verification, laboratory fortified blank, standard reference material) and the analytical batch controls (i.e., matrix spike and matrix spike duplicate). The criteria used for this assessment will be the limits that each laboratory developed through control charting of each method's performance or based on individual method requirements. Method QC descriptions are contained in Appendix E. Accuracy is determined by the percent recovery for each sample, determined as follows:

$$\text{Matrix Spike \% Recovery} = \frac{\text{Spiked Sample Result} - \text{Sample Result}}{\text{Spike Concentration}} \times 100$$

$$\text{Control Standard \% Recovery} = \frac{\text{Instrument Determined Concentration}}{\text{True Concentration}} \times 100$$

**Corrective Action:** For any QC value outside of the recovery range, check with the laboratory to see how they addressed the non-conformance and qualify data as necessary.

## 4.6 Analysis of Results

All sample results will be compiled into a spreadsheet containing the results for each parameter at every sample site. The analysis method will vary depending on the sample collection method and site objectives, which are described in the subsequent sections.

### 4.6.1 Sample Collection at Sites Verde Up and Verde Down

The objective at Verde Up and Verde Down is to compare influent and effluent data for the Vortechs® hydrodynamic separator. BMP effectiveness will be quantified by calculating the percent change in pollutant concentration between the two sample sites, using Equation 1. The calculated percent change for each sample collected will be presented on a graph (sample date vs. percent change) to assess the long-term performance of the BMP.

$$\text{Percent Change} = \frac{C_i - C_e}{C_i} \times 100$$



Where:

- $C_i$  = Influent concentration (mg/L)
- $C_e$  = Effluent concentration (mg/L)

#### 4.6.2 Sample Collection at all Sites

A graph will be generated showing sample date (time) vs. concentration, for each parameter. These graphics will show the trend in water quality data over the period of time which samples are being collected. A downward trend will indicate that BMPs implemented upstream are effective, while a stagnant or upward trend would indicate the BMPs implemented upstream are not effective at reducing pollutants. A separate analysis of each parameter can be used to help understand the effectiveness of BMPs for a variety of parameters considered.

**Table 4-2. Data Analysis Plan**

Sample Collection Method	Monitoring Objective	Analysis Procedure
In-Stream Monitoring	Understand the ambient wet weather water quality status of the receiving waterbodies (Missouri River and Sun River)	Compare results to surface water quality standards
In-Stream Monitoring	Understand the trends in water quality observed for the receiving waterbodies	Evaluate results in a time series chart
In-Stream Monitoring	Understand how stormwater runoff is contributing pollutant loads to receiving waterbodies during representative storm events (evaluate how in-stream water quality changes from upstream of the MS4 to downstream of the City's regulated MS4 area)	Compare downstream to upstream results
Stormwater System Monitoring	Understand how pollutant concentrations vary by land use (residential vs commercial)	Directly compare residential and commercial results in time series
Stormwater System Monitoring	Evaluate reduction in pollutant loading over time as upstream BMPs are installed	Evaluate results in a time series chart
BMP Monitoring	Assess the performance of the BMP for removal of a variety of pollutants in stormwater runoff	Compare influent and effluent concentrations and calculate percent removal
BMP Monitoring	Evaluate the effectiveness of the BMP to understand whether the BMP implementation is reducing the discharge of pollutants of concern from the MS4	Compare influent and effluent concentrations and calculate percent removal

## 5 Records

The results from stormwater monitoring will be recorded and maintained at The City office in the Public Works Department; Environmental Division. Records will be retained for a period of at least five years from the date of sample, measurement, report, or application.

## 6 References

Kron, D. (2018, May 4). Telephone Discussion: Wet-Weather Monitoring. (M. P. HDR, Interviewer)

Montana Department of Environmental Quality. (2012, February). *Water Quality Planning Bureau Field Procedures Manual for Water Quality Assessment Monitoring*. Retrieved from <http://deq.mt.gov/Portals/112/Water/WQPB/QAProgram/Documents/PDF/SOPs/WQPBWQM>

-020.pdf

Montana Department of Environmental Quality. (2016). Appendix A - Impaired Waters. In *Final 2016 Water Quality Integrated Report*.

## Appendix A. Supplemental Figures

Please refer to the following website:  
<https://greatfallsmt.net/publicworks/storm-water>

## **Appendix B. Sample Collection Container Requirements**

**Table B-1. Sample Collection Container Requirements**

Site ID	Required Analyses	Required Containers
Whitebear	TSS, COD, Phosphorus (total), Total Nitrogen (Persulfate method), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Chromium, Mercury, Selenium	<input checked="" type="checkbox"/> One (1) – 1L unpreserved plastic bottle <input checked="" type="checkbox"/> One (1) – 500 mL plastic bottle preserved with H <sub>2</sub> SO <sub>4</sub> <input checked="" type="checkbox"/> One (1) – 250 mL plastic bottle preserved with HNO <sub>3</sub> <input checked="" type="checkbox"/> Two (2) – 1 L clear glass bottles preserved with H <sub>2</sub> SO <sub>4</sub>
Black Eagle	TSS, COD, Phosphorus (total), Total Nitrogen (Persulfate method), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Chromium, Mercury, Selenium	<input checked="" type="checkbox"/> One (1) – 1L unpreserved plastic bottle <input checked="" type="checkbox"/> One (1) – 500 mL plastic bottle preserved with H <sub>2</sub> SO <sub>4</sub> <input checked="" type="checkbox"/> One (1) – 250 mL plastic bottle preserved with HNO <sub>3</sub> <input checked="" type="checkbox"/> Two (2) – 1 L clear glass bottles preserved with H <sub>2</sub> SO <sub>4</sub>
Sun	TSS, COD, Phosphorus (total), Total Nitrogen (Persulfate method), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease	<input checked="" type="checkbox"/> One (1) – 1L unpreserved plastic bottle <input checked="" type="checkbox"/> One (1) – 500 mL plastic bottle preserved with H <sub>2</sub> SO <sub>4</sub> <input checked="" type="checkbox"/> One (1) – 250 mL plastic bottle preserved with HNO <sub>3</sub> <input checked="" type="checkbox"/> Two (2) – 1 L clear glass bottles preserved with H <sub>2</sub> SO <sub>4</sub>
Sun River Downstream	TSS, COD, Phosphorus (total), Total Nitrogen (Persulfate method), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease	<input checked="" type="checkbox"/> One (1) – 1L unpreserved plastic bottle <input checked="" type="checkbox"/> One (1) – 500 mL plastic bottle preserved with H <sub>2</sub> SO <sub>4</sub> <input checked="" type="checkbox"/> One (1) – 250 mL plastic bottle preserved with HNO <sub>3</sub> <input checked="" type="checkbox"/> Two (2) – 1 L clear glass bottles preserved with H <sub>2</sub> SO <sub>4</sub>
Expo	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Chromium, Mercury, Selenium	<input checked="" type="checkbox"/> One (1) – 1L unpreserved plastic bottle <input checked="" type="checkbox"/> One (1) – 500 mL plastic bottle preserved with H <sub>2</sub> SO <sub>4</sub> <input checked="" type="checkbox"/> One (1) – 250 mL plastic bottle preserved with HNO <sub>3</sub> <input checked="" type="checkbox"/> Two (2) – 1 L clear glass bottles preserved with H <sub>2</sub> SO <sub>4</sub>
Loaf N Jug	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Chromium, Mercury, Selenium	<input checked="" type="checkbox"/> One (1) – 1L unpreserved plastic bottle <input checked="" type="checkbox"/> One (1) – 500 mL plastic bottle preserved with H <sub>2</sub> SO <sub>4</sub> <input checked="" type="checkbox"/> One (1) – 250 mL plastic bottle preserved with HNO <sub>3</sub> <input checked="" type="checkbox"/> Two (2) – 1 L clear glass bottles preserved with H <sub>2</sub> SO <sub>4</sub>
Sand Coulee 2	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Salinity	<input checked="" type="checkbox"/> One (1) – 1L unpreserved plastic bottle <input checked="" type="checkbox"/> One (1) – 500 mL plastic bottle preserved with H <sub>2</sub> SO <sub>4</sub> <input checked="" type="checkbox"/> One (1) – 500 mL unpreserved plastic bottle <input checked="" type="checkbox"/> One (1) – 250 mL plastic bottle preserved with HNO <sub>3</sub> <input checked="" type="checkbox"/> Two (2) – 1 L clear glass bottles preserved with H <sub>2</sub> SO <sub>4</sub>
Verde Up	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Chromium, Mercury, Selenium	<input checked="" type="checkbox"/> One (1) – 1L unpreserved plastic bottle <input checked="" type="checkbox"/> One (1) – 500 mL plastic bottle preserved with H <sub>2</sub> SO <sub>4</sub> <input checked="" type="checkbox"/> One (1) – 250 mL plastic bottle preserved with HNO <sub>3</sub> <input checked="" type="checkbox"/> Two (2) – 1 L clear glass bottles preserved with H <sub>2</sub> SO <sub>4</sub>

Site ID	Required Analyses	Required Containers
Verde Down	TSS, COD, Phosphorus (total), Nitrogen (total), pH, Copper, Lead, Zinc, Estimated Flow, Oil and Grease, Chromium, Mercury, Selenium	<input checked="" type="checkbox"/> One (1) – 1L unpreserved plastic bottle <input checked="" type="checkbox"/> One (1) – 500 mL plastic bottle preserved with H <sub>2</sub> SO <sub>4</sub> <input checked="" type="checkbox"/> One (1) – 250 mL plastic bottle preserved with HNO <sub>3</sub> <input checked="" type="checkbox"/> Two (2) – 1 L clear glass bottles preserved with H <sub>2</sub> SO <sub>4</sub>
MS4-OF #13	PCBs	See Appendix C
Giant Springs Rd	PCBs	See Appendix C

## Appendix C. PCB Sampling Protocol

# PCB Sampling Protocol

## 1 Introduction

The primary objective of this protocol is to conduct PCB monitoring at MS4 outfalls to assess whether the MS4 contributes PCBs to the Missouri River. Laboratory analyses are unable to attain low enough reporting/detection limits for PCBs in the water column, which precludes the usefulness of collecting water samples. The MS4 is not anticipating to be a contributor of PCBs. However, if future wet weather sampling events indicate elevated levels of PCBs, the sampling protocol outlined in Appendix C will be implemented.

PCB monitoring will be conducted in areas that discharge to the Missouri River because the Missouri River is impaired for PCBs. DEQ’s listed probable causes include permitted industrial point source discharge and permitted industrial-commercial site stormwater discharge. The MS4 is not anticipating to be a contributor of PCBs. However, if future wet weather sampling events indicate elevated levels of PCBs, the sampling protocol outlined in Appendix C will be implemented.

## 2 Sample Collection Locations

PCB monitoring will be conducted in areas that discharge to the Missouri River because the Missouri River is impaired for PCBs. Sediment samples will be gathered from areas that receive stormwater discharges from two of the MS4’s representative industrial areas because industrial areas are common sources of PCBs. PCB sample locations are provided in Table C-2-1.

**Table C-2-1. PCB Sediment Sample Collection Locations**

Name	Receiving Waterbody	Location	Collection Method <sup>1</sup>	Sample Parameters	Strategy
MS4 – OF #13	Missouri River	47.519084°N -111.307227°W	Sediment Composite	PCBs	Representative industrial area to assess potential for MS4 discharge of PCBs
Giant Springs Rd	Missouri River	47.536038°N -111.212400°W	Sediment Composite	PCBs	Downstream location from entire MS4 discharge of PCBs

## 3 Field Sampling Methods

### 3.1 Document the Site

Upon arrival at the designated sampling location, verify access to sediment depositional zones. If the site is deemed acceptable, record site identifier information on a field form, including site name, plot number, and latitude/longitude. A site is considered acceptable if at least five depositional zones of fine sediment (< 2.0mm) are accessible in water less than 2 feet deep. Take site photographs, and record the pertinent photo information.



## 3.2 Sediment Sampling Frame

Five sub-samples will be collected at each sample collection location. Identify an area at the site (sample frame) where sub-samples can be gathered. The goal of the sample frame is to gain a representation in areas most likely to be influenced by human activities (Kusnierz et al., 2013). Sediment in the sampling frame should be relatively homogenous to ensure data representativeness.

## 3.3 Collect the Sub-Samples

Identify five depositional zones in the sampling frame at each sampling site. Focus on obtaining samples of fine-grained surficial sediments from depositional zones during low-flow or no-flow conditions and on compositing samples from several depositional zones within a sampling frame.

Collect sub-samples of equal volumes of sediment from each of the five depositional zones in the sampling frame to form one composite sample:

- Use a stainless steel spoon to remove sediment from the depositional zone and place the sediment in a stainless steel bowl. A total volume of approximately 1.5 L of wet sediment from the five plots is desired (USGS 1994). Compositing will smooth the local scale variability and represent the average contaminant levels present at the site (USGS 1994).
- Collect sediment from the top 2-5 centimeters of the bed surface (USGS 1994; ORSANCO 2002; Wash. Dept. of Ecology 2003, 2007).
- Do not retain debris on the sediment surface.
- Sampling depth: Collect sub-samples from the nearshore zone in water less than 0.5 m deep as a safety measure and to minimize loss (wash-out) of surficial fine sediments as the sub-sample is drawn up through the water column (DEQ 2011; USFWS 2010).
- Sub-sampling: Subsample each depositional zone at a sampling site several times and composite all subsamples collected from depositional zones sampled at the same site. Base the number of samples from each zone on the areal size of each zone (that is, the larger the areal size of the zone, the greater the number of subsamples collected).
- Sampling timing: Unusually high flows can wash out, redistribute, or bury substantial parts of PCB deposits; therefore, sampling should be delayed following major discharge to allow fresh sediment to deposit. When sampling for bed sediment during summer or autumn, low-flow conditions are recommended to provide maximum direct access to the bed materials and to minimize seasonal streamflow variability (USGS 1994).
- Store this sample on ice (< 6°C) between sampling efforts at each depositional zone.

## 3.4 Composite and Sieve the Sub-Samples

Once all five depositional zones have been sampled and before transfer to the sample jars, use a stainless steel spoon to homogenize by stirring the composite sample to a uniform consistency and color (ORSANCO 2002; USEPA 2003; Puget Sound Water Quality Action Team 1997; Wash. Dept. of Ecology 2007, 2014).

Prior to collecting the final PCB and TOC sample in the field, use a stainless steel sieve (U.S. standard #10) to remove particles larger than 2mm:

- Agitate and stir with a stainless steel spoon and use the stainless steel spoon to add minimal additions of site native water only as needed to sieve the composite, homogenized sediment sample (from the stainless steel bowl) into a stainless steel bucket (ORSANCO 2002).
- Once sieved, use a stainless steel spoon and stainless steel funnel to transfer sieved sediments into a 1 liter (approx. 32 oz.) glass jar with a Teflon lid liner (ORSANCO 2002; Wash. Dept. of

Ecology 2007, 2014). It is preferable to fill the 1L jar if there is sufficient sample to do so; the lab needs a minimum of 250-300 grams of wet sample for the analyses (approx. 8oz. jar full).

- Tighten cap on jar and label with activity ID, waterbody name, sample type, collection date, and collector's name.

### 3.5 Decontamination of River/Stream Sediment Equipment

To avoid cross-contamination between sample sites, clean all collection equipment and supplies that may come into contact with the sample prior to use. A tiered approach to decontamination will be used in which a more thorough cleaning procedure is conducted before moving to a different sampling location (sampling frame) and a less-thorough procedure before moving on to a different depositional zone within the same sampling frame.

Between sub-sample collections at plots in the same sample collection location, clean all collection equipment used to collect sediment and obtain PCB sample (e.g., Ponar grab sampler, pans, spoons, scoops and compositing trays) that may come into contact with the sample prior to use as follows:

1. Scrub with a brush and phosphate-free Alconox® or Liquinox™ Soap
2. Thoroughly rinse with in situ (site native) water
3. Perform secondary rinse with ASTM (distilled) water

Once all sub-sampling within a sample collection location complete, clean all collection equipment used to collect sediment and obtain PCB sample (e.g., pans, spoons, scoops and compositing trays) that may come into contact with the sample prior to use as follows:

1. Scrub with a brush and phosphate-free Alconox® or Liquinox™ Soap
2. Thoroughly rinse with in situ (site native) water
3. Perform secondary rinse with ASTM (distilled) water
4. Perform tertiary rinse using certified ACS HPLC grade hexane. Decontamination with solvents should always be performed on an open deck of a vessel or outdoors if on land. All solvent and acid rinses should be followed by thorough rinses with analyte-free water. All decontamination fluids that include solvents or acid rinses should be properly contained and not allowed to enter the environment. Evaporation of small amounts of residual solvent into the air is acceptable (Puget Sound Water Quality Action Team 1997; ORSANCO 2002; Ohio EPA 2001).
5. Perform final rinse with ASTM (distilled) water
6. Allow to air dry
7. Wrap cleaned, decontaminated, and dried equipment in aluminum foil or seal in sealable plastic bags during transport to the next grid.

Rinse equipment again with distilled water after acid wash is complete.

## 4 Sample Containers, Preservation, and Holding Times

Table C-4-1 summarizes the amount of sample, the container, the preservation, storage, and holding time for each parameter being analyzed.

**Table C-4-1. Sediment Sampling Volumes, Containers, Preservation, and Holding Times**

Analyte	Sample Size <sup>1</sup>	Container	Preservation	Storage	Holding Time
PCB Aroclors (1016, 1232, 1242, 1248, 1254, 1260, 1262, 1268) <sup>3</sup>	50 g	1 L (32 oz.) glass wide mouth jar with Teflon lid liner; fill if possible but 250-300g (8-10 oz.) minimum.	None	Store at <6°C	14 days (extraction); 40 days (analysis)
TOC	50 g	possible but 250-300g (8-10 oz.) minimum.			14 days
Particle Size	50 g	Sieve to 2mm.			6 months
% Moisture	50 g				-

<sup>1</sup> The lab needs 250-300 grams (8 oz. jar) total of sediment as a minimum, which would supply sufficient sample for QC and reruns if necessary. The lab uses 50 grams for PCB, 50 grams for TOC and 50 grams for particle size analysis, but needs extra of each to do QC.

## 5 Sample Handling Procedures

Field samples will be collected and preserved in accordance to Section 4. City monitoring team members will be responsible for proper labeling, sample custody documentation, and storage. Sediment samples will be delivered to Energy Laboratories, Inc. for analysis within the holding time specified in Table C-4-1. Sediment samples will be stored on ice in a cooler at < 6°C until delivery to the laboratory for analysis.

## 6 Laboratory Analytical Measurements

Sediment samples, as well as water samples serving as equipment blanks (rinse water), will be analyzed using the methods listed in Table C-6-1. In addition, Table C-6-1 lists the required reporting limits to effectively evaluate the data to meet the project objectives.

**Table C-6-1. Analytical Methods and Required Reporting Limits**

Analyte	Analytical Method	Reporting Limit (mg/L)
<b>Sediment</b>		
PCB Aroclors (1016, 1232, 1242, 1248, 1254, 1260, 1262, 1268)	SW 8082 (Extraction Method or 3540 or 3541)	0.017 mg/kg (dry wt.)
PCB Aroclor 1221		0.033 mg/kg (dry wt.)
TOC	ASA29-3	0.02%
Percent Moisture	D2974	0.2 wt%
Particle Size	ASA15-5	1%
<b>Water (rinse water for equipment blanks only)</b>		
PCB Aroclors (1016, 1232, 1242, 1248, 1254, 1260, 1262, 1268)	SW8082	0.5 ug/L

Note: The total PCB concentration in each sediment sample is calculated by summing dry-weight concentrations of all individual Aroclors.

## 7 Quality Assurance and Quality Control Requirements

### 7.1 Field Blanks

The main objective of the blanks is to trace sources of contamination. Sediment sampling generally does not require the use of field blanks. However, the issue of adequate equipment cleanup between samples can be addressed through the use of an equipment blank. Equipment blanks are samples of water that have been used to rinse the sampling equipment.

Two equipment blanks will be collected, one during the first sampling event and one during the second sampling event. The equipment blanks are collected after all of the equipment has been cleaned according to the decontamination procedures described in Section 3.5. To collect the equipment blank, the rinse process of sample collection equipment (including compositing trays, spoons, etc.) is repeated and the entire rinse is collected and submitted as a solution sample to the lab to be analyzed for the same parameter suite used on the sediment samples.

## 8 Schedule

Two PCB sampling events may occur during the current General Permit cycle (2022 to 2027).

## References

- Ohio Environmental Protection Agency (Ohio EPA). 2001. Sediment Sampling Guide and Methodologies, 2<sup>nd</sup> Edition. Ohio Environmental Protection Agency, Division of Surface Water. Available at <http://www.epa.ohio.gov/portals/35/guidance/sedman2001.pdf>.
- Kusnierz, P.C., Welch, A., and Kron., D. 2013. The Montana Department of Environmental Quality Sediment Assessment Method: Considerations, Physical and Biological Parameters, and Decision Making. Helena, MT: Montana Dept. of Environmental Quality. Report WQPBMASSTR-02.
- Montana Department of Environmental Quality (DEQ). 2011. Sample Collection and Laboratory Analysis of Chlorophyll-a Standard Operation Procedure, Revision 5. Helena, MT: Montana Department of Environmental Quality. Report WQPBWQM-011.
- Montana Department of Environmental Quality (DEQ). 2014. Sampling and Analysis Plan for Flathead and Whitefish Sampling Project - 2014. Helena, MT: Montana Department of Environmental Quality.
- Ohio River Valley Water Sanitation Commission (ORSANCO). 2002. Bottom Sediment Sampling for Dioxin, PCB's, and Chlordane. Available at <http://www.orsanco.org/watershed-pollutant-reduction/10-mainpages/orsanco-programs/209-bottom-sediment-sampling>.
- Puget Sound Water Quality Action Team. 1997. Recommended Guidelines for Measuring Organic Compounds in Puget Sound Water, Sediment and Tissue Samples. Prepared for U.S. Environmental Protection Agency, Region 10. Puget Sound Water Quality Action Team; Olympia, WA. Available at [http://www.psparchives.com/publications/our\\_work/science/protocols\\_guidelines/organics.pdf](http://www.psparchives.com/publications/our_work/science/protocols_guidelines/organics.pdf) Accessed 7/27/14.
- U.S. Environmental Protection Agency (USEPA). 2003. Post-Remediation Sediment Sampling On the Raisin River Near Monroe, Michigan Final Results from 2001-2002 Survey: PCB Chemistry, Caged Fished and Bioaccumulation Results. U.S. Environmental Protection Agency, Great Lakes National Program Office; Chicago, Illinois. Available at <http://www.epa.gov/greatlakes/sediment/raisin/raisinrvrpt.pdf>. Accessed on 7/27/2014.
- U.S. Fish and Wildlife Service (USFWS). 2010. Long-Term Monitoring of Freshwater Mussel Populations and Heavy Metal Sediment Contamination in the Lower Big River, Missouri. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Missouri Lead Mining District Natural Resource Damage Assessment and Restoration. Available at [http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/documents/bigriverlongtermmonitoring\\_methods.pdf](http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/documents/bigriverlongtermmonitoring_methods.pdf).
- U.S. Geological Survey (USGS). 1994. Guidelines for Collecting and Processing Samples of Stream Bed Sediment for Analysis of Trace Elements and Organic Contaminants for the National Water- Quality Assessment Program. U.S. Geological Survey; Sacramento, CA. Prepared by L.R. Shelton and P.D. Capel. Open-File Report 94-458. Available at <http://pubs.usgs.gov/of/1994/0458/report.pdf>. Accessed 7/27/14.
- Washington Department of Ecology. 2003. Quality Assurance Project Plan: Total Maximum Daily Load Study for PCBs in the Spokane River. Washington Department of Ecology,

Environmental Assessment Program; Olympia, WA. Publication No. 03-03-107. Available at <http://www.ecy.wa.gov/biblio/0303107.html>. Accessed on 7/27/14.

Washington Department of Ecology. 2007. Quality Assurance Project Plan: Dieldrin and PCB Monitoring of Wastewater Treatment Plants in the Palouse River Watershed. Washington Department of Ecology, Environmental Assessment Program; Olympia, WA. Publication No. 07-03-111. Available at [www.ecy.wa.gov/biblio/0703111.html](http://www.ecy.wa.gov/biblio/0703111.html). Accessed on 7/27/14.

Washington Department of Ecology. 2014. PCBs in Sediments at Selected Sites in Puget Sound. Washington Department of Ecology, Environmental Assessment Program; Olympia, WA. Publication No. 02-03-003. Available at <http://www.ecy.wa.gov/biblio/0203003.html>. Accessed on 7/27/14.

## **Appendix D. Field Blanks and Field Duplicates Protocol**

As presented in Montana DEQ's *Water Quality Planning Bureau Field Procedures Manual for Water Quality Assessment Monitoring* (2012)

## 5.4 QUALITY ASSURANCE AND QUALITY CONTROL – FIELD BLANKS

### 5.4.1 Description

Field Blanks are collected according to SAP/QAPP guidelines for all water chemistry samples to assess potential for false positive results due to site contamination, preservative and/or container contamination. Field blank results will verify that false positive results from site conditions or cross-contamination during transport will not result in erroneous beneficial use support determinations.

### 5.4.2 Preparation, Transport, and Submittal

- The analytical laboratory will provide distilled water in a large ( $\geq 4$  liter) sealed HDPE container. Field personnel must keep several liters (enough to triple rinse and refill an entire set of bottles used for routine water chemistry sampling) of distilled water in clean 1L HDPE bottles in the vehicle where it is not exposed to excessive dust, mud, or other equipment. Label these bottles “distilled water” to avoid accidental contamination and triple rinse the bottles with distilled water prior to (re)filling.
- Prepare field blanks in the field each time samples are to be delivered to the analytical laboratory. For example, prepare field blanks after sampling the last site of a multi-site sampling “trip”, or “mid-trip” if sample holding times require samples to be delivered to the lab part-way through a multi-site sampling trip.
- At the sampling site, prepare a set of bottles – the same number and size bottles as used for routine sampling – by rinsing each bottle three times with the distilled water. Fill each sample bottle with distilled water as during routine sampling except pour or filter (with a 60cc syringe and 0.45um filter unit) *distilled* water instead of *stream* water (**Section 5.2**).
- Add the appropriate preservative to each sample bottle, securely affix the lid and mix the sample by gently inverting 3-5 times (**Table 5-1**).
- Affix to each bottle a label containing the following information and cover it with clear tape:
  - Activity ID
  - Collector’s name
  - Collection date
  - Sample type
  - Write “Field Blank” in place of waterbody name on the label
- Ensure lids are tight and will not leak. Store samples completely surrounded with ice in a cooler until delivery to the laboratory along with routine samples for analysis. **Field blanks must be handled identically (e.g., preservation, holding time) to their respective sample counterparts.**
- Fill out a *separate* Site Visit Form for field blanks. Fill this new form the same as the initial Site Visit Form (**Section 4.3**), except use a distinct Activity ID (i.e., site visit code) and write “Field Blanks” in the “Site Visit Comments” field. Use the same medium code as the initial samples (e.g., “W” for water, “SED” for sediment) (**Attachments C and D**, lines 7-17). Refer to the project plan (SAP/QAPP) for quality control criteria.



## 5.5 QUALITY ASSURANCE AND QUALITY CONTROL – FIELD DUPLICATES

### 5.5.1 Description

To assess both precision and representativeness of the sampling technique, DEQ collects duplicate samples for all chemistry (except in situ physical) parameters. The number of duplicate samples to collect will depend on sampling frequency per parameter throughout the field season; **generally, collect duplicate samples for at least 10% of the total number of samples per parameter.** Duplicate sample results will verify that field personnel collect samples consistently and that method and site variability is understood.

### 5.5.2 Sample Collection and Submittal

- Select a site that allows for two samples to be taken side-by-side upstream from any previous disturbances. When collecting duplicate samples, repeat all steps performed in collecting one sample (or set of samples) so that TWO IDENTICAL samples (or sets of samples) have been collected at the SAME site.
- Add the appropriate preservative to each sample bottle, securely affix the lid and mix the sample by gently inverting 3-5 times (**Table 5-1**).
- Affix to each bottle a label containing the following information and cover it with clear tape:
  - Activity ID
  - Collector's name
  - Collection date
  - Sample type
  - Waterbody name (write "Duplicate Sample" next to waterbody name on the label)
- Ensure lids are tight and will not leak. Store samples completely surrounded with ice in a cooler until delivery to the laboratory along with routine samples for analysis. **Duplicate samples must be handled identically (e.g., preservation, holding time) to their respective sample counterparts.**
- Fill out a *separate* Site Visit Form for duplicate samples. Fill this new form the same as the initial Site Visit Form (**Section 4.3**), except use a distinct Activity ID (i.e., site visit code) and write "Duplicate Samples" in the "Site Visit Comments" field. Use the same medium code as the initial samples (e.g., "W" for water, "SED" for sediment) (**Attachments C and D**, lines 7-17). Refer to the project plan (SAP/QAPP) for quality control criteria.

## Appendix E. Data Qualifiers

**Table E-1. Data Qualifiers and Descriptions**

Result Qualifier	Result Qualifier Description
B	Detection in Field and/or trip blank
D	Reporting limit (RL) increased due to sample matrix interference (sample dilution)
H	EPA Holding Time Exceeded
J	Estimated: The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
R	Rejected: The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
U	Not Detected: The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
UJ	Not Detected/Estimated: The analyte was not detected at a level greater than or equal to the adjusted CRQL or the reported adjusted CRQL is approximate and may be inaccurate or imprecise.

**Table E-2. Quality Control Terminology and Descriptions**

FIELD QC		
Term	Description	Purpose/Usage
Field Blank	Reagent water exposed to field sampling conditions	Monitors contamination resulting from field activities and/or ambient levels of analytes present at time of sampling.

Field Duplicate	Two independent samples taken under the same conditions. For solids; tow samples which are co-located (taken side by side). Water samples would be two independent samples taken at the same location at the same time.	To determine the homogeneity of the samples collected.
Field Replicate	A single sample is obtained, homogenized, and then split into multiple samples.	Monitors laboratory precision independent of laboratory operations.

### LABORATORY BATCH QC

Acronym	Description	Definition
LRB/Method Blank	Laboratory Reagent Blank	An aliquot of reagent water or other blank matrices that are treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, and internal standards that are used with other samples. The LRB is used to determine if method analytes or other interferences are present.
LFB/LCS	Laboratory Fortified Blank; Laboratory Control Sample	Reagent water spiked with a known amount of analyte. Ideally treated exactly like a MS/LFM. Control used to determine bias is sample spikes.
MS/LFM	Matrix Spike/Laboratory Fortified Matrix	An aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for background concentrations.

MSD/LFMD	Matrix Spike Duplicate/Laboratory Fortified Matrix Duplicate	Determine method precision in sample concentrations are < 5X the RL.
DUP	Duplicate	Determine method precision in sample concentrations are >5X the RL.
QCS	Quality Control Sample	A solution of method analytes of known concentrations which is used to fortify an aliquot of reagent water or sample matrix. The QCS is obtained from a source external to the laboratory and different from the source of calibration standards. It is used to check either laboratory or instrument performance.
SRM	Standard Reference Material	Primarily used as a QCS to verify instrument calibration.

**LABORATORY ANALYSIS QC**

Acronym	Description	Definition
ICB	Initial Calibration Blank	Monitors instrument drift at low end of calibration curve.
CCB	Continuing Calibration Blank	Monitors instrument drift at low end of calibration curve.
ICV	Initial Calibration Blank	Monitors instrument drift at a defined concentration near the mid-range of the calibration curve.
CCV	Continuing Calibration Blank	Monitors instrument drift at a defined concentration near the mid-range of the calibration curve.
IPC	Instrument Performance Check	Monitors instrument drift at a defined concentration near the mid-range of the calibration curve.

MS/LFM	Matrix Spike Duplicate/Laboratory Fortified Matrix	An aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for background concentrations.
MSD/LFMD	Matrix Spike Duplicate/Laboratory Fortified Matrix Duplicate	Determine method precision in sample concentration are <5X the RL.
DUP	Duplicate	Determine method precision in sample concentrations are >5X the RL.
QCS	Quality Control Sample	A solution of method analytes of known concentrations which is used to fortify an aliquot of reagent water or sample matrix. The QCS is obtained from a source external to the laboratory and different from the source of calibration standards. It is used to check either laboratory or instrument performance.
SRM	Standard Reference material	Primarily used as a QCS to verify instrument calibration.
IDL	Instrument Detection Limit	Signal just above baseline. 3-5X the STD DEV of 7 replicates of a blank. Not used for quantification.
MDL	Method Detection Limit	Statistical determination of the lowest concentration of an analyte with 95% certainty the analyte is present.
PQL	Practical Quantitation Limit	3-5X the MDL. Lowest level that quantification is determined.
RL	Reporting Limit	Value a laboratory reports results. Usually the PQL.

## Outfalls Discharging to Impaired Waterbodies & Associated Impairments

Outfall ID#	Receiving Waterbody	Impairments
112	Sand Coulee Creek	Lead, Zinc
1	Missouri River (Sheep to Sun)	TSS
2	Missouri River (Sheep to Sun)	TSS
3	Missouri River (Sheep to Sun)	TSS
24	Missouri River (Sheep to Sun)	TSS
25	Missouri River (Sheep to Sun)	TSS
53	Missouri River (Sheep to Sun)	TSS
95	Missouri River (Sheep to Sun)	TSS
96	Missouri River (Sheep to Sun)	TSS
97	Missouri River (Sheep to Sun)	TSS
98	Missouri River (Sheep to Sun)	TSS
113	Missouri River (Sheep to Sun)	TSS
5	Missouri River (Sun to Rainbow)	TSS
7	Missouri River (Sun to Rainbow)	TSS
8	Missouri River (Sun to Rainbow)	TSS
9	Missouri River (Sun to Rainbow)	TSS
10	Missouri River (Sun to Rainbow)	TSS
11	Missouri River (Sun to Rainbow)	TSS
12	Missouri River (Sun to Rainbow)	TSS
13	Missouri River (Sun to Rainbow)	TSS
14	Missouri River (Sun to Rainbow)	TSS
15	Missouri River (Sun to Rainbow)	TSS
16	Missouri River (Sun to Rainbow)	TSS
17	Missouri River (Sun to Rainbow)	TSS
18	Missouri River (Sun to Rainbow)	TSS
19	Missouri River (Sun to Rainbow)	TSS
20	Missouri River (Sun to Rainbow)	TSS
21	Missouri River (Sun to Rainbow)	TSS
22	Missouri River (Sun to Rainbow)	TSS
23	Missouri River (Sun to Rainbow)	TSS
27	Missouri River (Sun to Rainbow)	TSS
28	Missouri River (Sun to Rainbow)	TSS
29	Missouri River (Sun to Rainbow)	TSS
30	Missouri River (Sun to Rainbow)	TSS
54	Missouri River (Sun to Rainbow)	TSS
55	Missouri River (Sun to Rainbow)	TSS
56	Missouri River (Sun to Rainbow)	TSS
57	Missouri River (Sun to Rainbow)	TSS
58	Missouri River (Sun to Rainbow)	TSS



## Outfalls Discharging to Impaired Waterbodies & Associated Impairments

Outfall ID#	Receiving Waterbody	Impairments
62	Missouri River (Sun to Rainbow)	TSS
63	Missouri River (Sun to Rainbow)	TSS
64	Missouri River (Sun to Rainbow)	TSS
65	Missouri River (Sun to Rainbow)	TSS
67	Missouri River (Sun to Rainbow)	TSS
68	Missouri River (Sun to Rainbow)	TSS
70	Missouri River (Sun to Rainbow)	TSS
71	Missouri River (Sun to Rainbow)	TSS
72	Missouri River (Sun to Rainbow)	TSS
73	Missouri River (Sun to Rainbow)	TSS
74	Missouri River (Sun to Rainbow)	TSS
75	Missouri River (Sun to Rainbow)	TSS
76	Missouri River (Sun to Rainbow)	TSS
103	Missouri River (Sun to Rainbow)	TSS
104	Missouri River (Sun to Rainbow)	TSS
107	Missouri River (Sun to Rainbow)	TSS
109	Missouri River (Sun to Rainbow)	TSS
60	Missouri River (Rainbow to Morony)	TSS, Copper
61	Missouri River (Rainbow to Morony)	TSS, Copper
102	Missouri River (Rainbow to Morony)	TSS, Copper





## Outfalls Discharging to Impaired Waterbodies & Associated Impairments

Outfall ID#	Receiving Waterbody	Impairments
31	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
34	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
35	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
36	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
37	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
39	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
40	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
41	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
43	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
45	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
46	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
47	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
48	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
49	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
51	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
52	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
100	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
101	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
111	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations



114	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
115	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations
116	Sun River	TSS, Total Nitrogen, Total Phosphorus, Sedimentation/Siltation, Other flow regime alterations

**BMP Summary:**

The City of Great Falls (COGF) continues to develop and implement its MS4 program that encompasses all required minimum control measures (MCM-1 through MCM-6). Implementation of the MS4 program will target pollutants of impairment by evaluating potential impacts/sources to receiving waterbodies and determining the best course of action to address those impacts/sources. COGF utilizes both administrative (implementation of the MS4 program) and structural (ponds other physical features, etc.) BMPs to specifically target removal of Total Phosphorous (TP), total Nitrogen (TN), and Sediment. For example, the primary purpose for the temporary BMPs required in MCM-4 as well as permanent BMPs required in MCM-5 is to minimize erosion and discharge of sediment. In addition, removal of sediment can also potentially aide in the removal of other types of potential pollutants (i.e. TN, TP, metals, etc.).



**Response to Montana DEQ letter dated 7/21/23 regarding the 2022 Annual Report for the City of Great Falls MPDES Permit MTR040004 – City of Great Falls Small MS-4**

*The following response are compiled by the City of Great Falls Environmental Division and its Stormwater Management Team personnel, with approval from the City of Great Falls Public Works Director*

- Minimum Control Measure 1 & 2 – Public Education, Outreach, Involvement, and Participation
  - Copy of the Notice of Intent (NOI), public feedback feature for the SWMP, and a link to the building permit application are now available on the City of Great Falls Environmental Division web page at the following URL:  
<https://greatfallsmt.net/publicworks/storm-water>
  - Key audiences and outreach strategies for the 2023 annual report were re-evaluated following internal discussion/DEQ recommendations – please refer to the 2023 annual report for additional details
- Minimum Control Measure 3 – Illicit Discharge Detection and Elimination (IDDE)
  - Identifying and Evaluating Categories of Non-storm Water Discharges – please refer to the City’s updated SWMP for additional details.
  - Local Controls and Conditions to Address Non-Stormwater Discharges – please refer to the City’s updated SWMP for additional details.
  - Corrective Action Plan – please refer to the City’s updated SWMP for additional details.
  - Please refer to the 2023 annual report and 2023 SWMP for an updated map of the City’s Storm Drain System
  - Significant illicit discharge will be reported promptly to DEQ
    - Additionally, this incident was reported to DEQ via FACTS on 7/1/22 under the City’s WWTP Stormwater Permit (MTR000452) (see attached).
  - Please refer to the 2023 SWMP maps for locations of the High Priority Outfalls and metrics of determining their status
- Minimum Control Measure 4 – Construction Site Storm Water Management
  - Please refer to the 2023 SWMP attachments for the newly updated Site Inspection Form that includes the Construction GP’s Technology-Based Effluent Limitations
  - Please refer to the 2023 SWMP attachments for the Active Construction Site priority form
- Minimum Control Measure 5 - Post-Construction Site Storm Water Management Minimum Control
  - Please refer to the 2023 annual report MCM-5 attachments for the City’s current inventory of all known post-construction BMPs and the inspection frequency form on how priorities are determined
- Minimum Control Measure 6
  - Please refer to the 2023 annual report MCM-6 attachments on all updated SOPs and trainings performed
- Training
  - Please refer to the 2023 annual report’s general attachment of training activities performed by City SWMT members

If there are any additional questions or concerns, please contact the City of Great Falls Public Works Environmental Division at 406-727-8390

# Storm Water Discharges Associated with Industrial Activity for CITY OF GREAT FALLS

## Permit #: MTR000452

[View/Edit Representatives](#)

[Transfer](#)  
[Terminate](#)  
[Modification](#)

**Status:** Effective

**Balance Due:** \$0.00

**Assigned to:** Melinda Horne, 406-444-6747

No action needed. Updating narrative conditions.

## Document Manager

[Upload](#)

Show  entries

[Customize View](#)

Page search:

Name	Document Type	Date	LINKS
2022_06_29_5-day_NCR_Form.pdf	Non-Compliance Non Compliance Report	07/01/2022 10:04 AM	<a href="#">🔗</a>
2022_06_28_MDEQ_24-hr Notification.pdf	Non-Compliance Correspondence NCR	06/28/2022 01:48 PM	<a href="#">🔗</a>
2022_01_25_AR_SWI_MTR000452.pdf	Permit Annual Report	01/25/2022 08:30 AM	<a href="#">🔗</a>
🌟 MTR000452_AR.pdf	Permit Annual Report	02/03/2021 12:54 PM	<a href="#">🔗</a>
🌟 MTR00452_AR-SWI.pdf	Permit Annual Report	01/28/2019 01:12 PM	<a href="#">🔗</a>

## MCM-1 & MCM-2 ATTACHMENTS





## City of Great Falls - Local Government

Published by Dianna Strending · November 8 at 1:09 PM ·



The City's storm drain system collects storm water drainage from the entire City and directly discharges it to our local waterbodies (Missouri River, Sun River and Sand Coulee Creek). When debris of any kind enters the storm drainage system it not only creates additional maintenance requirements/challenges for City crews but it also impacts the water quality in our local waters where many of us enjoy participating in recreational activities. City storm drains are not filtered or pretreated in any way. They run from the street inlets directly to the outfall at the river or creek.

"When depositing yard debris on the public right of way, it directly affects the neighborhood and is considered a Criminal Public Nuisance under OCCGF §8.50.040. The Official Code of the City of Great Falls §8.51.040 states conditions prohibited on the right-of-way within the incorporated City limits includes any accumulation of dirt, litter, debris, rubbish, weeds or any other kind of waste or unsanitary material of any kind.

Additionally, as defined by the Montana Department of Environmental Quality (MT DEQ), an illicit discharge is "any discharge to a municipal separate storm sewer that is not composed entirely of storm water..." Consequently, any lawn clippings, yard debris, trash, fertilizers, etc. that enter the public right-of-way (ie. streets, sidewalks, curb and gutters, etc.) would constitute an illicit discharge and would be in direct violation of the Official Code of the City of Great Falls (OCCGF, §13.2.160). Furthermore, §8.8.080, §8.8.120, and §8.9.030 of the OCCGF reference requirements pertaining to proper storage, transport, and disposal of these types of refuse/waste.

Please help prevent potential pollutants/contaminations from entering the storm drain system and ultimately our treasured local water bodies and be respectful of keeping our wonderful City and properties beautiful.



**Do This!!**

- Leaves piled on boulevard
- Cleared from storm inlet
- Cleared from curb line
- Be a good neighbor!

**YARD DEBRIS**

**Not This!!**

- Do not rake or blow leaves onto roadway
- Do not rake or blow into storm drain
- Do not blow into neighbor's yard.


## Post Insights

### Total Insights


See more details about your post.

Post Impressions 

**1,584**

Post reach 

**1,524**

Engagement 

**159**



SHIPPING DOCUMENT		1. Generator ID Number <b>MTR000000430</b>	2. Page 1 of <b>3</b>	3. Emergency Response Phone <b>(877) 818-0087</b>	4. Shipping Document Tracking Number <b>ZZ 00936071</b>			
5. Generator's Name and Mailing Address <b>NATHAN BESICH</b> CITY OF GREAT FALLS PO BOX 5021 GREAT FALLS, MT 59404 Generator's Phone: <b>140 645-5814</b>			Generator's Site Address (if different than mailing address) <b>SAME</b>					
6. Transporter 1 Company Name <b>VEOLIA ES TECHNICAL SOLUTIONS</b>				U.S. EPA ID Number <b>NJD080631369</b>				
7. Transporter 2 Company Name <b>BSIN TRANSPORTATION</b>				U.S. EPA ID Number <b>OKR000031492</b>				
8. Designated Facility Name and Site Address <b>VEOLIA ES TECHNICAL SOLUTIONS, L.L.C.</b> <b>9131 EAST 96TH AVE.</b> <b>HENDERSON, CO 80640</b> Facility's Phone: <b>303 289-4827</b>				U.S. EPA ID Number <b>COD980591184</b>				
9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers		11. Total Quantity	12. Unit Wt./Vol.	13. Codes		
		No.	Type					
<b>X</b>	<b>1. UN1930, AEROSOLS, FLAMMABLE (EACH NOT EXCEEDING 1L CAPACITY), 2.1, LIMITED QUANTITY</b>	<b>1</b>	<b>B A</b>	<b>450</b>	<b>P</b>	<b>NONE</b>		
<b>X</b>	<b>2. UN1950, AEROSOLS, FLAMMABLE (EACH NOT EXCEEDING 1L CAPACITY), 2.1, LIMITED QUANTITY</b>	<b>2</b>	<b>C F</b>	<b>800</b>	<b>P</b>	<b>NONE</b>		
<b>X</b>	<b>3. UN1978, PROPANE, 2.1</b>	<b>8</b>	<b>C Y</b>	<b>24</b>	<b>P</b>	<b>NONE</b>		
<b>X</b>	<b>4. UN1044, FIRE EXTINGUISHERS CONTAINING COMPRESSED OR LIQUEFIED GAS, 2.2</b>	<b>1</b>	<b>C Y</b>	<b>10</b>	<b>P</b>	<b>NONE</b>		
14. Special Handling Instructions and Additional Information <b>ER Service Contracted by VESTS + Contract retained by generator confers agency authority on initial transporter to add or substitute additional transporters on generator's behalf - 1) ERG:126 W:1150789 A:HENRCI46289-152 2) ERG:126 W:1150789 A:HENRCI46289-152 3) ERG:115 W:1150852 A:HENAFT442416 4) ERG:126 W:974227 A:HENAFT442416</b>								
15. GENERATOR S/OFFEROR S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.								
Generator's/Offeror's Printed/Typed Name <b>BRANDON CHRISTENSEN</b>			Signature 		Month <b>04</b>	Day <b>15</b>	Year <b>23</b>	
16. International Shipments <input type="checkbox"/> Import to U.S. <input type="checkbox"/> Export from U.S. Port of entry/exit: _____ Date leaving U.S.: _____								
17. Transporter Acknowledgment of Receipt of Shipment								
Transporter 1 Printed/Typed Name <b>ANTHONY C. ROMERO</b>			Signature 		Month <b>04</b>	Day <b>15</b>	Year <b>23</b>	
Transporter 2 Printed/Typed Name <b>William Merrick</b>			Signature 		Month <b>4</b>	Day <b>29</b>	Year <b>23</b>	
18. Discrepancy								
18a. Discrepancy Indication Space <input type="checkbox"/> Quantity <input type="checkbox"/> Type <input type="checkbox"/> Residue <input type="checkbox"/> Partial Rejection <input type="checkbox"/> Full Rejection								
18b. Alternate Facility (or Generator) Shipping Document Tracking Number: _____ U.S. EPA ID Number: _____								
18c. Signature of Alternate Facility (or Generator) Facility's Phone: _____ Month: _____ Day: _____ Year: _____								
19. Report Management Method Codes (i.e., codes for treatment, disposal, and recycling systems)								
1. <b>H061</b>		2. <b>H061</b>		3. <b>H141</b>		4. <b>H141</b>		
20. Designated Facility Owner or Operator: Certification of receipt of shipment except as noted in Item 18a								
Printed/Typed Name <b>Whitney Leday</b>			Signature 		Month <b>15</b>	Day <b>14</b>	Year <b>23</b>	

GENERATOR

TRANSPORTER INT'L

DESIGNATED FACILITY

DESIGNATED FACILITY TO GENERATOR



SHIPPING DOCUMENT (Continuation Sheet)	21. Generator ID Number <b>M T R 0 0 0 0 0 4 3 0</b>	22. Page <b>2 of 3</b>	23. Shipping Document Tracking Number <b>ZZ00936071</b>
---	---	---------------------------	--

24. Generator's Name **CITY OF GREAT FALLS**

25. Transporter **3** Company Name **VEOLIA ES TECHNICAL SOLUTIONS** U.S. EPA ID Number **N J D 0 8 0 6 3 1 3 6 9**

26. Transporter \_\_\_\_\_ Company Name \_\_\_\_\_ U.S. EPA ID Number \_\_\_\_\_

27a. HM	27b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	28. Containers		29. Total Quantity	30. Unit Wt./Vol.	31. Codes	
		No.	Type				
X	5. UN1992, FLAMMABLE LIQUIDS, TOXIC, n.o.s., (PETROLEUM DISTILLATES, PYRETHRINS), 3 (6.1), II, RQ	6	CF	1350 <del>2400</del>	P	NONE	
X	6. UN1993, FLAMMABLE LIQUIDS, n.o.s., (GASOLINE, PETROLEUM DISTILLATES), 3, II	2	TP	500	G	NONE	
X	7. UN1263, PAINT RELATED MATERIAL, 3, II	16	BA	11,458 <del>12700</del>	P	NONE	
X	8. NA1325, FUSEE (RAILWAY OR HIGHWAY), 4.1, II	1	DF	12	P	NONE	
X	9. UN2811, TOXIC SOLIDS, ORGANIC, n.o.s., (LINDANE, DURSBAN), 6.1, II, RQ	1	BA	400	P	NONE	
X	10. UN3264, CORROSIVE LIQUID, ACIDIC, INORGANIC, n.o.s., (HYDROCHLORIC ACID, SULFURIC ACID), 8, II	1	CF	400	P	NONE	
X	11. UN3265, CORROSIVE LIQUID, ACIDIC, ORGANIC, n.o.s., (ACETIC ACID, FORMALDEHYDE), 8, II	1	CF	400	P	NONE	
X	12. UN3267, CORROSIVE LIQUID, BASIC, ORGANIC, n.o.s., (SODIUM HYDROXIDE, POLYAMINES), 8, II	1	CF	200	P	NONE	
X	13. UN2809, MERCURY, 8 (6.1), III, RQ	1	DF	13	P	NONE	
X	14. UN2672, AMMONIA SOLUTION, 8, III	1	CF	400	P	NONE	

32. Special Handling Instructions and Additional Information 5) ERG:131 W:1150775 A:HENTWIBT8228 6) ERG:128 W:1150851 A:HENFLS 7) ERG:128 W:1150766 A:HENRCI46289-157 8) ERG:133 W:974222 A:HEN 9) ERG:154 W:1150782 A:HENTWIBT8226 10) ERG:154 W:1150777 A:HENTWIBT8229IAC 11) ERG:153 W:1150784 A:HENTWIBT8230OA 12) ERG:153 W:1150778 A:HENTWIBT8231BAS 13) ERG:172 W:1150796 A:HENSLM-239065 14) ERG:154 W:1150779 A:HENTWIBT8231BAS

33. Transporter **3** Acknowledgment of Receipt of Shipment  
 Printed/Typed Name: *M. Arnold* Signature: *M. Arnold* Month: **15** Day: **15** Year: **23**

34. Transporter \_\_\_\_\_ Acknowledgment of Receipt of Shipment  
 Printed/Typed Name: \_\_\_\_\_ Signature: \_\_\_\_\_ Month: \_\_\_\_\_ Day: \_\_\_\_\_ Year: \_\_\_\_\_

35. Discrepancy *Line 7 - Section 28+29 = 17 BA 11962 P - Nathan Besica/Brandon C/ MA 5-25-23*

36. Report Management Method Codes (i.e., codes for treatment, disposal, and recycling systems)

5. #141	6. #061	7. #061	8. #141	9. #141
10. #141	11. #141	12. #141	13. #141	14. #141

DESIGNATED FACILITY TO GENERATOR

GENERATOR

TRANSPORTER

DESIGNATED FACILITY

SHIPPING DOCUMENT (Continuation Sheet)		21. Generator ID Number MTR000000430	22. Page 3 of 3	23. Shipping Document Tracking Number ZZ00936071		
24. Generator's Name CITY OF GREAT FALLS						
25. Transporter _____ Company Name						U.S. EPA ID Number
26. Transporter _____ Company Name						U.S. EPA ID Number
27a. HM	27b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	28. Containers		29. Total Quantity	30. Unit Wt./Vol.	31. Codes
		No.	Type			
	15. LATEX PAINT, n.o.s.	2	CW	2000	P	NONE
32. Special Handling Instructions and Additional Information 15) W:1150767 A:GCO-LATEX PAINT						
33. Transporter _____ Acknowledgment of Receipt of Shipment	Printed/Typed Name		Signature		Month	Day Year
34. Transporter _____ Acknowledgment of Receipt of Shipment	Printed/Typed Name		Signature		Month	Day Year
35. Discrepancy						
36. Report Management Method Codes (i.e., codes for treatment, disposal, and recycling systems)						
15. H41						

GENERATOR

TRANSPORTER

DESIGNATED FACILITY



Please print or type.

Form Approved. OMB No. 2050-0039

<b>UNIFORM HAZARDOUS WASTE MANIFEST</b>		1. Generator ID Number <b>M T R 0 0 0 0 0 0 4 3 0</b>	2. Page 1 of <b>2</b>	3. Emergency Response Phone <b>(877) 818-0087</b>	4. Manifest Tracking Number <b>002018053 VES</b>					
5. Generator's Name and Mailing Address <b>CITY OF GREAT FALLS PO BOX 5021 GREAT FALLS, MT 59404 Generator's Phone: 140 645-5814</b>			Generator's Site Address (if different than mailing address) <b>SAME</b>							
6. Transporter 1 Company Name <b>VEOLIA ES TECHNICAL SOLUTIONS</b>				U.S. EPA ID Number <b>N J D 0 8 0 6 3 1 3 6 9</b>						
7. Transporter 2 Company Name <b>Basin Transportation</b>				U.S. EPA ID Number <b>OKR 000031492</b>						
8. Designated Facility Name and Site Address <b>VEOLIA ES TECHNICAL SOLUTIONS, L.L.C. 9131 EAST 96TH AVE. HENDERSON, CO 80640</b>				U.S. EPA ID Number <b>C O D 9 8 0 5 9 1 1 8 4</b>						
9a. HM		9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))		10. Containers No. Type		11. Total Quantity				
						12. Unit Wt./Vol.				
						13. Waste Codes				
X	1.	UN1950, AEROSOLS, FLAMMABLE (EACH NOT EXCEEDING 1L CAPACITY), 2.1, LIMITED QUANTITY		1	B A	4 5 0	P	NONE		
X	2.	UN1992, FLAMMABLE LIQUIDS, TOXIC, n.o.s., (PETROLEUM DISTILLATES, PYRETHRINS), 3 (6.1), II, RQ		5	C F	7 5 8	P	NONE		
X	3.	UN1993, FLAMMABLE LIQUIDS, n.o.s., (GASOLINE, PETROLEUM DISTILLATES), 3, II		1	D F	3 0	G	NONE		
X	4.	UN1993, FLAMMABLE LIQUIDS, n.o.s., (GASOLINE, PETROLEUM DISTILLATES), 3, II		8	D M	4 4 0	G	NONE		
14. Special Handling Instructions and Additional Information <b>ER Service Contracted by VESTS -/- Contract retained by generator confers agency authority on initial transporter to add or substitute additional transporters on generator's behalf -/- 1) ERG:126 W:1150789 A:HENRC146289-152 2) ERG:131 W:1150775 A:HENTWIBT8228 3) ERG:128 W:1150851 A:HENFLS 4) ERG:128 W:1150851 A:HENFLS</b>										
15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent. I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.										
Generator's/Offor's Printed/Typed Name <b>Nathan Besich</b>				Signature 		Month Day Year <b>1 0 2 1 2 3</b>				
16. International Shipments <input type="checkbox"/> Import to U.S. <input type="checkbox"/> Export from U.S. Port of entry/exit: _____ Date leaving U.S.: _____										
17. Transporter Acknowledgment of Receipt of Materials										
Transporter 1 Printed/Typed Name <b>Brandon Christensen</b>				Signature 		Month Day Year <b>1 0 2 1 2 3</b>				
Transporter 2 Printed/Typed Name <b>Craig Zisser Beaufait</b>				Signature 		Month Day Year <b>1 1 6 2 3</b>				
18. Discrepancy										
18a. Discrepancy Indication Space <input type="checkbox"/> Quantity <input type="checkbox"/> Type <input type="checkbox"/> Residue <input type="checkbox"/> Partial Rejection <input type="checkbox"/> Full Rejection										
18b. Alternate Facility (or Generator) Manifest Reference Number: _____ U.S. EPA ID Number _____										
18c. Signature of Alternate Facility (or Generator) _____ Month Day Year _____										
19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)										
1. <b>H141</b>		2. <b>H141</b>		3. <b>H061</b>		4. <b>H061</b>				
20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a										
Printed/Typed Name <b>M. Arnold</b>				Signature 		Month Day Year <b>2 1 2 4</b>				



<b>UNIFORM HAZARDOUS WASTE MANIFEST</b> (Continuation Sheet)		21. Generator ID Number <b>M T R 0 0 0 0 0 0 4 3 0</b>	22. Page <b>2 of 2</b>	23. Manifest Tracking Number <b>002018053VES</b>					
24. Generator's Name <b>CITY OF GREAT FALLS</b>									
25. Transporter <b>3</b> Company Name <b>Veolia ES TS</b>			U.S. EPA ID Number <b>NJSD80631369</b>						
26. Transporter _____ Company Name			U.S. EPA ID Number						
27a. HM	27b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	28. Containers		29. Total Quantity	30. Unit Wt./Vol.	31. Waste Codes			
		No.	Type						
X	5. UN1993, FLAMMABLE LIQUIDS, n.o.s., (GASOLINE, PETROLEUM DISTILLATES), 3, II	1	TP	275	G	NONE			
X	6. UN1263, PAINT RELATED MATERIAL, 3, II	3	BA	2015	P	NONE			
X	7. UN2811, TOXIC SOLIDS, ORGANIC, n.o.s., (LINDANE, DURSEAN), 6.1, II, RQ	1	BA	508	P	NONE			
X	8. UN3264, CORROSIVE LIQUID, ACIDIC, INORGANIC, n.o.s., (HYDROCHLORIC ACID, SULFURIC ACID), 8, II	1	CF	62	P	NONE			
X	9. UN3267, CORROSIVE LIQUID, BASIC, ORGANIC, n.o.s., (SODIUM HYDROXIDE, POLYAMINES), 8, II	1	CF	62	P	NONE			
X	10. UN2794, BATTERIES, WET, FILLED WITH ACID, ELECTRIC STORAGE, 8	1	CF	282	P	NONE			
X	11. UN3480, LITHIUM ION BATTERIES, 9	1	DF	10	P	NONE			
	12. UNIVERSAL WASTE-LAMPS	1	DF	25	P	NONE			
	13. BATTERIES, DRY, SEALED, n.o.s., (ALKALINE BATTERIES)	1	DF	18	P	NONE			
32. Special Handling Instructions and Additional Information <b>7) ERG:154 W:1150782 A:HENTWIBT8226 8) ERG:154 W:1150777 A:HENTWIBT8229IAC 9) ERG:153 W:1150778 A:HENTWIBT8231 BAS 10) ERG:154 W:974226 A:HENKBI-1720-PE 11) ERG:147 W:974225 A:HENKBI-1720-LIO 12) W:1150794 A:HENSLM-194790 8' BULB COUT#11, 4' BULB COUT#2, CFL'S#56 13) W:974224 A:HENKBI-1720-AK</b>									
33. Transporter <b>3</b> Acknowledgment of Receipt of Materials									
Printed/Typed Name <b>M. Arnold</b>		Signature <b>M. Arnold</b>		Month Day Year <b>2 5 24</b>					
34. Transporter _____ Acknowledgment of Receipt of Materials									
Printed/Typed Name		Signature		Month Day Year					
35. Discrepancy									
36. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)									
5	<del>H141</del> H061	6	H141	7	H141	8	H141	9	H141
10	H141	11	H141	12	H141	13	H141		

## Elementary

Year	Students	Projects	Teams
2017	72	58	N/A
2018	146	97	N/A
2019	163	102	N/A
2020	153	114	N/A
2021	0	0	N/A
2022	43	34	9
2023	48	38	N/A

## Total Students

Year	Students	Projects
2017	423	336
2018	464	363
2019	411	304
2020	455	342
2021	46	31
2022	357	257
2023	305	241

## Middle School

Year	Students	Projects	Teams
2017	305	243	N/A
2018	265	228	N/A
2019	197	160	N/A
2020	233	181	N/A
2021	36	22	N/A
2022	228	158	48
2023	204	164	N/A

## High School

Year	Students	Projects	Teams
2017	46	35	N/A
2018	53	38	N/A
2019	51	42	N/A
2020	69	47	N/A
2021	10	9	N/A
2022	86	65	20
2023	53	39	N/A

<b>Cartegraph ID</b>	<b>Private Facilities Owner</b>	<b>Outreach Activities</b>
70 & decimals	<i>Great Falls Public School Systems</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached), meeting with facility managers in person to establish expectation on how each facilities' BMPs need to be managed
80 & decimals		
84 & decimals		
86 & decimals		
73 & decimals	<i>Montana Specialty Mills</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached), meeting with facility managers in person to establish expectation on how each facilities' BMPs need to be managed
88	<i>Cargill Inc.</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached), meeting with facility managers in person to establish expectation on how each facilities' BMPs need to be managed
72 & decimals	<i>TownPump Developments</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached) on expectations and plan moving forward
85 & decimals		
90 & decimals		
77 & decimals	<i>Rockcress Commons</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached) on expectations and plan moving forward
87 & decimals	<i>University of Providence</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached) on expectations and plan moving forward
89	<i>Northern Montana Oral Surgery Center</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached) on expectations and plan moving forward
92 & decimals	<i>HUB International</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached) on expectations and plan moving forward
91	<i>Harold &amp; Carmern Poulsen Legacy Housing</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached) on expectations and plan moving forward
93	<i>Independence Bank</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached) on expectations and plan moving forward

Cartegraph ID	Private Facilities Owner	Outreach Activities
81 & decimals	<i>Ace Hardware</i>	Onsite visit/inspection of storm BMPs, email correspondence (see attached) on expectations and plan moving forward
75	<i>Citizens Alliance Bank</i>	Established correspondence with facility manager. Provided self-inspection report and made schedule on future inspections
71	<i>Eagles Beverage</i>	Established correspondence with facility manager and established expectations of BMP maintenance activities
76	<i>Falls Mechanical</i>	Established correspondence with facility manager and established expectations of BMP maintenance activities

**KEY & NOTES**

1. All correspondence records with private stormwater BMP owners for 2023 are categorized within City Environmental database.



## Nathan Besich

---

**From:** Jack Wang  
**Sent:** Thursday, October 5, 2023 1:01 PM  
**To:** 'Alyssa Larkey'  
**Cc:** Nathan Besich  
**Subject:** RE: WoW 2023 stats

Thank you Alyssa,

This is very helpful. We at Public Works ENV look forward to participating in future events.

Regards,

Jack

---

**From:** Alyssa Larkey <alarkey@GreatFallsChamber.org>  
**Sent:** Monday, October 2, 2023 2:34 PM  
**To:** Jack Wang <jwang@greatfallsmt.net>  
**Cc:** Nathan Besich <nbesich@greatfallsmt.net>  
**Subject:** RE: WoW 2023 stats

Good afternoon, Jack,

Below is a blurb for you to take and utilize as you see fit.

Thanks again! Please let me know if you have any questions.

Worlds of Work (WOW) – Wowing 8th and 10th Grade Students!

A big thank you to the many volunteers, schools and others who helped with this incredible event, highlighting our area businesses and organizations, showcasing the career opportunities for almost 2,000 students from across the area and state. Twenty-six schools from eight counties this year participated in this hands-on, interactive, and experiential event to ignite their passion about working for great companies right here in Great Falls! We also had 187 volunteers who donated between \$4,500 and \$14,000 in labor to make our event a success.

We have to also thank all the exhibitors for taking the time to set up, visit with these excited students, showing them the great work you do in our area, and then tearing down! It is fun to not only watch the students get excited, but watching exhibitors interact with these students with the passion they have for their work and career. We saw a BIG step up in the displays and interactive 'work' this year as many saw a glimpse of what they could do from last year and they all stepped up their booths.

Check out KRTV's coverage – [click here](#)

Alyssa

---

**From:** Alyssa Larkey  
**Sent:** Wednesday, September 27, 2023 12:15 PM  
**To:** Jack Wang <[jwang@greatfallsmt.net](mailto:jwang@greatfallsmt.net)>  
**Cc:** Nathan Besich <[nbesich@greatfallsmt.net](mailto:nbesich@greatfallsmt.net)>  
**Subject:** RE: WoW 2023 stats



Good afternoon, Jack,

Thank you for being a part of WOW and asking for some information about participation. I would be happy to send it your way once I have all the data solidified.

I hope to have that to you by this Friday, Jack.

Thanks again! I hope you enjoyed yesterday overall. Talk soon.

Alyssa

---

**From:** Jack Wang <[jwang@greatfallsmt.net](mailto:jwang@greatfallsmt.net)>  
**Sent:** Wednesday, September 27, 2023 9:21 AM  
**To:** Alyssa Larkey <[alarkey@GreatFallsChamber.org](mailto:alarkey@GreatFallsChamber.org)>  
**Cc:** Nathan Besich <[nbesich@greatfallsmt.net](mailto:nbesich@greatfallsmt.net)>  
**Subject:** WoW 2023 stats

Good morning Alyssa,

My name is Jack, I am with the City of Great Falls Public Works Environmental Division. I was wondering if you'd be able to provide me some information regarding WoW 2023's participation among students (total number for 8<sup>th</sup> and 10<sup>th</sup> graders) as well as businesses/organizations (total numbers). We would like to include these information in our outreach report to MT DEQ. If you have additional questions please feel free to reach out.

Thank you,

**Jack (Mujen) Wang**  
Environmental Division Program Specialist  
City of Great Falls – Public Works  
1005 25<sup>th</sup> Ave NE  
Great Falls, MT 59404  
(406) 455 8147



City of Great Falls e-mails may be subject to Montana's Right To Know law (Article II Sec 9, Montana Constitution) and may be a Public Record (2-6-1002, M.C.A.) and available for public inspection.

MCM-3 ATTACHMENTS



# MS4 Outfall 5

Date: 10/09/2023

Weather: Sunny and 80

---



## **MS4 Outfall 5**

Date: 10/09/2023

Weather: Sunny and 80

---

### **Items of Concern:**

- **Overgrown Vegetation**
- **Sediment Deposits**

### **Condition of Outfall:**

- **The outfall was in good condition. Some sediment has been deposited inside the outfall structure.**
- **Vegetation is growing over and around the structure.**

### **Summary**

- **Access to the outfall was not difficult. To access outfall you have to walk around the trees at the north end of Garden Home Park. Then head toward the river. During the time of inspection, no discharge from the outfall was observed. It was observed that some sediment has been deposited in the mouth of the outfall. The vegetation near the outfall has begun to grow over and around the outfall structure.**

### **Recommendations**

- **Recommend trimming vegetation that is growing around the outfall structure. It is also recommended to clean out the sediment in the structure.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
5	10/9/2023	Johnny Cavill	80 F	0 in	0 in	10:39:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Mixed Use	Not Submerged	Unlikely	RCP	42	Single Circular	
Inspection Conditions			Notes	Rating			
pH	0 ph			Excellent			
Aesthetics	5						
Floatables	None						
Benthic Growth	5						
Abnormal Vegetation	4						
Turbidity	None						
Ammonia	0 mg/l						
Odor	None						
Outfall Damage	5						
Water Temperature	0 F						
Conductivity	0						
Color	None						
Pool Quality	0						
Volume	0 l						
Structure	5						
Deposits/Stains	4.5						
Time to Fill	0 sec						
Surface	5						



## MS4 Outfall 7

Date: 10/09/2023

Weather: Sunny and 80

---



## **MS4 Outfall 7**

Date: 10/09/2023

Weather: Sunny and 80

---

### **Items of Concern:**

- **Sediment deposits**
- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall at the time of inspection appeared to be good. Some sedimentation and other debris has been deposited and built up inside of the outfall structure. As shown in the photo, vegetation is growing in and around the structure.**

### **Summary**

- **Accessing the outfall was pretty straightforward, as it is easily accessed from the trail adjacent to the river. There was no discharge observed during the time of inspection. It was observed that sediment and other debris has accumulated in the outfall structure. The adjacent vegetation was observed to be growing over, around, and into the outfall structure.**

### **Recommendations**

- **Recommend trimming vegetation that is growing in, around, and over the outfall structure. Recommend cleaning all the sediment and other debris from the outfall structure.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
7	10/9/2023	Johnny Cavill	66 F	0 in	0 in	10:48:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Commercial	Not Submerged	Unlikely	RCP	24	Single Circular	
Inspection Conditions			Notes	Rating			
Deposits/Stains	3.5			Excellent			
Conductivity	0						
Outfall Damage	4						
Time to Fill	0 sec						
Pool Quality	4.5						
Volume	0 l						
Odor	None						
Water Temperature	0 F						
Floatables	None						
Benthic Growth	5						
Aesthetics	4						
Color	None						
Ammonia	0 mg/l						
Turbidity	None						
Structure	4						
pH	0 ph						
Surface	4						
Abnormal Vegetation	3						



## MS4 Outfall 8

Date: 10/9/2023

Weather: Sunny and 80

---



## **MS4 Outfall 8**

Date: 10/9/2023

Weather: Sunny and 80

---

### **Items of Concern:**

- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall at the time of inspection appeared to be good. As shown in the photo, vegetation is growing in and around the structure.**

### **Summary**

- **Accessing this outfall can be difficult. To get to the outfall structure you can observe it from the trail adjacent to the river. This will put you right above the outfall. Getting down to the actual structure is going to be much more difficult as there is not much available to access the outfall. There was standing water in the mouth of the outfall at the time of inspection. This water is in the mouth of the outfall due to the elevation of the river.**

### **Recommendations**

- **Recommend trimming vegetation that is growing in, around, and over the outfall structure.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
8	10/9/2023	Johnny Cavill	73 F	0 in	0 in		0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Mixed Use	Not Submerged	Unlikely	RCP	42	Single Circular	
Inspection Conditions			Notes	Rating			
Ammonia	0.25 mg/l			Excellent			
Outfall Damage	4.5						
Structure	4.5						
Pool Quality	4.5						
Turbidity	None						
Conductivity	233.5						
Floatables	None						
Abnormal Vegetation	4						
Aesthetics	4.5						
Odor	None						
Benthic Growth	4.5						
Water Temperature	0 F						
Surface	4.5						
Color	None						
pH	8.19 ph						
Time to Fill	1 min						
Deposits/Stains	4.5						
Volume							



# MS4 Outfall 9

Date: 10/9/2023

Weather: Sunny and 80

---



## **MS4 Outfall 9**

Date: 10/9/2023

Weather: Sunny and 80

---

### **Items of Concern:**

- **Moss build up**

### **Condition of Outfall:**

- **The overall condition of the outfall during the time of inspection appeared to be good. There was some moss growth in the mouth of the outfall structure.**

### **Summary**

- **Access to this outfall is somewhat difficult. Outfall can be found from the trail adjacent to the river. To access this outfall structure, you will need to climb over a small fence and carefully make your way to the structure. During the inspection, a flow was observed and proper testing parameters were conducted. It was observed that moss is growing inside the structure.**

### **Recommendations**

- **Recommend cleaning the moss out of the mouth of the structure.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
9	10/9/2023	Johnny Cavill	68 F	0 in	0 in	11:38:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Mixed Use	Not Submerged	Unlikely	RCP	54	Single Elliptical	
Inspection Conditions			Notes	Rating			
pH	8.42 ph			Excellent			
Surface	4.5						
Outfall Damage	5						
Color	None						
Water Temperature	65.4 F						
Time to Fill	15.09 sec						
Structure	5						
Deposits/Stains	4						
Turbidity	None						
Volume	1 l						
Pool Quality	4.5						
Conductivity	222						
Odor	None						
Ammonia	0.25 mg/l						
Benthic Growth	3.5						
Abnormal Vegetation	4.5						
Floatables	None						
Aesthetics	5						



# MS4 Outfall 10

Date: 10/10/2023

Weather: Sunny and 70



## **MS4 Outfall 10**

Date: 10/10/2023

Weather: Sunny and 70

---

### **Items of Concern:**

- **None at this time**

### **Condition of Outfall:**

- **The condition of the outfall at the time of inspection appeared to be good.**

### **Summary**

- **Accessing this outfall is pretty straightforward. It is a short walk from a nearby parking lot. During the inspection a flow was observed coming from the outfall structure.**

### **Recommendations**

- **None at this time.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
10	10/10/2023	Johnny Cavill	62 F	0 in	0 in	10:07:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Potential	RCP	30	Single Circular	
Inspection Conditions			Notes	Rating			
Color	None			Excellent			
Outfall Damage	4.5						
pH	8.38 ph						
Floatables	None						
Conductivity	149						
Ammonia	0 mg/l						
Turbidity	None						
Deposits/Stains	4.5						
Surface	4.5						
Aesthetics	4.5						
Pool Quality	4.5						
Structure	4.5						
Benthic Growth	5						
Abnormal Vegetation	4.5						
Water Temperature	59.1 F						
Volume	1 l						
Time to Fill	4.7 sec						
Odor	None						



# MS4 Outfall 11

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 11**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall during the time of inspection was good. There was vegetation growing all around the outfall.**

### **Summary**

- **Accessing this outfall was pretty easy. It is a short walk from a nearby parking lot. During the inspection, flow was observed coming from the outfall structure. During the inspection, vegetation was observed growing all over the outfall structure.**

### **Recommendations**

- **Recommend trimming all the overgrown and overhanging vegetation around the outfall structure.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
11	10/10/2023	Johnny Cavill	62 F	0 in	0 in	10:17:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Potential	RCP	48	Single Circular	
Inspection Conditions			Notes	Rating			
Surface	4.5	Needs cleaning	Excellent				
Ammonia	0.25 mg/l						
pH	8.58 ph						
Volume	1 l						
Odor	None						
Pool Quality	4						
Abnormal Vegetation	2.5						
Aesthetics	4.5						
Outfall Damage	4						
Floatables	None						
Deposits/Stains	4						
Time to Fill	39 sec						
Water Temperature	59.7 F						
Conductivity	150.4						
Color	None						
Structure	4.5						
Turbidity	None						
Benthic Growth	3.5						



## MS4 Outfall 12

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 12**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall during the time of inspection was good.**

### **Summary**

- **Accessing this outfall was easy. This outfall can be reached a short distance off River's Edge Trail. During the time of inspection no flow was observed coming out of the structure. The photo above shows water in the structure and is there due to the level of the river. There was some willows that have begun to grow over and around the structure.**

### **Recommendations**

- **Recommend trimming the vegetation grown over and around the outfall structure.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
12	10/10/2023	Johnny Cavill	62 F	0 in	0 in	10:37:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Submerged, Partially, with Sediment	Unlikely	RCP	30	Single Circular	
Inspection Conditions			Notes	Rating			
Deposits/Stains	4.5		Needs cleaning	Good			
Abnormal Vegetation	3						
Pool Quality	5						
Color	Easily Visible in Outfall						
Benthic Growth	4						
Odor	Easily Detected						
Turbidity	Cloudy						
pH	8.59 ph						
Volume	200 ml						
Outfall Damage	4.5						
Surface	4.5						
Time to Fill	15 sec						
Floatables	Few						
Ammonia	0.25 mg/l						
Conductivity	131.5						
Structure	4.5						
Water Temperature	57.8 F						
Aesthetics	4.5						



# MS4 Outfall 13

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 13**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Trash on the grate**

### **Condition of Outfall:**

- **The condition of the outfall during the time of inspection appeared to be good.**

### **Summary**

- **This outfall is easy to access and is in good condition. The outfall had standing water in the structure during the time of inspection due to level of the river. No flow was observed.**

### **Recommendations**

- **Clean Grate**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
13	10/10/2023	Johnny Cavill	65 F	0 in	0 in	10:52:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Submerged, Partially	Suspect	RCP	54	Single Circular	
Inspection Conditions			Notes	Rating			
Water Temperature Outfall Damage 5 Odor None Floatables Few Surface 4.5 Deposits/Stains 4.5 Ammonia Turbidity Faint Cloudiness Volume Color Faint Benthic Growth 5 Pool Quality 5 Abnormal Vegetation 5 Aesthetics 4 Time to Fill Conductivity Structure 5 pH			Dead snake. Small oil sheen on right side, see photo.				



# MS4 Outfall 14

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 14**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall during time of inspection appeared to be good. There was an abundance of vegetation observed growing in the outfall structure.**

### **Summary**

- **Accessing this outfall was pretty easy. It is located just off the River's Edge Trail. During the inspection no flow was observed. An abundance of vegetation was observed during the inspection growing in the actual outfall structure.**

### **Recommendations**

- **Recommend removing all vegetation growing inside the outfall structure as well as vegetation growing in the mouth of the structure.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
14	10/10/2023	Johnny Cavill	65 F	0 in	0 in		0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Submerged, Partially	Unlikely	RCP	15	Single Circular	
Inspection Conditions			Notes	Rating			
Outfall Damage	4.5		Needs cleaned asap				
Surface	1.5						
Time to Fill							
Volume							
Deposits/Stains	4						
Odor	None						
Floatables	None						
Benthic Growth	3.5						
pH							
Abnormal Vegetation	2						
Turbidity	None						
Water Temperature							
Color	Faint						
Structure	4.5						
Pool Quality	4						
Aesthetics	1.5						
Conductivity							
Ammonia							



## MS4 Outfall 15

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 15**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Debris build up**

### **Condition of Outfall:**

- **During the time of inspection, the outfall structure appeared to be in good condition.**

### **Summary**

- **Accessing the outfall was pretty straightforward as it is just off the River's Edge Trail. During the inspection no flow was observed. The level of the river was high enough that it backed up into the outfall structure. There was a fair amount of debris build up on the outfall structure bar rack.**

### **Recommendations**

- **Recommend cleaning all the debris from the bar rack at the outfall structure.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
15	10/10/2023	Johnny Cavill	65 F	0 in	0 in	11:02:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Context Cam	Industrial	Submerged, Partially		RCP	36	Single Circular	
Inspection Conditions			Notes	Rating			
Turbidity	None			Good			
Time to Fill	0 sec						
Volume	0 l						
Water Temperature	0 F						
Outfall Damage	4						
Surface	4.5						
Deposits/Stains	2						
pH	0 ph						
Benthic Growth	2.5						
Abnormal Vegetation	4						
Conductivity	0						
Structure	4.5						
Aesthetics	4.5						
Pool Quality	4						
Color	None						
Odor	None						
Floatables	None						
Ammonia	0 mg/l						



# MS4 Outfall 16

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 16**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **The condition of the outfall appeared to be good during the time of inspection.**

### **Summary**

- **Accessing this outfall was fairly easy to reach. The outfall is located just off the River's Edge Trail.**

### **Recommendations**

- **None at this time.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
16	10/10/2023	Johnny Cavill	65 F	0 in	0 in	11:17:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	48	Single Circular	
Inspection Conditions			Notes	Rating			
Water Temperature	75.3 F			Excellent			
Pool Quality	4.5						
Deposits/Stains	4.5						
Odor	None						
Conductivity	672						
Aesthetics	4.5						
Abnormal Vegetation	5						
Structure	5						
Turbidity	None						
Color	None						
Floatables	None						
Time to Fill	60 sec						
Ammonia	0.25 mg/l						
Surface	5						
Outfall Damage	4.5						
Volume	0.2 l						
Benthic Growth	4						
pH	8.55 ph						



# MS4 Outfall 17

Date: 10/10/2023

Weather: Sunny and 73



DIRECTION  
53 deg(T)

47.52016°N  
111.30319°W

ACCURACY 5 m  
DATUM WGS84

2023-10-10  
11:21:15-06:00

## **MS4 Outfall 17**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Trash and Debris**

### **Condition of Outfall:**

- **Condition of the outfall during the time of inspection was good.**

### **Summary**

- **Accessing this outfall was very simple as the outfall structure is located just off the River's Edge Trail. The outfall appeared to be in good condition. There was no flow observed coming from the outfall during the time of inspection.**

### **Recommendations**

- **Clean up trash and Debris**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
17	10/10/2023	Johnny Cavill	67 F	0 in	0 in	11:21:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	12	Single Circular	
Inspection Conditions			Notes	Rating			
Color	None	A lot of trash, clean.	Excellent				
Benthic Growth	5						
Time to Fill	0 sec						
Water Temperature	0 F						
Turbidity	None						
pH	0 ph						
Pool Quality	4.5						
Aesthetics	4						
Abnormal Vegetation	3.5						
Volume	0 l						
Conductivity	0						
Floatables	None						
Deposits/Stains	5						
Surface	4						
Ammonia	0 mg/l						
Odor	None						
Structure	4						
Outfall Damage	4						



# MS4 Outfall 18

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 18**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall during the inspection was good. There was a large amount of vegetation growing around the outfall structure.**

### **Summary**

- **Accessing this outfall was pretty easy. The outfall is located just off the River's Edge Trail. It was a bit difficult to locate the outfall structure due to all the vegetation growing around and over the outfall structure.**

### **Recommendations**

- **Recommend trimming vegetation that is growing around the structure so it is easier to find.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
18	10/10/2023	Johnny Cavill	68 F	0 in	0 in	12:56:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Submerged, Partially, with Sediment	Unlikely	CMP	24	Single Circular	
Inspection Conditions			Notes	Rating			
pH	8.65 ph			Excellent			
Conductivity	163.1						
Turbidity	None						
Time to Fill	35 sec						
Ammonia	0.25 mg/l						
Odor	None						
Floatables	Few						
Color	None						
Pool Quality	4.5						
Surface	4.5						
Benthic Growth	4.5						
Outfall Damage	4.5						
Volume	300 ml						
Structure	4.5						
Aesthetics	4.5						
Water Temperature	64.5 F						
Deposits/Stains	4.5						
Abnormal Vegetation	3.5						



## MS4 Outfall 19

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 19**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **The condition of the outfall during the time of inspection appeared to be good.**

### **Summary**

- **Accessing this outfall was pretty straightforward, as it is located just off the River's Edge Trail. The condition of the outfall was good. During the time of inspection, a flow was observed coming from the outfall.**

### **Recommendations**

- **None**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
19	10/10/2023	Johnny Cavill	68 F	0 in	0 in	1:02:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	12	Single Circular	
Inspection Conditions			Notes	Rating			
Conductivity	0			Excellent			
Color	None						
Odor	None						
pH	0 ph						
Time to Fill	0 sec						
Turbidity	None						
Benthic Growth	4.5						
Abnormal Vegetation	3.5						
Water Temperature	0 F						
Pool Quality	4.5						
Floatables	None						
Aesthetics	3.5						
Outfall Damage	4.5						
Structure	4.5						
Surface	4.5						
Ammonia	0 mg/l						
Deposits/Stains	4						
Volume	0 l						



# MS4 Outfall 20

Date: 10/10/2023

Weather: Sunny and 73



## **MS4 Outfall 20**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- Condition of the outfall during the time of inspection was determined to be good.

### **Summary**

- Accessing this outfall was very straightforward as the outfall is located just off the River's Edge Trail.

### **Recommendations**

- **None**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
20	10/10/2023	Johnny Cavill	68 F	0 in	0 in	1:08:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	15	Single Circular	
Inspection Conditions			Notes	Rating			
Volume	0 l			Excellent			
Aesthetics	4.5						
Ammonia	0 mg/l						
Outfall Damage	4.5						
Water Temperature	0 F						
Odor	None						
Structure	4.5						
Floatables	None						
Benthic Growth	5						
Time to Fill	0 sec						
pH	0 ph						
Color	None						
Surface	4.5						
Pool Quality	4.5						
Abnormal Vegetation	2.5						
Deposits/Stains	4.5						
Turbidity	None						
Conductivity	0						



## MS4 Outfall 21

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 21**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **The condition of the outfall at the time of inspection appeared to be good.**

### **Summary**

- **Accessing this outfall was very straightforward, as it located just off the River's Edge Trail. During the inspection no flow was observed coming from the outfall.**

### **Recommendations**

- **None**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
21	10/10/2023	Johnny Cavill	68 F	0 in	0 in	1:11:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	CMP	30	Single Circular	
Inspection Conditions			Notes	Rating			
Structure	5			Excellent			
Conductivity	0						
Outfall Damage	5						
Ammonia	0 mg/l						
Aesthetics	5						
Odor	None						
Color	None						
pH	0 ph						
Pool Quality	5						
Water Temperature	0 F						
Surface	5						
Floatables	None						
Volume	0 l						
Turbidity	None						
Benthic Growth	5						
Time to Fill	0 sec						
Deposits/Stains	5						
Abnormal Vegetation	5						



## MS4 Outfall 22

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 22**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **The condition of the outfall during the time of inspection appeared to be good.**

### **Summary**

- **Accessing the outfall was pretty easy as it is just off the River's Edge Trail. During the inspection water was present, an attempt was made to get a sample but so little was coming from the structure a sample could not be collected. So no sample was able to be taken.**

### **Recommendations**

- **None**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
22	10/10/2023	Johnny Cavill	69 F	0 in	0 in	1:14:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	36	Single Circular	
Inspection Conditions			Notes	Rating			
Ammonia	0 mg/l		Clean ASAP	Excellent			
Outfall Damage	4.5						
Color	None						
Surface	4.5						
Deposits/Stains	4						
Structure	5						
Volume	0 l						
Benthic Growth	3.5						
Turbidity	None						
pH	0 ph						
Time to Fill	0 sec						
Odor	None						
Floatables	None						
Conductivity	0						
Water Temperature	0 F						
Abnormal Vegetation	4.5						
Aesthetics	4.5						
Pool Quality	4.5						



## MS4 Outfall 23

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 23**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **Condition of the outfall structure at the time of inspection was good.**

### **Summary**

- **Accessing this outfall was pretty straightforward as the outfall is located just off the River's Edge Trail. During the inspection there was water observed in the pan of the outfall structure but there was no flow observed coming out of the structure at the time. This was observed for a period of time to make sure there was no flow coming from the structure.**

### **Recommendations**

- **None at this time.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
23	10/10/2023	Johnny Cavill	69 F	0 in	0 in	1:20:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	30	Single Circular	
Inspection Conditions			Notes	Rating			
Floatables	None			Excellent			
Ammonia	0 mg/l						
Time to Fill	0 sec						
Conductivity	0						
Aesthetics	4.5						
Volume	0 l						
Turbidity	None						
Structure	4.5						
Water Temperature	0 F						
Deposits/Stains	4.5						
Outfall Damage	4.5						
pH	0 ph						
Odor	None						
Surface	4.5						
Benthic Growth	4						
Pool Quality	4.5						
Abnormal Vegetation	3.5						
Color	None						



# MS4 Outfall 66

Date: 10/10/2023

Weather: Sunny and 73



## **MS4 Outfall 66**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **Condition of the outfall at time of inspection appeared to be good. There was some graffiti on the side of the structure.**

### **Summary**

- **Accessing this outfall is somewhat difficult. It is located just off the River's Edge Trail, but one has to walk down a steep bank to get to the outfall structure. Caution should be used getting to this outfall. During the time of inspection, flow was observed coming from the outfall. Proper sampling procedures were conducted.**

### **Recommendations**

- **None at his time**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
66	10/10/2023	Johnny Cavill	73 F	0 in	0 in	3:10:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
	Undetermined			Reinforced Concrete			
Inspection Conditions			Notes	Rating			
Water Temperature	63.7 F			Excellent			
Pool Quality	5						
Deposits/Stains	4.5						
Conductivity	137.2						
pH	8.95 ph						
Aesthetics	4						
Abnormal Vegetation	5						
Floatables	None						
Color	None						
Time to Fill	1 sec						
Structure	5						
Turbidity	None						
Outfall Damage	4.5						
Ammonia	0.25 mg/l						
Volume	1 l						
Odor	None						
Benthic Growth	5						
Surface	4.5						



# MS4 Outfall 5

Date: 10/09/2023

Weather: Sunny and 80

---



## **MS4 Outfall 5**

Date: 10/09/2023

Weather: Sunny and 80

---

### **Items of Concern:**

- **Overgrown Vegetation**
- **Sediment Deposits**

### **Condition of Outfall:**

- **The outfall was in good condition. Some sediment has been deposited inside the outfall structure.**
- **Vegetation is growing over and around the structure.**

### **Summary**

- **Access to the outfall was not difficult. To access outfall you have to walk around the trees at the north end of Garden Home Park. Then head toward the river. During the time of inspection, no discharge from the outfall was observed. It was observed that some sediment has been deposited in the mouth of the outfall. The vegetation near the outfall has begun to grow over and around the outfall structure.**

### **Recommendations**

- **Recommend trimming vegetation that is growing around the outfall structure. It is also recommended to clean out the sediment in the structure.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
5	10/9/2023	Johnny Cavill	80 F	0 in	0 in	10:39:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Mixed Use	Not Submerged	Unlikely	RCP	42	Single Circular	
Inspection Conditions			Notes			Rating	
pH	0 ph				Excellent		
Aesthetics	5						
Floatables	None						
Benthic Growth	5						
Abnormal Vegetation	4						
Turbidity	None						
Ammonia	0 mg/l						
Odor	None						
Outfall Damage	5						
Water Temperature	0 F						
Conductivity	0						
Color	None						
Pool Quality	0						
Volume	0 l						
Structure	5						
Deposits/Stains	4.5						
Time to Fill	0 sec						
Surface	5						



# MS4 Outfall 7

Date: 10/09/2023

Weather: Sunny and 80



## **MS4 Outfall 7**

Date: 10/09/2023

Weather: Sunny and 80

---

### **Items of Concern:**

- **Sediment deposits**
- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall at the time of inspection appeared to be good. Some sedimentation and other debris has been deposited and built up inside of the outfall structure. As shown in the photo, vegetation is growing in and around the structure.**

### **Summary**

- **Accessing the outfall was pretty straightforward, as it is easily accessed from the trail adjacent to the river. There was no discharge observed during the time of inspection. It was observed that sediment and other debris has accumulated in the outfall structure. The adjacent vegetation was observed to be growing over, around, and into the outfall structure.**

### **Recommendations**

- **Recommend trimming vegetation that is growing in, around, and over the outfall structure. Recommend cleaning all the sediment and other debris from the outfall structure.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
7	10/9/2023	Johnny Cavill	66 F	0 in	0 in	10:48:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Commercial	Not Submerged	Unlikely	RCP	24	Single Circular	
Inspection Conditions			Notes	Rating			
Deposits/Stains	3.5			Excellent			
Conductivity	0						
Outfall Damage	4						
Time to Fill	0 sec						
Pool Quality	4.5						
Volume	0 l						
Odor	None						
Water Temperature	0 F						
Floatables	None						
Benthic Growth	5						
Aesthetics	4						
Color	None						
Ammonia	0 mg/l						
Turbidity	None						
Structure	4						
pH	0 ph						
Surface	4						
Abnormal Vegetation	3						



## MS4 Outfall 8

Date: 10/9/2023

Weather: Sunny and 80

---



## **MS4 Outfall 8**

Date: 10/9/2023

Weather: Sunny and 80

---

### **Items of Concern:**

- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall at the time of inspection appeared to be good. As shown in the photo, vegetation is growing in and around the structure.**

### **Summary**

- **Accessing this outfall can be difficult. To get to the outfall structure you can observe it from the trail adjacent to the river. This will put you right above the outfall. Getting down to the actual structure is going to be much more difficult as there is not much available to access the outfall. There was standing water in the mouth of the outfall at the time of inspection. This water is in the mouth of the outfall due to the elevation of the river.**

### **Recommendations**

- **Recommend trimming vegetation that is growing in, around, and over the outfall structure.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
8	10/9/2023	Johnny Cavill	73 F	0 in	0 in		0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Mixed Use	Not Submerged	Unlikely	RCP	42	Single Circular	
Inspection Conditions			Notes	Rating			
Ammonia	0.25 mg/l			Excellent			
Outfall Damage	4.5						
Structure	4.5						
Pool Quality	4.5						
Turbidity	None						
Conductivity	233.5						
Floatables	None						
Abnormal Vegetation	4						
Aesthetics	4.5						
Odor	None						
Benthic Growth	4.5						
Water Temperature	0 F						
Surface	4.5						
Color	None						
pH	8.19 ph						
Time to Fill	1 min						
Deposits/Stains	4.5						
Volume							



## MS4 Outfall 9

Date: 10/9/2023

Weather: Sunny and 80

---



## **MS4 Outfall 9**

Date: 10/9/2023

Weather: Sunny and 80

---

### **Items of Concern:**

- **Moss build up**

### **Condition of Outfall:**

- **The overall condition of the outfall during the time of inspection appeared to be good. There was some moss growth in the mouth of the outfall structure.**

### **Summary**

- **Access to this outfall is somewhat difficult. Outfall can be found from the trail adjacent to the river. To access this outfall structure, you will need to climb over a small fence and carefully make your way to the structure. During the inspection, a flow was observed and proper testing parameters were conducted. It was observed that moss is growing inside the structure.**

### **Recommendations**

- **Recommend cleaning the moss out of the mouth of the structure.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
9	10/9/2023	Johnny Cavill	68 F	0 in	0 in	11:38:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Mixed Use	Not Submerged	Unlikely	RCP	54	Single Elliptical	
Inspection Conditions			Notes	Rating			
pH	8.42 ph			Excellent			
Surface	4.5						
Outfall Damage	5						
Color	None						
Water Temperature	65.4 F						
Time to Fill	15.09 sec						
Structure	5						
Deposits/Stains	4						
Turbidity	None						
Volume	1 l						
Pool Quality	4.5						
Conductivity	222						
Odor	None						
Ammonia	0.25 mg/l						
Benthic Growth	3.5						
Abnormal Vegetation	4.5						
Floatables	None						
Aesthetics	5						



# MS4 Outfall 10

Date: 10/10/2023

Weather: Sunny and 70



## **MS4 Outfall 10**

Date: 10/10/2023

Weather: Sunny and 70

---

### **Items of Concern:**

- **None at this time**

### **Condition of Outfall:**

- **The condition of the outfall at the time of inspection appeared to be good.**

### **Summary**

- **Accessing this outfall is pretty straightforward. It is a short walk from a nearby parking lot. During the inspection a flow was observed coming from the outfall structure.**

### **Recommendations**

- **None at this time.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
10	10/10/2023	Johnny Cavill	62 F	0 in	0 in	10:07:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Potential	RCP	30	Single Circular	
Inspection Conditions			Notes	Rating			
Color	None			Excellent			
Outfall Damage	4.5						
pH	8.38 ph						
Floatables	None						
Conductivity	149						
Ammonia	0 mg/l						
Turbidity	None						
Deposits/Stains	4.5						
Surface	4.5						
Aesthetics	4.5						
Pool Quality	4.5						
Structure	4.5						
Benthic Growth	5						
Abnormal Vegetation	4.5						
Water Temperature	59.1 F						
Volume	1 l						
Time to Fill	4.7 sec						
Odor	None						



# MS4 Outfall 11

Date: 10/10/2023

Weather: Sunny and 73



## **MS4 Outfall 11**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall during the time of inspection was good. There was vegetation growing all around the outfall.**

### **Summary**

- **Accessing this outfall was pretty easy. It is a short walk from a nearby parking lot. During the inspection, flow was observed coming from the outfall structure. During the inspection, vegetation was observed growing all over the outfall structure.**

### **Recommendations**

- **Recommend trimming all the overgrown and overhanging vegetation around the outfall structure.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
11	10/10/2023	Johnny Cavill	62 F	0 in	0 in	10:17:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Potential	RCP	48	Single Circular	
Inspection Conditions			Notes	Rating			
Surface	4.5	Needs cleaning	Excellent				
Ammonia	0.25 mg/l						
pH	8.58 ph						
Volume	1 l						
Odor	None						
Pool Quality	4						
Abnormal Vegetation	2.5						
Aesthetics	4.5						
Outfall Damage	4						
Floatables	None						
Deposits/Stains	4						
Time to Fill	39 sec						
Water Temperature	59.7 F						
Conductivity	150.4						
Color	None						
Structure	4.5						
Turbidity	None						
Benthic Growth	3.5						



## MS4 Outfall 12

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 12**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall during the time of inspection was good.**

### **Summary**

- **Accessing this outfall was easy. This outfall can be reached a short distance off River's Edge Trail. During the time of inspection no flow was observed coming out of the structure. The photo above shows water in the structure and is there due to the level of the river. There was some willows that have begun to grow over and around the structure.**

### **Recommendations**

- **Recommend trimming the vegetation grown over and around the outfall structure.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
12	10/10/2023	Johnny Cavill	62 F	0 in	0 in	10:37:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Submerged, Partially, with Sediment	Unlikely	RCP	30	Single Circular	
Inspection Conditions			Notes	Rating			
Deposits/Stains	4.5		Needs cleaning	Good			
Abnormal Vegetation	3						
Pool Quality	5						
Color	Easily Visible in Outfall						
Benthic Growth	4						
Odor	Easily Detected						
Turbidity	Cloudy						
pH	8.59 ph						
Volume	200 ml						
Outfall Damage	4.5						
Surface	4.5						
Time to Fill	15 sec						
Floatables	Few						
Ammonia	0.25 mg/l						
Conductivity	131.5						
Structure	4.5						
Water Temperature	57.8 F						
Aesthetics	4.5						



# MS4 Outfall 13

Date: 10/10/2023

Weather: Sunny and 73



## **MS4 Outfall 13**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Trash on the grate**

### **Condition of Outfall:**

- **The condition of the outfall during the time of inspection appeared to be good.**

### **Summary**

- **This outfall is easy to access and is in good condition. The outfall had standing water in the structure during the time of inspection due to level of the river. No flow was observed.**

### **Recommendations**

- **Clean Grate**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
13	10/10/2023	Johnny Cavill	65 F	0 in	0 in	10:52:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Submerged, Partially	Suspect	RCP	54	Single Circular	
Inspection Conditions			Notes	Rating			
Water Temperature Outfall Damage 5 Odor None Floatables Few Surface 4.5 Deposits/Stains 4.5 Ammonia Turbidity Faint Cloudiness Volume Color Faint Benthic Growth 5 Pool Quality 5 Abnormal Vegetation 5 Aesthetics 4 Time to Fill Conductivity Structure 5 pH			Dead snake. Small oil sheen on right side, see photo.				



# MS4 Outfall 14

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 14**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall during time of inspection appeared to be good. There was an abundance of vegetation observed growing in the outfall structure.**

### **Summary**

- **Accessing this outfall was pretty easy. It is located just off the River's Edge Trail. During the inspection no flow was observed. An abundance of vegetation was observed during the inspection growing in the actual outfall structure.**

### **Recommendations**

- **Recommend removing all vegetation growing inside the outfall structure as well as vegetation growing in the mouth of the structure.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
14	10/10/2023	Johnny Cavill	65 F	0 in	0 in		0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Submerged, Partially	Unlikely	RCP	15	Single Circular	
Inspection Conditions			Notes	Rating			
Outfall Damage	4.5		Needs cleaned asap				
Surface	1.5						
Time to Fill							
Volume							
Deposits/Stains	4						
Odor	None						
Floatables	None						
Benthic Growth	3.5						
pH							
Abnormal Vegetation	2						
Turbidity	None						
Water Temperature							
Color	Faint						
Structure	4.5						
Pool Quality	4						
Aesthetics	1.5						
Conductivity							
Ammonia							



## MS4 Outfall 15

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 15**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Debris build up**

### **Condition of Outfall:**

- **During the time of inspection, the outfall structure appeared to be in good condition.**

### **Summary**

- **Accessing the outfall was pretty straightforward as it is just off the River's Edge Trail. During the inspection no flow was observed. The level of the river was high enough that it backed up into the outfall structure. There was a fair amount of debris build up on the outfall structure bar rack.**

### **Recommendations**

- **Recommend cleaning all the debris from the bar rack at the outfall structure.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
15	10/10/2023	Johnny Cavill	65 F	0 in	0 in	11:02:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Context Cam	Industrial	Submerged, Partially		RCP	36	Single Circular	
Inspection Conditions			Notes	Rating			
Turbidity	None			Good			
Time to Fill	0 sec						
Volume	0 l						
Water Temperature	0 F						
Outfall Damage	4						
Surface	4.5						
Deposits/Stains	2						
pH	0 ph						
Benthic Growth	2.5						
Abnormal Vegetation	4						
Conductivity	0						
Structure	4.5						
Aesthetics	4.5						
Pool Quality	4						
Color	None						
Odor	None						
Floatables	None						
Ammonia	0 mg/l						



# MS4 Outfall 16

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 16**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **The condition of the outfall appeared to be good during the time of inspection.**

### **Summary**

- **Accessing this outfall was fairly easy to reach. The outfall is located just off the River's Edge Trail.**

### **Recommendations**

- **None at this time.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
16	10/10/2023	Johnny Cavill	65 F	0 in	0 in	11:17:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	48	Single Circular	
Inspection Conditions			Notes	Rating			
Water Temperature	75.3 F			Excellent			
Pool Quality	4.5						
Deposits/Stains	4.5						
Odor	None						
Conductivity	672						
Aesthetics	4.5						
Abnormal Vegetation	5						
Structure	5						
Turbidity	None						
Color	None						
Floatables	None						
Time to Fill	60 sec						
Ammonia	0.25 mg/l						
Surface	5						
Outfall Damage	4.5						
Volume	0.2 l						
Benthic Growth	4						
pH	8.55 ph						



# MS4 Outfall 17

Date: 10/10/2023

Weather: Sunny and 73



## **MS4 Outfall 17**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Trash and Debris**

### **Condition of Outfall:**

- **Condition of the outfall during the time of inspection was good.**

### **Summary**

- **Accessing this outfall was very simple as the outfall structure is located just off the River's Edge Trail. The outfall appeared to be in good condition. There was no flow observed coming from the outfall during the time of inspection.**

### **Recommendations**

- **Clean up trash and Debris**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
17	10/10/2023	Johnny Cavill	67 F	0 in	0 in	11:21:00 AM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	12	Single Circular	
Inspection Conditions			Notes	Rating			
Color	None	A lot of trash, clean.	Excellent				
Benthic Growth	5						
Time to Fill	0 sec						
Water Temperature	0 F						
Turbidity	None						
pH	0 ph						
Pool Quality	4.5						
Aesthetics	4						
Abnormal Vegetation	3.5						
Volume	0 l						
Conductivity	0						
Floatables	None						
Deposits/Stains	5						
Surface	4						
Ammonia	0 mg/l						
Odor	None						
Structure	4						
Outfall Damage	4						



# MS4 Outfall 18

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 18**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **Overgrown vegetation**

### **Condition of Outfall:**

- **The condition of the outfall during the inspection was good. There was a large amount of vegetation growing around the outfall structure.**

### **Summary**

- **Accessing this outfall was pretty easy. The outfall is located just off the River's Edge Trail. It was a bit difficult to locate the outfall structure due to all the vegetation growing around and over the outfall structure.**

### **Recommendations**

- **Recommend trimming vegetation that is growing around the structure so it is easier to find.**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
18	10/10/2023	Johnny Cavill	68 F	0 in	0 in	12:56:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Submerged, Partially, with Sediment	Unlikely	CMP	24	Single Circular	
Inspection Conditions			Notes	Rating			
pH	8.65 ph			Excellent			
Conductivity	163.1						
Turbidity	None						
Time to Fill	35 sec						
Ammonia	0.25 mg/l						
Odor	None						
Floatables	Few						
Color	None						
Pool Quality	4.5						
Surface	4.5						
Benthic Growth	4.5						
Outfall Damage	4.5						
Volume	300 ml						
Structure	4.5						
Aesthetics	4.5						
Water Temperature	64.5 F						
Deposits/Stains	4.5						
Abnormal Vegetation	3.5						



# MS4 Outfall 19

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 19**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **The condition of the outfall during the time of inspection appeared to be good.**

### **Summary**

- **Accessing this outfall was pretty straightforward, as it is located just off the River's Edge Trail. The condition of the outfall was good. During the time of inspection, a flow was observed coming from the outfall.**

### **Recommendations**

- **None**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
19	10/10/2023	Johnny Cavill	68 F	0 in	0 in	1:02:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	12	Single Circular	
Inspection Conditions			Notes	Rating			
Conductivity	0			Excellent			
Color	None						
Odor	None						
pH	0 ph						
Time to Fill	0 sec						
Turbidity	None						
Benthic Growth	4.5						
Abnormal Vegetation	3.5						
Water Temperature	0 F						
Pool Quality	4.5						
Floatables	None						
Aesthetics	3.5						
Outfall Damage	4.5						
Structure	4.5						
Surface	4.5						
Ammonia	0 mg/l						
Deposits/Stains	4						
Volume	0 l						



# MS4 Outfall 20

Date: 10/10/2023

Weather: Sunny and 73



## **MS4 Outfall 20**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- Condition of the outfall during the time of inspection was determined to be good.

### **Summary**

- Accessing this outfall was very straightforward as the outfall is located just off the River's Edge Trail.

### **Recommendations**

- **None**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
20	10/10/2023	Johnny Cavill	68 F	0 in	0 in	1:08:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	15	Single Circular	
Inspection Conditions			Notes	Rating			
Volume	0 l			Excellent			
Aesthetics	4.5						
Ammonia	0 mg/l						
Outfall Damage	4.5						
Water Temperature	0 F						
Odor	None						
Structure	4.5						
Floatables	None						
Benthic Growth	5						
Time to Fill	0 sec						
pH	0 ph						
Color	None						
Surface	4.5						
Pool Quality	4.5						
Abnormal Vegetation	2.5						
Deposits/Stains	4.5						
Turbidity	None						
Conductivity	0						



## MS4 Outfall 21

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 21**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **The condition of the outfall at the time of inspection appeared to be good.**

### **Summary**

- **Accessing this outfall was very straightforward, as it located just off the River's Edge Trail. During the inspection no flow was observed coming from the outfall.**

### **Recommendations**

- **None**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
21	10/10/2023	Johnny Cavill	68 F	0 in	0 in	1:11:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	CMP	30	Single Circular	
Inspection Conditions			Notes	Rating			
Structure	5			Excellent			
Conductivity	0						
Outfall Damage	5						
Ammonia	0 mg/l						
Aesthetics	5						
Odor	None						
Color	None						
pH	0 ph						
Pool Quality	5						
Water Temperature	0 F						
Surface	5						
Floatables	None						
Volume	0 l						
Turbidity	None						
Benthic Growth	5						
Time to Fill	0 sec						
Deposits/Stains	5						
Abnormal Vegetation	5						



## MS4 Outfall 22

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 22**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **The condition of the outfall during the time of inspection appeared to be good.**

### **Summary**

- **Accessing the outfall was pretty easy as it is just off the River's Edge Trail. During the inspection water was present, an attempt was made to get a sample but so little was coming from the structure a sample could not be collected. So no sample was able to be taken.**

### **Recommendations**

- **None**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
22	10/10/2023	Johnny Cavill	69 F	0 in	0 in	1:14:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	36	Single Circular	
Inspection Conditions			Notes	Rating			
Ammonia	0 mg/l		Clean ASAP	Excellent			
Outfall Damage	4.5						
Color	None						
Surface	4.5						
Deposits/Stains	4						
Structure	5						
Volume	0 l						
Benthic Growth	3.5						
Turbidity	None						
pH	0 ph						
Time to Fill	0 sec						
Odor	None						
Floatables	None						
Conductivity	0						
Water Temperature	0 F						
Abnormal Vegetation	4.5						
Aesthetics	4.5						
Pool Quality	4.5						



## MS4 Outfall 23

Date: 10/10/2023

Weather: Sunny and 73

---



## **MS4 Outfall 23**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **Condition of the outfall structure at the time of inspection was good.**

### **Summary**

- **Accessing this outfall was pretty straightforward as the outfall is located just off the River's Edge Trail. During the inspection there was water observed in the pan of the outfall structure but there was no flow observed coming out of the structure at the time. This was observed for a period of time to make sure there was no flow coming from the structure.**

### **Recommendations**

- **None at this time.**

# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
23	10/10/2023	Johnny Cavill	69 F	0 in	0 in	1:20:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
Contex Cam	Industrial	Not Submerged	Unlikely	RCP	30	Single Circular	
Inspection Conditions			Notes	Rating			
Floatables	None			Excellent			
Ammonia	0 mg/l						
Time to Fill	0 sec						
Conductivity	0						
Aesthetics	4.5						
Volume	0 l						
Turbidity	None						
Structure	4.5						
Water Temperature	0 F						
Deposits/Stains	4.5						
Outfall Damage	4.5						
pH	0 ph						
Odor	None						
Surface	4.5						
Benthic Growth	4						
Pool Quality	4.5						
Abnormal Vegetation	3.5						
Color	None						



# MS4 Outfall 66

Date: 10/10/2023

Weather: Sunny and 73



## **MS4 Outfall 66**

Date: 10/10/2023

Weather: Sunny and 73

---

### **Items of Concern:**

- **None**

### **Condition of Outfall:**

- **Condition of the outfall at time of inspection appeared to be good. There was some graffiti on the side of the structure.**

### **Summary**

- **Accessing this outfall is somewhat difficult. It is located just off the River's Edge Trail, but one has to walk down a steep bank to get to the outfall structure. Caution should be used getting to this outfall. During the time of inspection, flow was observed coming from the outfall. Proper sampling procedures were conducted.**

### **Recommendations**

- **None at his time**



# Inspection Results

Outfall ID	Inspection Date	Inspected By	Ambient Temperature	Rainfall (24 hr)	Rainfall (48 hr)	Time of Inspection	Flow
66	10/10/2023	Johnny Cavill	73 F	0 in	0 in	3:10:00 PM	0
GPS Model	Land Use Type	Pipe Location	Outfall Characterization	Pipe Material	Pipe Dimension	Pipe Shape	
	Undetermined			Reinforced Concrete			
Inspection Conditions			Notes	Rating			
Water Temperature	63.7 F			Excellent			
Pool Quality	5						
Deposits/Stains	4.5						
Conductivity	137.2						
pH	8.95 ph						
Aesthetics	4						
Abnormal Vegetation	5						
Floatables	None						
Color	None						
Time to Fill	1 sec						
Structure	5						
Turbidity	None						
Outfall Damage	4.5						
Ammonia	0.25 mg/l						
Volume	1 l						
Odor	None						
Benthic Growth	5						
Surface	4.5						



The City of Great Falls Environmental Division will be responsible for the implementation of the required BMPs. More specifically, the Environmental Division Manager, the Environmental Program Specialist, and the Stormwater Specialist.

### 2.2.1: MCM-3: BMP a.i & a.ii

COGF has evaluated the following non-stormwater discharges in order to determine if they are a significant contributor of pollutants to the City's storm drain system and its receiving waters.

1. Water line & hydrant flushing
  - a. Associated pollutant(s): Chlorine, TSS
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): COGF SOPs
2. Landscape Irrigation, Irrigation Water, Lawn Watering
  - a. Associated pollutant(s): Nutrients
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): None; no history of observed issues
3. Discharges from Potable Water Sources
  - a. Associated pollutant(s): Chlorine, nutrients
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): None; no history of observed issues
4. Rising Groundwater, Flows from Riparian Habitats and Wetlands, Diverted Stream Flows, Springs
  - a. Associated pollutant(s): varied depending on location and source of water
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): None; no history of observed issues
5. Untampered Groundwater Infiltration
  - a. Associated pollutant(s): varied depending on location and source of water
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Controls: COGF inspection & maintenance schedule / repairs
6. Untampered Pumped Groundwater
  - a. Associated pollutant(s): varied depending on location and source of water
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): YES
  - d. Local Control(s): COGF requires analytical testing prior to discharge approval
7. Foundation Drains, Water from Crawl Space Pumps, Footing Drains
  - a. Associated pollutant(s): varied depending on location and source of water
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): YES
  - d. Local Control(s): COGF requires analytical testing prior to discharge approval
8. Air Conditioning Condensation
  - a. Associated pollutant(s): none
  - b. Significant contributor of pollutants (yes/no): NO

- c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): None, no history of observed issues
9. Individual Residential Car Washing
- a. Associated pollutant(s): Wash water, soaps, oil & grease, etc.
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): None, no history of observed issues
10. Dechlorinated Swimming Pool Discharges
- a. Associated pollutant(s): Chlorine
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): must infiltrate on property or receive approval from COGF for discharge
11. Street Wash Water
- a. Associated pollutant(s): TSS, nutrients, oil & grease
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): NO
  - d. Local Control(s): COGF SOPs
12. Construction Dewatering
- a. Associated pollutant(s): TSS, nutrients, etc.
  - b. Significant contributor of pollutants (yes/no): NO
  - c. Addressed as illicit discharge (yes/no): YES
  - d. Local Control(s): Required to obtain MT DEQ Construction Dewatering Permit and maintain compliance with associated requirements. COGF reviews permit and approves discharge location prior to discharge approval

None of the above were identified as significant contributors of pollutants during 2023.



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2301 IDDE	5/25/2023	6/13/2023	No	Sediment	Enforcement L1
-----------	-----------	-----------	----	----------	----------------

### Response Notes

1-12-2023- Nate forwarded an email to Justin about the roads on and near Choteau Ave. The roads were muddy and a complete mess. About 9 a.m., Justin and Johnny went to the location of 423 Choteau Avenue and headed east. Home construction by Signature Homes was stockpiling dirt in the road, tracking dirt all over, and had no BMP's implemented. In some areas one could not see the curb. At about 2:10 p.m., Justin called Kyle Moore with Signature homes and discussed what COGF ENV had observed. Kyle said there was equipment broken down, but would get the issues resolved. COGF ENV will follow up on this.

4-28-2023- COGF ENV was by the site today and noticed some housekeeping issues on or near the site. We again spoke with Signature Homes about keeping their construction areas cleaned up and making sure the streets area swept. Kyle Moore said it would be addressed.

6-13-2023- Justin went up to this location area and observed that the area appeared to be well kept. No tracking issues were observed and stockpiles were not an issue leading to tracking sediment onto the roadway. As of 6-13-2023 this will be considered closed.



**Photo 1**

Stockpiles of dirt in the roadway near construction site with no BMP's around the stockpiles.



**Photo 2**

This photo shows that one of the construction sites allowed vehicles to enter roadway and track sediment onto roadways.



**Photo 3**

Another area where stockpiles were placed into roadway with no BMP's. It is shown here that you cannot see the curb in some areas.



**Photo 4**

Another area that shows stockpiling to occur on roadways.

**Investigator:** Doll/Cavill  
**Location:** Choteau Ave

**Weather:** Varied  
**Camera:** DMPV567CJ2D1



**Photo 5**

This photo shows the tracking near the construction site. Nothing at this point was not swept up.



**Photo 6**

Another side of the construction site showing sediment all over roadway and no BMP's not deployed.



**Photo 7**

Another area that stockpiling was placed in the flow line of the street, again with no BMP's installed.



**Photo 8**

Another area with sediment allowed into roadway. Tracking is also evident here.

**Investigator:** Doll/Cavill  
**Location:** Choteau Ave

**Weather:** Varied  
**Camera:** DMPV567CJ2D1

# Environmental Illicit Discharge Report

Date: 1-12-2023

Incident ID: 2301 IDDE

**1-12-2023**- Nate forwarded an email to Justin about the roads on and near Choteau Ave. The roads were muddy and a complete mess. About 9 a.m., Justin and Johnny went to the location of 423 Choteau Avenue and headed east. Home construction by Signature Homes was stockpiling dirt in the road, tracking dirt all over, and had no BMP's implemented. In some areas one could not see the curb. At about 2:10 p.m., Justin called Kyle Moore with Signature homes and discussed what COGF ENV had observed. Kyle said there was equipment broken down, but would get the issues resolved. COGF ENV will follow up on this.

**4-28-2023**- COGF ENV was by the site today and noticed some housekeeping issues on or near the site. We again spoke with Signature Homes about keeping their construction areas cleaned up and making sure the streets area swept. Kyle Moore said it would be addressed.

**6-13-2023**- Justin went up to this location area and observed that the area appeared to be well kept. No tracking issues were observed and stockpiles were not an issue leading to tracking sediment onto the roadway. As of 6-13-2023 this will be considered closed.





Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2302 IDDE	5/25/2023	3/3/2023	Yes	Other	Enforcement L1
-----------	-----------	----------	-----	-------	----------------

**Response Notes**

3-2-2023- GFFR was notified by an anonymous citizen that Wadsworth Builders located at 4601 2nd Ave North was discharging a green liquid into a parking/storage area that was also discharging into the flow line and down the street. Great Falls Environmental arrived and GFFR was washing curb line down to a vacuum truck operated by Central Plumbing and Excavation to capture the liquid. Floor dry was also deployed to catch any of the green liquid that may not be captured by the vacuum truck.

COGF ENV talked with Riley Wadsworth and said they discharged a pump on their property. Once they saw GFFR onsite and realized it was going into street and towards the storm drain they stopped and began clean up activities. No material made it into a storm drain. COGF ENV informed Riley this was considered an illicit discharge.

3-3-2023- Jack went to site to follow up. It appeared that the area had been cleaned up. As of 3-3-2023 COGF considers this IDDE closed.

# Environmental Illicit Discharge Report

Date: 3-2-2023

Incident ID: 2302 IDDE

**3-2-2023-** GFFR was notified by an anonymous citizen that Wadsworth Builders located at 4601 2<sup>nd</sup> Ave North was discharging a green liquid into a parking/storage area that was also discharging into the flow line and down the street. Great Falls Environmental arrived and GFFR was washing curb line down to a vacuum truck operated by Central Plumbing and Excavation to capture the liquid. Floor dry was also deployed to catch any of the green liquid that may not be captured by the vacuum truck.

COGF ENV talked with Riley Wadsworth and said they discharged a pump on their property. Once they saw GFFR onsite and realized it was going into street and towards the storm drain they stopped and began clean up activities. No material made it into a storm drain. COGF ENV informed Riley this was considered an illicit discharge.

**3-3-2023-** Jack went to site to follow up. It appeared that the area had been cleaned up. As of 3-3-2023 COGF considers this IDDE closed.



Photo 1

Green liquid discharging from business running down the flow line toward storm drain inlet.



Photo 2

Crews had put down absorbent material to damn liquid from reaching storm drain.



Photo 3

Crews work on cleaning the liquid up from the flow line of the street.



Photo 4

Member of GFFR is working on cleaning the area up of the green liquid.

Investigator: COGF ENV  
Location: 4601 2<sup>nd</sup> Ave N

Weather: 34 and overcast  
Camera: Various



**Photo 5**

GFFR washing green liquid toward vac truck to be sucked up and properly disposed of.



**Photo 6**

Another shot of the liquid being washed towards the vac truck.



**Photo 7**

This photo is the following day showing how well the cleanup was done.



**Photo 8**

Another shot showing the how well the crews did clean the mess up.

**Investigator: COGF ENV**  
**Location: 4601 2<sup>nd</sup> Ave N**

**Weather: 34 and overcast**  
**Camera: Various**



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2303 IDDE	5/25/2023	3/10/2023	NO	Other	
-----------	-----------	-----------	----	-------	--

**Response Notes**

3-9-2023- At approximately 10:30 a.m., Don Tuncliff notified COGF ENV that there was a truck broke down in the North bound lane of the 15th Street bridge. Justin, Trudy, and Jack went to the location. Upon arrival we found that a Prairie Water Supply truck busted a drive shaft. Driver was allowing water to discharge from truck onto bridge and eventually ending in the Missouri River. This had to be discharged this way so that the tow truck would be able to tow the truck off the bridge. It was estimated roughly 4500 gallons of City water was discharged.

3-10-2023- As of 3-10-2023 this IDDE is closed.



**Photo 1**

Photo shows water truck discharging the water they were hauling so they could be towed off the bridge.



**Photo 2**

Another shot of the water truck discharging water. Truck had a broken drive line and had to be towed.



**Photo 3**

Photo shows where the water ended up on the ice of the Missouri River.

**Investigator:** Doll/Koelstra/Wang

**Location:** 1412 15<sup>th</sup> St N

**Weather:** 12 and Sunny

**Camera:** DMPV567CJ2D1

# Environmental Illicit Discharge Report

Date: 3-9-2023

Incident ID: 2303 IDDE

**3-9-2023**- At approximately 10:30 a.m., Don Tuncliff notified COGF ENV that there was a truck broke down in the North bound lane of the 15<sup>th</sup> Street bridge. Justin, Trudy, and Jack went to the location. Upon arrival we found that a Prairie Water Supply truck busted a drive shaft. Driver was allowing water to discharge from truck onto bridge and eventually ending in the Missouri River. This had to be discharged this way so that the tow truck would be able to tow the truck off the bridge. It was estimated roughly 4500 gallons of City water was discharged.

**3-10-2023**- As of 3-10-2023 this IDDE is closed.



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2304 IDDE	5/25/2023	3/22/2023	No	Other	Enforcement L1
-----------	-----------	-----------	----	-------	----------------

### Response Notes

3-22-2023- At 11:30, Johnny received a phone call from an individual inquiring who would he would need to get ahold of regarding who is allowed to fill a tub of water from the county's water source near Bootlegger Hill. He said a company was filling totes with water. He wasn't sure what the totes had in them, but was concerned with the fill hole touching other containers as the hose may have residuals of whatever is on or in the tub. As the individual uses this as water for his home supply. He wanted to verify it is still safe. The individual sent some photos of the company in question, which was BRY. This is a directional drilling or boring company. At 12:30 p.m., Justin called Ryan Yurek and left a message about the issues. At about 1 p.m., Ryan called Justin back. He said the tank that was being filled was a plastic storage tank. Nothing was added to the water, so the water coming out of tote was potable water. Water was discharged because a valve was frozen. Ryan told Justin this would not happen again. As of 3/22/2023 this is considered closed.





Photo 1

Photo shows company allowing water to overflow a tank they were filling up. Water pooled on shoulder of the road.



Photo 2

Photo shows the company responsible.



Photo 3

Photo shows the water that is allowed to discharge from the tank being filled.

Investigator: Doll  
Location: 1428 36<sup>th</sup> Ave NE

Weather: 27 and Sunny  
Camera: Unknown

# Environmental Illicit Discharge Report

Date: 3-22-2023

Incident ID: 2304 IDDE

**3-22-2023-** At 11:30, Johnny received a phone call from an individual inquiring who would he would need to get ahold of regarding who is allowed to fill a tub of water from the county's water source near Bootlegger Hill. He said a company was filling totes with water. He wasn't sure what the totes had in them, but was concerned with the fill hole touching other containers as the hose may have residuals of whatever is on or in the tub. As the individual uses this as water for his home supply. He wanted to verify it is still safe. The individual sent some photos of the company in question, which was BRY. This is a directional drilling or boring company. At 12:30 p.m., Justin called Ryan Yurek and left a message about the issues. At about 1 p.m., Ryan called Justin back. He said the tank that was being filled was a plastic storage tank. Nothing was added to the water, so the water coming out of tote was potable water. Water was discharged because a valve was frozen. Ryan told Justin this would not happen again. As of 3/22/2023 this is considered closed.



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2305 IDDE	5/25/2023	3/23/2023	No	Wash Water	Enforcement L1
-----------	-----------	-----------	----	------------	----------------

**Response Notes**

3-23-2023- At about 12:15 p.m., Paula was contacted by Heather Rolf with Code Enforcement notified us that someone at 4th Street and 2nd Ave South was washing out paint supplies into a storm drain. Justin and Jack went to the described location. Upon arrive a hose was hooked up to the Rescue Mission's spigot and was over to the storm drain where it appeared paint rollers and some paint trays were washed out. Justin and Jack went inside and asked to speak to whoever was responsible for the hose and paint at the storm drain. Justin also asked that this practice does not take place again as it is not allowed. Justin also had the responsible party remove the hose and paint supplies and told them moving forward the storm drain is not the proper location for their cleaning activities. As of 3/23/2023 this is considered closed.



Photo 1

Photo shows individuals standing above a storm inlet washing paint products into the inlet. COGF informed them this is not allowed.



Photo 2

Photo shows hose coming out of business responsible for washing down the storm drain inlet.

Investigator: Doll/Wang  
Location: 326 2<sup>nd</sup> St S

Weather: 46 and Sunny  
Camera: DMPV567CJ2D1

# Environmental Illicit Discharge Report

Date: 3-23-2023

Incident ID: 2305 IDDE

**3-23-2023**- At about 12:15 p.m., Paula was contacted by Heather Rolf with Code Enforcement notified us that someone at 4<sup>th</sup> Street and 2<sup>nd</sup> Ave South was washing out paint supplies into a storm drain. Justin and Jack went to the described location. Upon arrive a hose was hooked up to the Rescue Mission's spigot and was over to the storm drain where it appeared paint rollers and some paint trays were washed out. Justin and Jack went inside and asked to speak to whoever was responsible for the hose and paint at the storm drain. Justin also asked that this practice does not take place again as it is not allowed. Justin also had the responsible party remove the hose and paint supplies and told them moving forward the storm drain is not the proper location for their cleaning activities. As of 3/23/2023 this is considered closed.



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2306 IDDE	5/25/2023	6/9/2023			Enforcement L1
-----------	-----------	----------	--	--	----------------

**Response Notes**

3-29-2023- Amanda Brownlee, COGF Engineer informed COGF ENV that while out on a walk through on Park Garden Lane, she noticed a lot of tracking coming from 2906 Park Garden Lane. Amanda also noted no BMP's were installed around the nearest storm inlet. Also, that there may be a possible concrete washout onsite with no containment. Dan Palagi spoke with contractor and noted they needed to clean the tracking up and install wattles.

3-30-2023- Justin and Johnny went to location and also spoke to the contractor. Justin asked them to sweep up the street and install wattles at the inlet. No concrete washout was observed. We will monitor this site to be monitored.

4-24-2023- Justin drove by at approximately 2 p.m., the area looked good and the issue has been resolved as of 4-24-2023 and is considered closed.



Sediment tracking along the street



Sediment tracking along the street

**Investigator:** Doll/Cavill

**Location:** 2906 Park Garden Lane

**Weather:** 30 F cloudy

**Camera:** Various



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2307 IDDE	5/25/2023		No	Petroleum	
-----------	-----------	--	----	-----------	--

### Response Notes

4/19/23

City of Great Falls was notified of oil sheen observed coming out from Veolia wastewater treatment's sanitary outfall and onto the Missouri River. T. Kolestro, N. Besich, and J. Doll responded to the incident along with response teams from Calumet refinery and Veolia wastewater treatment plant. Boom was deployed to contain the oil sheen coming out from the sanitary outfall. A same day press release was also issued to notify citizens of the City's response.

4/20/23

Absorbent boom has been determined to be critical to contain the issue and will be monitored continuously with Calumet along with 2 scheduled maintenance/day until the matter is completely resolved. Calumet has also acknowledged they were the responsible party and all matter of subsequent response was turned over to them with CoGF Pretreatment Specialist/ENV manager receiving updates on their progress. The matter is considered closed for MS4 Illicit Discharge follow up. The additional dates detail the continued response Calumet provided to CoGF on their findings and our response.

4/26/23

Veolia Sampling result came back indicating discharge level exceeds their effluent limit

5/10/23

Veolia returned more analytical results confirming the origin of the sheen

5/22/23

Calumet refinery returned test results of the substance released from the refinery and have been issued a level 2 violation through the City's pretreatment program. A follow up press release was also issued to citizens regarding the absorbent boom's continued presence on the river and the City's progress on the matter.

6/2/23

Calumet received the formal notice of pretreatment program violation

6/13/23

Calumet responded to T. Koelstra on the measures they have employed to get back to compliance.





1. Oil sheen flowing along railroad tracts.



2. Oil sheen flowing into culvert along tracts.



3. Oil sheen seen in Veolia treatment plant pond.



4. Oil in treatment pond

**Investigator:** T.Kolesta,N.Besic,J.Doll  
**Location:** Waste Water Treatment Plant

**Weather:** 33 F and Snow  
**Camera:** Various



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2308 IDDE	5/25/2023	5/25/2023	No	Other	Enforcement L1
-----------	-----------	-----------	----	-------	----------------

### Response Notes

Teresa Hille called COGF ENV at 10:46 am reporting white liquid substance exiting a storm pipe from the retaining wall behind the McDonald's on 10th Ave S (1721 10th Ave S). Phone call was received by Jack Wang of ENV along with pictures taken by Teresa Hille. Following the call the ENV Division (J. Cavill, J. Wang, and T. Koelstra) visited the site and located the storm pipe in question (~11:05 am).

The white liquid coming out from the pipe had strong odor and was continuously dripping still when ENV Division visited the site. The liquid puddle from the pipe was flowing toward the direction of 17th St S but largely confined to the back alley way.

J. Cavill spoke with McDonald's Manager onsite and he acknowledged the leak is from them and the white substance is likely a mix of creamer/ flavor syrup from one of their coffee machines and is the result of a mishandled plumbing repair from back in October 2022. The manager mentioned they have been pushing to get the issue fixed since but has not been able to do so as of May 2023. He further explained there had been multiple complaints from others in the past regarding this issue and said they will work quickly in the meantime to clean up the leak in the alley.

J. Wang informed the manager that City ENV will follow up next week to check if proper clean-up has been done.

5-15-23

A follow-up text was also sent to Teresa Hille to let her know City ENV has responded to the problem.

5-19-23

Teresa Hille contacted Environmental again to report another leakage from Mcdonald's (07:21 am). A follow up text was sent letting her know Environmental will look into it.

5-24-23

Teresa Hille reached out again (08:37 am) saying they are still observing leakage from the back alley of the McDonald's on 10th. Environmental followed up reveal the leakage are from condensation and are not from any coffee machines (observed liquid did not have any coloration). The matter is considered closed.



Observed coloration in discharge (5/12/23)



Observed coloration in discharge (5/12/23)



Observed coloration in discharge along the alley (5/12/23)



Observed coloration in discharge along the alley (5/12/23)

**Investigator:** Cavill/Koelstra/Wang

**Location:** 1721 10<sup>th</sup> Ave S

**Weather:** 58 F

**Camera:** DMPV567CJ2D1



Trash observed at discharge site but no additional colored discharge (5/17/23 follow up)



(5/17/23 follow up)

**Investigator:** Koelstra/Wang

**Location:** 1721 10<sup>th</sup> Ave S

**Weather:** 56 F

**Camera:** DMPV567CJ2D1



Final follow up (5/22/23)



Final follow up, no observed coloration compare to 5/12/23 site investigation (5/22/23)

**Investigator:** Koelstra/Wang

**Location:** 1721 10<sup>th</sup> Ave S

**Weather:** 66 F

**Camera:** DMPV567CJ2D1



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2309 IDDE	5/25/2023	10/26/2023	No	Sediment	Enforcement L1
-----------	-----------	------------	----	----------	----------------

### Response Notes

5/15/23

United Materials management called in PW ENV regarding large pile of sediment stockpiles located at the Centene Stadium/Eagle Falls Golf Course. J. Doll and N. Besich responded to the scene and took pictures.

5/17/23

J. Doll and J. Cavill went out again to check the site and discovered strong wind has resulted in sand making into the inlet. J. Doll spoke to a rep of the golf course who stated they simply do not have any other location to store the sand. J. Doll relayed to him the MS4 requirement issues.

Following the onsite visit on the 17th, N. Besich relayed the issue to the PW director as well as the golf course as it is under City Parks and Recreation's purview (as a third party)

5/22/23

N. Besich had a follow-up conversation with Director of Parks and Rec and was notified the piles will be cleaned up ASAP

5/24/23

ENV went out again to check the status of the clean up and have verified the piles have been removed. This matter is considered closed



Stockpile present on the golf field parking lot



Stockpile present on the golf field parking lot



Stockpile debris have been blown around



Stockpile present on the golf field parking lot

**Investigator:** Besich/Doll

**Location:** 1025 25<sup>th</sup> St N

**Weather:** 75 F and clear

**Camera:** DMPV567CJ2D1

# Environmental Illicit Discharge Report

Date: 5/15/23

Incident ID: 2309\_IDDE

Narrative:

Reporting/Initial Investigation date – 5/15/23

**05/15/23**

Citizen called and sent it pictures of unprotected stockpile located in the Eagle Falls Golf Course and Centene Stadium parking lot (1025 25<sup>th</sup> St N & 1015 25<sup>th</sup> St N respectively). N. Besich and J. Doll from Environmental responded and visited site to take pictures for our records and notified the golf course/City of Great Falls Parks and Recreation for our findings.

**05/17/23**

Golf course and Parks and Rec has responded and mentioned they will take care of the issue ASAP. Environmental plan on driving out later in the week to verify.

**05/25/23**

Stockpile has been cleaned up and the matter is considered closed





Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2310 IDDE	9/28/2023	10/25/2023	No	Petroleum	Enforcement L1
-----------	-----------	------------	----	-----------	----------------

**Response Notes**

6/8/23

ENV received a notice from Sanitation that a streak of what looked like oil leak stretched through a portion of 10th Ave S near Lithia's. J. Cavill, T. Koelstra, and J. Wang visited the site

Upon visit it was determined a vehicle parked in the Lithia parking lot had engine oil leaking out. ENV was unable to locate the owner of the vehicle nor spoke with any Lithia personnel. Kitty litter was applied to the site with the most significant leakage.

6/12/23

J. Doll visited the site and verified the leak has been cleaned up. The matter is considered closed.



Oil stain can be seen on roadway coming off 10<sup>th</sup> Ave So and 40<sup>th</sup> St So.



Oil stain can be seen going North on 40<sup>th</sup> St So. Oil looks to be tracked from 10<sup>th</sup> Ave So.



Oil found to be coming from parked vehicle in Lithia parking lot. Oil was tracked onto roadway.



Oil leaking from vehicle on private lot was handled with cat litter to absorb and cleaned up at a later time.

**Investigator:** Cavill/Koelstra

**Location:** 10<sup>th</sup> Ave So & 40<sup>th</sup> St So.

**Weather:** 65 F and clear

**Camera:** Various



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2311 IDDE	9/29/2023	10/25/2023	No	Other	Enforcement L1
-----------	-----------	------------	----	-------	----------------

**Response Notes**

Graywater discharged - lime was applied to neutralize it

7/24/23

ENV was notified of a potential illicit discharge. T. Koelstra and J. Cavill responded to the site. Upon examining the site and the substance in question it was likely greywater discharged from the RV. The substance did not reach any storm inlet and stayed largely stationary from where it was discharged. J. Cavill and T. Koelstra spoke with the RV owner regarding improper greywater discharge practice and purchased some kitty litter to cover up the area affected.

The matter is considered closed



1. Greywater seen discharged from RV into gravel/dirt area. No inlets around area were effected.



2. Greywater was soaking into ground and had kitty litter put on area to absorb.

**Investigator: J.Cavill/T.Koelstra**  
**Location: 409 14<sup>th</sup> St SW**

**Weather: N/A**  
**Camera: Various**



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2312 IDDE	9/29/2023	10/25/2023	No	Other	Enforcement L1
-----------	-----------	------------	----	-------	----------------

**Response Notes**

Floor polish washout from school

8/15/23

City ENV was notified of a white substance flowing along the curb and gutter coming out of West Elementary. J. Cavill and T. Koelstra of ENV responded to the scene.

Upon speaking with the school's custodial staff it was determined the substance was excess floor polish used by the school. One of the staffers dumped it outside but the substance DID NOT reach any storm inlet. Head of maintenance for West Elementary said they will clean it up right away.

8/16/23

J. Wang sent out an email to the general facilities manager of GF public school to notify them of this incident and that it should be discouraged/barred practice as the this could have amount to a violation if the substance entered any City inlets.

8/16/23

Matter is considered closed



1. White substance flowing along curb from West Elementary.



2. White substance flowing from outside entrance doors.



3. Substance flowing along curb and tracked into roadway.



4. Closest storm inlet not impacted by IDDE.

**Investigator:** J.Cavill/T.Koelstra  
**Location:** West Elementary

**Weather:** N/A  
**Camera:** Various



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2313 IDDE	9/29/2023	10/25/2023	No	Other	
-----------	-----------	------------	----	-------	--

**Response Notes**

Suspected broken water main

9/14/23

J. Cavill and N. Besich of CoGF ENV responds to an email from Cascade County official of potential illicit discharge near Eagles Lodge.

Upon arriving at the site and speaking with the facility manager of Eagles Lodge. It was determined the leaking liquid is water from a broken water main/underground main pipe. The manager has called a plumber to check the situation. J. Cavill and N. Besich has requested the manager to ensure the pumped out water (through a hose) is being discharged to the landscape area of Eagle's Lodge.

9/19/23

J. Cavill and N. Besich went out again to verify there were no additional water flow issues. The matter's considered closed.



1. Water being pumped from building into parking lot with garden hose.



2. Discharged water flowing through parking lot towards storm inlet on 15<sup>th</sup> Ave So.



3. Discharged water being pumped from building flows along curb to storm inlet.

**Investigator:** J.Cavill/N.Besich

**Location:** 1501 9<sup>th</sup> St So

**Weather:** N/A

**Camera:** Various





Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2314 IDDE	9/19/2023	10/25/2023	No	Concrete	Enforcement L1
-----------	-----------	------------	----	----------	----------------

### Response Notes

9/14/23

Illicit discharge incident was called in through police dispatch from resident located at 205 Riverview Drive to P. Baroch of Utilities. J. Wang and T. Koelstra from ENV responded to the call

Site investigation showed a stockpile location outside of 156 Riverview Dr E had concrete washout flowing along the curb and gutter down the hill of Riverview 3E. No washout made it to the storm inlet at the bottom of Riverview 3E. Construction activity was identified to be from Baer Construction. J. Wang contacted Baer owner Trennis following site investigation. Trennis stated they will clean out the washout ASAP.

9/18/23 - J. Wang followed up on the site and found the washout was cleaned out as much as possible. The matter is considered closed



1. Concrete washout flowing along curb line from stockpile at 156 Riverview 3E.



2. Concrete washout flowing along curb line.



3. Concrete washout flowing along curb line downhill.



4. Concrete washout stopped flowing in curb line and did not enter storm inlet.

**Investigator:** J.Wang/T.Koelstra  
**Location:** 205 Riverview Dr.

**Weather:** N/A  
**Camera:** Various

ID: 2314\_IDDE

9/14/23

Illicit discharge Incident called in through police dispatch from 205 Riverview Drive. ENV was informed by P. Baroch of Utilities after the police dispatch contacted her. Site was subsequently investigated by T. Koelstra and J. Wang.

- Baer Construction worked on the driveway for 156 Riverview Drive E.
- Concrete washout was observed to have been flowing along the curb and gutter down the hill of Riverview 3E
- No washout made it to storm inlet
- Baer Construction was contacted by J. Wang at 14:47 pm with the owner Trennis Baer stating they will clean up the washout tomorrow
- Follow-up will be performed on 9/15/23 or 9/18/23



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2315 IDDE	9/27/2023	10/9/2023	No	Other	Enforcement L1
-----------	-----------	-----------	----	-------	----------------

### Response Notes

Motor oil from the boat engine

9/27/23 - J. Wang and T. Koelstra responded to a report from Public Works Streets Division regarding a boat parked on 13th Ave S leaking oil from the rear engine. Upon visiting the site it was determined the boat belonged to the resident of 3409 13th Ave S. J. Wang and T. Koelstra spoke with a resident there who mentioned the boat belonged to her son and that she will let him know ASAP to clean up the leak. We told the resident we will revisit in a week's time to check on the site. We also applied some kitty litter on the puddle of oil that has been leaked

10/2/23 - J. Wang and T. Koelstra visited the site again and found the boat was not moved nor was the leakage properly cleaned up. We again spoke with the same resident who mentioned her son was away in Missoula and once he's back he will move the boat.

10/9/23 - J. Wang went out to the site and verified the boat has been moved and no leakage was observed on the road/old spot. The matter is considered closed



1. Boat parked at 3409 13<sup>th</sup> Ave So leaking from motor.



2. Boat leaking at 3409 13<sup>th</sup> Ave So. Resident was aware at time of inspection and given a week to move and clean up.



3. Returned to 3409 13<sup>th</sup> Ave So on 10-2-2023 to find boat not moved and IDDE not cleaned up properly. Resident was reminded again it needed to be cleaned up.



4. Returned on 10-9-2023 to find boat moved and leak was cleaned up and posed no hazard to MS4.

**Investigator:** J. Wang / T. Koelstra

**Location:** 3409 13<sup>th</sup> Ave So

**Weather:** N/A

**Camera:** Various

9/27/23

- D. Palagi from Streets reported seeing liquid flowing on the streets out from 3409 13<sup>th</sup> Ave S – 1:26 pm
- Trudy Koelstra and Jack Wang responded to the call at 2:30 pm following tour at the WWTP
- Investigation indicate the leak was from motor oil on the rear of a parked boat
- Jack spoke with the owner of 3409 13<sup>th</sup> Ave S – presumably a member of the Friese Family. The lady who answered the door indicated her grandson is the owner of the boat and will urge him to clean the leak ASAP
- Trudy and Jack told the owner they will be back next week to verify compliance have been met



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2316 IDDE	10/11/2023	10/25/2023	No	Concrete	Enforcement L1
-----------	------------	------------	----	----------	----------------

### Response Notes

Dried cement/concrete washout observed near a trash enclosure ramp. The cement/washout has been observed on an onsite inlet

10/10/23 - J. Wang observed concrete washout was present on one of the private inlets in West Bank Landing (WBL) site near The Peak gym. Pictures were taken and compiled as a photolog and sent to Beau Johnson, SWPPP admin/prep at large for adjacent WBL projects with Talcott Constructions.

10/11/23 - Beau Johnson responded to J. Wang regarding the site. Beau indicated the activity there belongs to a separate project to construct a trash enclosure for surrounding WBL businesses. Mentioned the project manager have been notified and will clean the site up as soon as possible.

10/17/23 - J. Wang checked out the site and saw the concrete washout was still present. Informed Beau Johnson again about addressing this issue along with other site manager.

10/23/23 - J. Wang verified the washout has been cleaned. The matter is considered closed



Photo shows concrete washout/cement material from dried ramp work traveling down to the storm inlet



Photo shows general extent of the issue surrounding the trash enclosure

**Investigator:** Wang

**Weather:** Cloudy with some sun

**Location:** trash enclosure in parking lot between The Peak and Five on Black, West Bank Landing

**Camera:** Various





Photo shows concrete washout/cement material from dried ramp work traveling down to the storm inlet



Photo shows general extent of the issue surrounding the trash enclosure

**Investigator:** Wang

**Weather:** Windy

**Location:** trash enclosure in parking lot between The Peak and Five on Black, West Bank Landing

**Camera:** Various



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2317_IDDE	11/6/2023		No	Other	Enforcement L1
-----------	-----------	--	----	-------	----------------

### Response Notes

Antifreeze container with no lid under the car

11/6/23

J. Wang & N. Besich received an electronic msg submittal from a citizen complaint of potential illicit discharge from an open antifreeze container beneath a vehicle. J. Wang investigated the site and spoke with the father of the vehicle's owner. The father mentioned he will communicate to his kid about cleaning out the anti-freeze. J. Wang gave his card to the individual and will follow up on this matter.

11/14/23

JC & JB visited the site and the container of antifreeze was removed from the area and was not observed on-site.

\*This IDDE is considered closed.



1. Antifreeze under a vehicle in open container.



2. Antifreeze in open container under vehicle, not leaking from vehicle at time of inspection. Father of car owner was aware it needed to be disposed of properly.

**Investigator:** J. Wang  
**Location:** 1220 9<sup>th</sup> Ave So

**Weather:** N/A  
**Camera:** Various



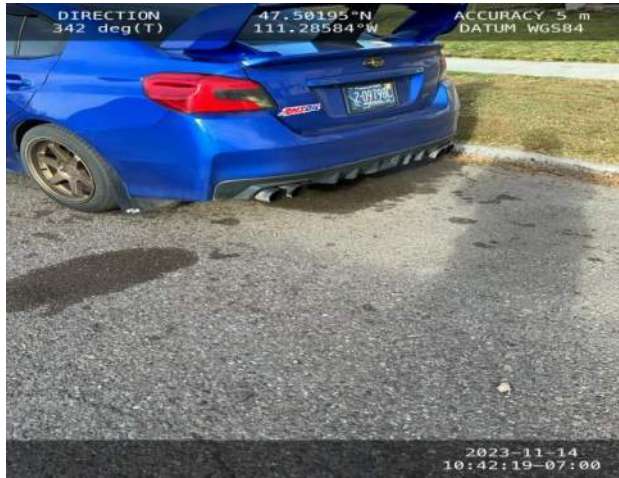
Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2318 IDDE	11/13/2023	11/14/2024	No	Petroleum	Enforcement L1
-----------	------------	------------	----	-----------	----------------

**Response Notes**

Called on 11/13/2023 by Amber at Head Start about a resident at 1217 3rd Ave So. with two vehicles leaking oil and running into the storm inlet. Jake B. and Johnny C. dispatched and found old yellow corvette and blue Subaru parked in front of residences. Oil stains could be seen dried under vehicles and up and down roadway in front of other residences. All oil stains were dry to the touch, aged and had not ran down curb line and into MS4. No active leaks could be seen and pose no threat to the MS4.

Case is considered closed



Oil stains can were observed at 1217 3<sup>rd</sup> Ave So. All stains were dry to the touch and aged, none led into curb line and into MS4.



Oil stains were seen in front of other residences as well.



Oil stains can be seen dried in space and is not running down curb.



Closest storm inlet can be seen covered with debris and no trace of oil entering MS4. This poses no threat to the MS4.

**Investigator: Broden & Cavill**  
**Location: 1217 3<sup>rd</sup> Ave So**

**Weather: 62 F and sunny**  
**Camera: Various**



Request ID	Entry Date	Close Date	Hazmat Response Required	Pollutant Type	Enforcement Level
------------	------------	------------	--------------------------	----------------	-------------------

2319 IDDE	11/21/2023	11/21/2023	No	Other	Enforcement L1
-----------	------------	------------	----	-------	----------------

### Response Notes

11-17-2023

9am: Jake B. and Johnny C. responded to 14th St NE and N River Rd to report of a diesel spill. Upon arrival Black Eagle Fire had blocked off and contained site. Found diesel had come from a truck with a broken fuel tank that continued driving and is now parked at 1400 10th Ave No. Black Eagle Fire had laid cat litter around inlet that was determined to be owned and maintained by MDT. Black Eagle Fire was waiting for MDT representative to arrive on site to determine best method to clean up discharge. We then drove to 1400 10th Ave No to determine if IDDE has impacted our MS4. Found the truck pulled into the parking lot and still leaking fuel. GFFR was on site and containing spill to under the truck which was on gravel parcel in lot. A small amount of diesel was seen on roadway entering parking lot on 14th St No but will dry in place before entering MS4. GFFR will continue to be on site and help driver stop leak on the truck. Talked with Colter with GFFR and informed him that we would be leaving site as this poses no hazard or impact to the MS4 once truck entered within City of Great Falls limits.

12:30pm: Johnny drove by 1400 10th Ave No to witness truck still on site but not leaking. GFFR was also off site at this time. Witnessed street sweepers cleaning the spill at 14th St NE and N River Rd.

This IDDE is considered closed. All cleanup was MDT responsibility



1. Truck with broken fuel tank spilled diesel fuel at intersection of N River Rd and 15<sup>th</sup> St NE. Black Eagle Fire blocked off and placed cat litter around inlet.



2. At 1400 10<sup>th</sup> Ave N GFFR responded to location of truck with broken tank parked in lot of Johnny's Bar. Diesel seen on 14<sup>th</sup> St No as truck pulled into lot.



3. Truck parked in parking lot of Johnny's Bar still leaking diesel on gravel section of lot.



4. Truck with broken fuel tank.

**Investigator:** JB/JC

**Location:** 1400 10<sup>th</sup> Ave No

**Weather:** 50 F and sunny

**Camera:** Various

MCM-4 ATTACHMENTS







DATE RECEIVED \_\_\_\_\_

**CITY OF GREAT FALLS  
CONSTRUCTION SITE STORMWATER INSPECTION  
FREQUENCY DETERMINATION PROTOCOL**

NAME OF PROJECT:		PROJECT FILE NUMBER:		PROJECT ADDRESS:	
TOTAL ACRES:	DISTURBED ACRES:	LATITUDE:	LONGITUDE:		
OWNER:		ADDRESS:		PHONE NUMBER:	

**CONSTRUCTION SITE RATING TABLE**

CRITERIA	RATING SYSTEM	YES / NO	COMMENTS
Project Size	Greater than 1 acre	N	
Proximity to a surface water	Less than 1,000' or direct discharge	N	
Steepness of project site slopes	Slopes of 12% or greater	N	
Discharge to a impaired waterbody impaired	Pollutants of impairment expected at active construction site	N	

**INSPECTION FREQUENCY DETERMINATION TABLE**

TOTAL RATING VALUE	PRIORITY	INSPECTION FREQUENCY
1	LOW	1. Once upon receipt of a complaint
		2. Once at the conclusion of the project prior to final stabilization
2-3	MEDIUM	1. Once upon receipt of a complaint
		1. Once at the commencement of construction after BMPs have been implemented
4	HIGH	2. Once at the conclusion of the project prior to final stabilization
		1. Once at the commencement of construction after BMPs have been implemented
		2. Once w/in 48 hrs after rain event of 1/4" or greater
		3. Once w/in 48 hrs after each occurrence of runoff from snowmelt
		4. Once at the conclusion of the project prior to final stabilization

**INSPECTION FREQUENCY FOR CONSTRUCTION SITE**

TOTAL RATING	SITE PRIORITY
0	LOW

<b>Date</b>	<b>Construction Project Name</b>	<b>Inspection Type</b>
1/10/2023	<i>Arc Apartments</i>	General Checkup and SWPPP deficiency correction
7/11/2023		
8/1/2023		
11/9/2023		
8/1/2023	<i>Aurora Apartments</i>	SWPPP deficiency check up, onsite followed up on 8/11 and find the correction adequate. 9/6/23 temporary certificate of occupancy for single apartment building
8/11/2023		
9/6/2023		
8/18/2023	<i>Beehive Homes</i>	Final Inspection - Certificate of Occupancy
12/4/2023	<i>Copperview Apartments</i>	Final Inspection - Certificate of Occupancy
8/8/2023	<i>Gibson Park Lower Water Main repair</i>	Responded to citizen complaint related to construction site SWPPP deficiency. Met onsite with the general contractor on 9/12/23 and corrective action were implemented on 9/14/23
8/15/2023		
9/12/2023		
9/14/2023		
12/1/2023	<i>Great Falls Clinic</i>	Certificate of Occupancy - bond for remaining incomplete work/landscaping
9/13/2023	<i>Les Schwab - Market Place</i>	Final Inspection - Certificate of Occupancy
12/7/2023	<i>Meadowlark Elementary</i>	Final Inspection - Certificate of Occupancy
9/26/2023	<i>Milwaukee Station Apartments</i>	General checkup
8/21/2023	<i>New City Church</i>	General check up
8/3/2023	<i>Taylor's Automax</i>	Final Inspection - Certificate of Occupancy
3/27/2023	<i>Touro Osteopathic Medical School</i>	General and construction progress check ups, main campus closed out. Side parking lot ongoing wrap up
7/28/2023		
8/18/2023		
12/1/2023		
10/10/2023	<i>West Bank Landing - QDOBA Mexican Grill</i>	Final Inspection - Certificate of Occupancy
10/23/2023	<i>West Bank Landing - Townhome Hotel</i>	SWPPP deficiency check up, followed up on 11/4 and find the correction adequate
11/4/2023		

MCM-5 ATTACHMENTS



Cartograph ID / Priority Level	DATE	Private Party	BMP Types	Comments/Action Taken
70 / <u>3</u> 70.1 / <u>3</u>	7/14/23	Giant Springs Elementary	Underground Detention HDS	No issue found during inspection, established correspondence with facility/grounds manager
71 / <u>4</u>	7/20/23	Eagle Beverage	Retention Pond	No issue found during inspection, established correspondence with facility/grounds manager
72 / <u>4</u> 72.1 / <u>4</u>	5/24/23	Fox Farm Sleep Inn	Bioretention Cell Underground Detention	No issue found during inspection, established correspondence with facility/grounds manager
73 / <u>3</u> 73.1 / <u>3</u>	3/3/23	Montana Specialty Mills	Retention Ponds	Onsite visit with facility manager, no significant issue found
75 / <u>4</u>	8/16/23	Citizens Alliance Bank	Hydrodynamic Separator (HDS)	Established correspondence with facility manager. Provided self-inspection records
76 / <u>3</u> 76.1 / <u>3</u>	2/16/23	Falls Mechanical	Detention Ponds	Established correspondence with facility manager. Provided self-inspection notes
77 / <u>3</u> 77.1 / <u>3</u> 77.2 / <u>3</u> 77.3 / <u>3</u>	March & July'23	Rockcross Commons	Extendend Detention Basins Detention Ponds	Established correspondence with facility manager, discovered issues during onsite visit. Established timetable with owner/facility manager to rectify the issue
80 / <u>3</u> & 81 / <u>3</u>	7/20/23	CM Russell High School	Extendend Detention Basins(EDB)	Established correspondence with facility/grounds manager. Minor issue found upon onsite visit, owner corrected the issue upon further inspection/meeting
81 / <u>3</u> 81.1 / <u>3</u>	7/11/23	Ace Hardware	EDB Permeable Pavers	No issue found during onsite inspection, established correspondence with facility/grounds manager
84 / <u>3</u> 84.1 / <u>3</u> 84.2 / <u>3</u> 84.3 / <u>3</u>	4/24/23	Great Falls High School	Retention Pond Underground Detention HDS Retention Pond	Onsite visit with facility manager, no significant issue found
85 / <u>3</u> 85.1 / <u>3</u> 85.2 / <u>3</u> 85.3 / <u>3</u>	5/24/23	TownPump #2 C-Suite	Bioswale Retention Pond Underground Detention HDS	No issue found during onsite inspection, established correspondence with facility/grounds manager
86 / <u>3</u> 86.1 / <u>3</u> 86.2 / <u>3</u> 86.3 / <u>3</u>	7/14/23	Longfellow Elementary	Bioretention Cells Detention Pond HDS	Minor issue with BMPs maintenance while visiting onsite. Established correspondence with facility manager and the issue was resolved the during the followup checkup
87 / <u>3</u> 87.1 / <u>3</u> 87.2 / <u>3</u> 87.3 / <u>3</u> 87.4 / <u>3</u>	July - Aug'23	University of Providence University Center	Bioretention Cells Retention Pond Bioretention Cells	Onsite visit found minor issue with storm BMPs. Correspondence was established with facility owner. Follow up inspections saw owner rectify the issue
88 / <u>3</u>	3/9/23	Cargill Inc.	Retention Pond	Onsite visit with facility manager, no significant issue found
89 / <u>2</u>	5/31/23	Northern Montana Oral Surgery Center	Retention Pond	Onsite visit with facility manager, no significant issue found

Cartograph ID / Priority Level	DATE	Private Party	BMP Types	Comments/Action Taken
90/ <u>3</u>	5/24/23	Town Pump Express Car Wash	Bioswale	No issue found during inspection, established correspondence with facility/grounds manager
90.1/ <u>3</u>			Underground Detention	
90.2/ <u>3</u>			Retention Pond	
91/ <u>2</u>	2/16/23	Poulsen Legacy Housing	Bioretention Cell	Onsite visit with facility manager, no significant issue found
92/ <u>4</u>	8/22/23	HUB International	Drainage Swale	Minor issue with BMPs maintenance while visiting onsite. Established correspondence with facility manager and the issue was resolved the during the followup checkup
92.1/ <u>4</u>			Detention Ponds	
92.2/ <u>4</u>				
92.3/ <u>4</u>				
93/ <u>4</u>	8/3/23	Independence Bank	HDS	No issue found during inspection, established correspondence with facility/grounds manager
98/ <u>3</u>	6/9/23	Big Iron Truck Wash	Bioretention Cell	Onsite visit of the BMP, no significant issue found. Established correspondence with owner

### KEY & NOTES

1. Current priority levels are classified from 1 to 5, with 1 being lowest and 5 being the highest (High Priority)
2. Refer to the attached **Post-Construction Inspection Frequency Form** to see how priority levels are determined
3. Decimal points indicate the establishment/business/entity possess multiple BMPs
4. This list share overlap with MCM-1 & 2 list of post-construction BMP owners that were contacted by City of Great Falls Environmental
5. Contact/Inspection was not successfully established with all known private stormwater BMP owners. Businesses/establishments included on this list have been operating more than 1 year prior to 2023. City Environmental has plans to establish more communication with all known private BMP holders (post MS4 program establishment) during the permit cycle





PROJECT RECEIVED DATE \_\_\_\_\_

**CITY OF GREAT FALLS  
POST-CONSTRUCTION STORMWATER MANAGEMENT CONTROL  
INSPECTION FREQUENCY DETERMINATION PROTOCOL**

NAME OF PROJECT:		PROJECT ADDRESS:	
Post-Construction Acreage	# of BMPs	SIGNED M.A.* DATE	
<u>LAND OWNER*:</u>	<u>OWNER ADDRESS:</u>	<u>OWNER CONTACT:</u>	
PRIMARY RESPONSIBLE PARTY CONTACT INFORMATION:			
CONTACT NAME:	CONTACT NUMBER:	CONTACT EMAIL:	
CONSTRUCTION SITE RATING TABLE			
CRITERIA	RATING SYSTEM	YES / NO	COMMENTS
Drainage Area Treated	Greater than 1 acre		
Proximity to Major Waterbody	Less than 500' or direct discharge		
Land Use Type	Industrial		
Discharge to a Imparied Waterbody	Pollutants of impairment expected at property		
O&M Requirements	Difficult and/or complicated O&M requiring specialty personnel		
INSPECTION FREQUENCY DETERMINATION TABLE			
TOTAL RATING VALUE	PRIORITY	INSPECTION FREQUENCY	
0-3	LOW	Upon receipt of complaint	
4	MEDIUM	Once per permit cycle	
5	HIGH	Annually	
INSPECTION FREQUENCY FOR CONSTRUCTION SITE			
TOTAL RATING	SITE PRIORITY		
0	LOW		

MA\*: Maintenance Agreement

LAND OWNER\*: May be different than primary contact and operating business



**CITY OF GREAT FALLS  
PUBLIC WORKS - ENVIRONMENTAL DIVISION  
POST-CONSTRUCTION SITE VISIT CHECKLIST  
(ENV STAFF USE ONLY)**

**GENERAL INFORMATION**

<i>Project/Site Name</i>			
<i>Type of Post-Construction Control(s)</i>			
<i>Site Address:</i>			
<i>Site Owner:</i>		<i>Site Owner Contact:</i>	
<i>Responsible Party(ies)</i>		<i>Responsible Party Contact:</i>	
<i>Date of Inspection:</i>		<i>Duration:</i>	
<i>Inspector(s):</i>		<i>Inspector Contact:</i>	

**TYPE OF INSPECTION**

ROUTINE, DRY WEATHER
  ROUTINE, WET WEATHER
  COMPLAINT RESPONSE

Other:

**WEATHER INFORMATION**

CLEAR       CLOUDY       RAINING       SLEET/HAIL       HIGH WINDS  
 SNOWING       FOG      OTHER:      TEMP:

ARE THERE ANY STORMWATER DISCHARGED AT TIME OF INSPECTION?     YES       NO

IF YES, PROVIDE LOCATION(S) AND A DESCRIPTION OF STORMWATER DISCHARGED FROM THE SITE (PRESENCE OF SUSPENDED SEDIMENT, TURBID WATER, DISCOLORATION, AND/OR OIL SHEEN, ODOR, ETC/

## WEATHER INFORMATION CONT.

DO YOU SUSPECT THAT ANY PHYSICAL CHANGES OR DAMAGES TO THE STORMWATER MANAGEMENT CONTROL MAY HAVE OCCURRED SINCE THE LAST INSPECTION:

YES

NO

## PROHIBITED DISCHARGES

ARE THERE ANY PROHIBITED DISCHARGES AT THE TIME OF INSPECTION AND/OR ANY SIGNS OF PROHIBITED DISCHARGES SINCE THE LAST INSPECTION?  YES  NO

IF YES, PROVIDE LOCATIONS AND A DESCRIPTION:

	DESIRED CONDITIONS	FINDINGS	CORRECTIVE ACTIONS NEEDED & NOTES
1	Are the approved structural BMPs present?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
2	Are the structural BMPs sized in accordance with approved plans?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
3	Presence of excessive sediment deposition?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
4	Slopes are well stabilized and are not contributing sediment to the stormwater control(s)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
5	Absence of scour in swales or other vegetated areas	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
6	Trash racks, inlets, outlets, and low flow orifices are free of trash, debris, and sediment	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
7	Absence of woody vegetation impeding the performance of stormwater control(s)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
8	No signs of settling, cracking, bulging, misalignment, or other structural damages on outfalls	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
9	No signs of erosion in embankments, spillways, side slopes, inlet/outlet	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
10	Pipes going into and/or out of any stormwater control(s) are unclogged and unobstructed	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	



	DESIRED CONDITIONS	FINDINGS	CORRECTIVE ACTIONS NEEDED & NOTES
11	Absence of animal burrows	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
12	Absence of trash or debris in the stormwater control(s)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
13	There are no encroachments on the stormwater control(s)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
14	All necessary repairs to safety devices such as fences, gates, covers, or locks are complete	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
15	Absence of algae or overgrown vegetation in the pond/ditch	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
16	The ground surface stabilization is retaining any highly erosive or unstable soils	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
17	Seed germination practice is properly facilitated with blankets and/or netting	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
18	Stormwater control(s) appear to function properly	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	
19	Are there location where additional stormwater control(s) are needed?	<input type="checkbox"/> YES	
		<input type="checkbox"/> NO	
		<input type="checkbox"/> N/A	
20	Additional items	<input type="checkbox"/> YES	
		<input type="checkbox"/> NO	
		<input type="checkbox"/> N/A	
Describe any incidents of non-compliance or maintenance needs that were not covered above			
Follow up inspection required? <input type="checkbox"/> YES <input type="checkbox"/> NO			
Inspector signature			Date



Public Works Department  
 Environmental Division  
 1025 25th Ave NE  
 Great Falls, MT 59404  
 406-727-8390

Initial Submittal Date:
Resubmittal Date:
Resubmittal Version:

**Post- Construction MS4 Stormwater Project Submittal Review Checklist**  
 (ENV Staff Use Only)

**General Project Information**

Site Address:	
Project Name:	
Type of Work:	

**General Submittal Information**

<u>DOCUMENTS</u>	<u>STATUS</u>	<u>COMMENTS</u>
Stormwater Management Permit Application		
SWPPP report (if ≥ 1 acre disturbed)		
ECP report (1 acre > disturbed area > 10,000 SF)		
MCM-5 Stormwater Drainage Report		
Geotech/Hydrogeology Report		
Industrial Pretreatment (IPT) Survey		
Waivers or Variances		

**Drainage Plans/Civil Drawings**

<u>REQUIREMENTS</u>	<u>ADDRESSED</u>	<u>COMMENTS</u>
Project Name	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Developer and landowner information	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Preparation Date	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Name of preparer (e.g. name of company)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
North arrow and Scale	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Pervious and Impervious area label	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Municipal boundaries	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Roads	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Property boundaries (e.g. bearings)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Easements/right-of-ways	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Drainage basin boundaries	<input type="checkbox"/> Yes <input type="checkbox"/> No	

**Drainage Plans/Civil Drawings Continued**

<u>REQUIREMENTS</u>	<u>ADDRESSED</u>	<u>COMMENTS</u>
Existing and proposed buildings/structures within 150' of project area	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Existing and proposed utilities (type/location)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Irrigation Canals with diversion points	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Wildlife Habitat disturbance	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
FEMA floodplain disturbance	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Environmentally sensitive feature disturbance (e.g. wetlands)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Water resources (rivers, ponds, etc.) within 500' of project area	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Existing and proposed site topography (2' maximum contour intervals)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Existing and proposed permanent stormwater facilities (stormdrain, inlets, manholes, etc.)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Invert elevations, slopes, and lengths of stormdrain facilities	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Location of permanent stormwater control(s)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Plan and profile of each permanent stormwater control	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Discharge points clearly labeled	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	

**Maintenance Agreement and associated O&M manuals for each permanent Stormwater Management Control**

<u>REQUIREMENTS</u>	<u>ADDRESSED</u>	<u>COMMENTS</u>
A copy of the recorded M.A. with COGF ENV		
M.A. includes a schedule for routine and non-routine maintenance/inspections		
O&M manual addressing proper performance requirement(s) for each control(s)		
Contact information of responsible party for long term management (cell, email, etc.)		
Owner of stormwater management control(s) - usually the property owner		

# Job Sheet Report

Task ID	Activity	Address	Asset
989622	Clean Detention Pond		MS4 BMP 17

Basic Information		Costs	
Department	Storm Drain Collection	Labor	\$2,321.76
Start Date	11/22/2023	Equipment	\$2,052.16
Stop Date	11/22/2023	Material	\$0.00
		Other	\$0.00
		<b>Total</b>	<b>\$4,373.92</b>

## Labor

ID	Full Name	Hours	Cost
624	Dante Dyson	8.00	\$403.92
634	Derick Smith	8.00	\$382.72
633	George Nelson	8.00	\$382.72
636	Tyler Nygard	8.00	\$382.72
627	Kirt Kramlich	8.00	\$382.72
628	David Betts	8.00	\$386.96

## Equipment

ID	Description	Usage	Cost
639	2017 PETERBILT 337	8.00 hr	\$729.36
642	2020 CHEVROLET 3500 DUMP TRUCK BLUE	8.00 hr	\$292.40
637	2011 FORD F450 DUMP TRUCK	8.00 hr	\$301.04
634	Sewer Jet	8.00 hr	\$729.36

# Job Sheet Report

Task ID	Activity	Address	Asset
989622	Clean Detention Pond		MS4 BMP 17

## Material

ID	Description	Quantity	Cost
----	-------------	----------	------

## Other

Description	Usage	Cost
-------------	-------	------



## Post-Construction Stormwater BMPs Inventory

Cartograph ID	Locations/Address	BMP Type	Ownership	Priority
1	1100 21 St Ave S	Detention Pond	City of Great Falls_Permittee	N/A
2	2901 6th Street S	Detention Pond	City of Great Falls_Permittee	N/A
3	11th St NE/36th Ave NE Intersection	Retention Pond	City of Great Falls_Permittee	N/A
4	In front of 02 5th St N	Catch Basket	City of Great Falls_Permittee	N/A
5	801 17th St S Chowen Springs Park	Detention Pond	City of Great Falls_Permittee	N/A
6	30th Ave NE Horizon Heights Park	Detention Pond	City of Great Falls_Permittee	N/A
7	6th St NE Loaf n Jug	Detention Pond	City of Great Falls_Permittee	N/A
8	3115 Evergreen Dr Lower Belview	Detention Pond	City of Great Falls_Permittee	N/A
9	25th Ave NE Lower Public Works Pond	Detention Pond	City of Great Falls_Permittee	N/A
10	2001 14th St SW Market Place E	Retention Pond	City of Great Falls_Permittee	N/A
11	1713 Whispering Ridge Dr Mt View Coulee	Retention Pond	City of Great Falls_Permittee	N/A
12	506 36th Ave NE Regional Pond	Detention Pond	City of Great Falls_Permittee	N/A
13	1504 25th St S Sand Hills Park	Detention Pond	City of Great Falls_Permittee	N/A
14	3309 10th St NE Skyline Heights	Detention Pond	City of Great Falls_Permittee	N/A
15	3401 Kingwood Dr Upper Belview	Detention Pond	City of Great Falls_Permittee	N/A
16	25th Ave NE Upper Public Works Pond	Detention Pond	City of Great Falls_Permittee	N/A
17	1709 Upper River Rd Verde Park	Hydrodynamic Separator	City of Great Falls_Permittee	N/A
18	18th Ave N Agri-Tech Lot 10	Detention Pond	Private	
20	57th St N/River Rd N	Detention Pond	MDOT	N/A*
22	2nd St NE/Flathead Ave NE	Detention Pond	Private	
26	Walmart east 10th Ave S	Detention Pond	Private	
27	Walmart west 8th St NE	Detention Pond	Private	
28	Near highway 1011 Broadwater Dr	Detention Pond	City of Great Falls_Permittee	N/A
29	River Dr S_Overkil Customs Inc.	Detention Pond	Private	
30	4th St S Benefis Hospital Campus	Detention Pond	Private	
31	4th St S Falls Condo	Detention Pond	Private	
32	River Dr N TC Glass Property	Detention Pond	Private	
33	Close to 15th St NE Pepsi Bottling	Detention Pond	Private	
34	River Dr N Pepsi Bottling Group	Detention Pond	Private	
37	18th Ave N Agri-tech Lot 3A	Detention Pond	Private	
38	18th Ave N Agri-tech Lot 5A	Detention Pond	Private	
39	18th Ave N Agri-tech Lot 3A	Detention Pond	Private	
40	18th Ave N Agri-tech Lot 3A	Detention Pond	Private	
41	18th Ave N Agri-tech Lot 3A	Detention Pond	Private	
42	Smelter Ave N near JK Property Mgmt	Detention Pond	Private	
43	18th Ave N Agri-tech Lot 5A	Detention Pond	Private	
44	1630 Division RD	Detention Pond	Private	
45	1630 Division RD	Detention Pond	Private	
46	920 25th Ave NE	Extende Detention Basin	Private	
47	1001 10th St S	Detention Pond	Private	
48	528 Smelter Ave NE	Detention Pond	Private	
49	401 NW Bypass	Detention Pond	Private	
50	1605 Fox Farm Rd	Detention Pond	Private	
51	5th St NE Eagles Crossing	Retention Pond	Private	

## Post-Construction Stormwater BMPs Inventory

Cartograph ID	Locations/Address	BMP Type	Ownership	Priority
52	601 Bay Dr Garden Home Park	Retention Pond	City of Great Falls_Permittee	N/A
53	20th St S_Merriweather Subdivision	Detention Pond	City of Great Falls_Permittee	N/A
54	20th St S_Merriweather Subdivision	Hydrodynamic Separator	City of Great Falls_Permittee	N/A
55	3001 13th St S	Detention Pond	Private	
66	18th Ave N/River Dr N intersection	Detention Pond	Private	
69	43rd St S_L. Smith Pond	Retention Pond	Permittee_lease	N/A
70	Giant Springs Elementary	Underground Detention	Private	3
70.1	Giant Springs Elementary	Hydrodynamic Separator	Private	3
71	Eagle Beverage	Retention Pond	Private	4
72	Fox Farm Sleep Inn	Bioretention Cell	Private	4
72.1	Fox Farm Sleep Inn	Underground Detention	Private	4
73	Agri-Tech Lot 2 Montana Specialty Mills	Retention Pond	Private	3
73.1	Agri-Tech Lot 2 Montana Specialty Mills	Retention Pond	Private	3
74	West Bank Landing	Underground Detention	Private	4
	West Bank Landing	Biofiltration Beds	Private	4
	West Bank Landing	Permeable Pavements	Private	4
75	Citizens Alliance Bank_West Bank Landing	Hydrodynamic Separator	Private	4
76	Park Dr S Falls Mechanical	Detention Pond	Private	3
76.1	Park Dr S Falls Mechanical	Detention Pond	Private	3
77	Rockcross Commons Complex	Extende Detention Basin	Private	3
77.1	Rockcross Commons Complex	Extende Detention Basin	Private	3
77.2	Rockcross Commons Complex	Detention Pond	Private	3
77.3	Rockcross Commons Complex	Detention Pond	Private	3
78	River Dr S Broadwater Building	Underground Detention	Private	4
79	10th Ave S Planet Fitness	Hydrodynamic Separator	Private	3
80	CM Russell High School	Extended Detention Basin	Private	3
80.1	CM Russell High School	Extended Detention Basin	Private	3
81	10th Ave S Ace Hardware	Extended Detention Basin	Private	3
81.1	10th Ave S Ace Hardware	Permeable Pavements	Private	3
82	American Ave Westbrook Apartments	Retention Pond	Private	3
82.1	American Ave Westbrook Apartments	Retention Pond	Private	3
83	Watson Coulee Rd AJay Concrete	Bioretention Cell	Private	4
83.1	Watson Coulee Rd AJay Concrete	Bioretention Cell	Private	4
84	Great Falls High School	Retention Pond	Private	3
84.1	Great Falls High School	Underground Detention	Private	3
84.2	Great Falls High School	Hydrodynamic Separator	Private	3
84.3	Great Falls High School	Retention Pond	Private	3
85	10th Ave S Town Pump #2 C-Suite	Bioswale	Private	3
85.1	10th Ave S Town Pump #2 C-Suite	Retention Pond	Private	3
85.2	10th Ave S Town Pump #2 C-Suite	Underground Detention	Private	3
85.3	10th Ave S Town Pump #2 C-Suite	Hydrodynamic Separator	Private	3
86	Longfellow Elementary	Bioretention Cell	Private	3
86.1	Longfellow Elementary	Bioretention Cell	Private	3
86.2	Longfellow Elementary	Detention Pond	Private	3

## Post-Construction Stormwater BMPs Inventory

Cartegraph ID	Locations/Address	BMP Type	Ownership	Priority
86.3	Longfellow Elementary	Hydrodynamic Separator	Private	3
87	University of Providence - University Center	Bioretention Cell	Private	3
87.1	University of Providence - University Center	Bioretention Cell	Private	3
87.2	University of Providence - University Center	Retention Pond	Private	3
87.3	University of Providence - University Center	Bioretention Cell	Private	3
87.4	University of Providence - University Center	Bioretention Cell	Private	3
88	2301 Great Bear Ave	Retention Pond	Private	3
89	Northern Montana Oral Surgery Center	Retention Pond	Private	2
90	Town Pump Express Car Wash	Bioswale	Private	3
90.1	Town Pump Express Car Wash	Underground Detention	Private	3
90.2	Town Pump Express Car Wash	Retention Pond	Private	3
91	Harold & Carmen Poulsen Legacy Housing	Bioretention Cell	Private	3
92	Park Dr S HUB International	Drainage Swale	Private	4
92.1	Park Dr S HUB International	Detention Pond	Private	4
92.2	Park Dr S HUB International	Detention Pond	Private	4
92.3	Park Dr S HUB International	Detention Pond	Private	4
93	River Dr N Independence Bank	Hydrodynamic Separator	Private	4
94	10th Ave S Les Schwab Tires	Underground Detention	Private	3
94.1	10th Ave S Les Schwab Tires	Hydrodynamic Separator	Private	3
95	1626 10th Ave S Starbucks	Hydrodynamic Separator	Private	2
95.1	1626 10th Ave S Starbucks	Underground Detention	Private	2
96	1205 3rd St NW Starbucks	Hydrodynamic Separator	Private	4
96.1	1205 3rd St NW Starbucks	Underground Detention	Private	4
97	10th Ave S Tidal Wave Auto Spa	Hydrodynamic Separator	Private	3
97.1	10th Ave S Tidal Wave Auto Spa	Underground Detention	Private	3
98	2801 Poplar Dr Big Iron Truck Wash	Bioretention Cell	Private	3
99	1221 10th Ave S City Brew	Hydrodynamic Separator	Private	2
100	Great Falls Clinic main campus	Hydrodynamic Separator	Private	3
100.1	Great Falls Clinic main campus	Underground Detention	Private	3
100.2	Great Falls Clinic main campus	Extended Detention Basin	Private	3
100.3	Great Falls Clinic main campus	Bioretention Cell	Private	3
100.4	Great Falls Clinic main campus	Bioretention Cell	Private	3
100.5	Great Falls Clinic main campus	Detention Pond	Private	3
101	Division Rd Arc Apartments	Extended Detention Basin	Private	3
102	2nd Ave N Copperview Apartments	Retention Pond	Private	3
103	25th St S Beehive Homes	Underground Detention	Private	3
103.1	25th St S Beehive Homes	Permeable Pavements	Private	3
104	Great Falls Market Place Center	Detention Pond	Private	
105	Smelter Ave Walmart west	Detention Pond	Private	
106	10th Ave S Taylor's Automax	Retention Pond	Private	3
107	Great Falls Parks & Recreation Complex	Retention Pond	City of Great Falls_Permittee	N/A
108	Great Falls Market Place Les Schwab	Hydrodynamic Separator	Private	3
109	Touro Osteopathic Medical School	Detention Pond	Private	3
109.1	Touro Osteopathic Medical School	Hydrodynamic Separator	Private	3



Post-Construction Stormwater BMPs Inventory

Cartegraph ID	Locations/Address	BMP Type	Ownership	Priority
109.2	Touro Osteopathic Medical School	Bioretention Cell	Private	3
110	10th Ave S Chipotle	Underground Detention	Private	2
110.1	10th Ave S Chipotle	Hydrodynamic Separator	Private	2
111	West Bank One	Hydrodynamic Separator	Private	
111.1	West Bank One	Underground Detention	Private	
112	4401 Innovation St Sustainable Oils	Retention Pond	Private	
113	10th Ave S Walgreens	Bioswale	Private	
114	Park Garden Ln - Foxwood Estates	Hydrodynamic Separator	City of Great Falls_Permittee	N/A
115	Airport RD Love's Travel Stop	Detention Pond	Private	
116	3rd Ave S - close to Meadow Gold Dairy	Hydrodynamic Separator	City of Great Falls_Permittee	N/A
117	2nd Ave S - Near NAPA Auto	Hydrodynamic Separator	City of Great Falls_Permittee	N/A

**KEY & NOTES**

1. Current priority levels are classified from 1 to 5, with 1 being lowest and 5 being the highest (High Priority)
2. Refer to the attached **Post-Construction Inspection Frequency Form** to see how priority levels are determined
3. N/A priority level applies to all Permittee owned BMPs. They are inspected annually
4. Cartegraph ID 17 (Permittee owned) is considered a **High Priority Post-Construction BMP**
5. Cartegraph ID 20 is owned by MDOT, included here due to being within the City's MS4 boundary
6. Gaps in Cartegraph ID sequence are due to Cartegraph software system glitches that prevents retro correction and not due to omitted entries
7. Cartegraph IDs without Priority level assignments are legacy private BMPs prior to the City implementing a MS4 program.
8. Decimal points indicate the establishment/business/entity possess multiple BMPs
9. Refer to the attached **inspection list of all private BMPs inspected by CoGF ENV for 2023**



# 21st Ave. S, BMP #1

Date: 07/31/2023

Weather: 75 and Sunny

---

## Items of Concern:

- Bare and exposed soil
- Noxious weeds
- Trash
- Vegetation overgrowth

## Condition of Pond: Good

### Summary

The annual inspection for the 21<sup>st</sup> Ave. S. pond, also known as BMP #1 was conducted on July 31, 2023. The weather during the inspection was sunny and 75 degrees Fahrenheit. The condition of the pond at the time of the inspection was determined to be good. During the inspection there were 4 items observed that should be addressed.

In various areas around the pond, bare and exposed soil were observed. These areas are at an elevated risk for noxious weeds or unwanted vegetation to establish and outcompete more desirable vegetation. The areas with bare and exposed soil are also at risk of seeing erosion occur in these areas because there is no vegetation to hold the soil down.

Noxious weeds were observed throughout the entire site. Leafy spurge, spotted knapweed, and Canada thistle were the three types of weeds found. All three of these are classified as Priority 2B noxious weeds in Montana. Priority 2B classification means that these weeds are abundant and widespread throughout many different areas. The local weed district should be contacted to find out what herbicides work the best to combat each of these three noxious weeds. The weed district should also be able to provide application rates as well as best times to apply herbicides for best results.

Vegetation growth on inlet and outlet structures were observed. The two structures that saw vegetation growth in the structure as well as overgrowth around the structure were on the west end of the pond and in the southeast corner. This overgrowth and growth inside the structure prevents water from entering the pond as designed. The vegetation growth near the west inlet structure was so bad that locating the structure was difficult.

Finally, a large amount of trash was observed at the pond site. This should be removed as it give the pond site a negative image.

### Recommendations

- Recommend monitoring areas of bare and exposed soil so that no erosion takes place or so that it is not over taken by noxious weeds or unwanted vegetation.

## 21st Ave. S, BMP #1

Date: 07/31/2023

Weather: 75 and Sunny

---

- Recommend applying proper herbicide to all three types of noxious weeds observed at the pond.
- Recommend clearing the pond structures of all vegetation growing in and around the structures so that water can enter the pond as designed.
- Recommend cleaning up the trash at the pond site.



**Photo 1**

This photo is showing the inlet structure on the west end of the pond. The vegetation growth was so thick and well established.



**Photo 2**

This photo shows an inlet into pond with a lot of sediment and debris built up. This needs to be cleaned.



**Photo 3**

This photo is showing an area of bare soils and trash seen throughout the pond. Bare soils could lead to unwanted weeds and or erosion.



**Photo 4**

This photo is showing an inlet into the pond that is covered with natural vegetation. This could prevent water from entering.

**Investigator: Cavil**  
**Location: 21<sup>st</sup> Ave. S.**

**Weather: Sunny and 75**  
**Camera: Various**



**Photo 5**

This photo shows another inlet and rip rap into pond covered with grass trimmings and trash. Both need to be cleaned up.



**Photo 6**

This photo is showing the pond floor established with vegetation. As shown you can see weeds are mixed with grass, weeds can be removed.

**Investigator: Cavil**  
**Location: 21<sup>st</sup> Ave. S.**

**Weather: Sunny and 75**  
**Camera: Various**

## 36th Ave. NE, BMP #3

Date: 12/13/2024

Weather: 50 and Sunny

---

### Items of Concern:

- Standing water
- Sediment
- Seasonal cleanup

### Condition of Pond: Good

### Summary

The annual pond inspection for the 36<sup>th</sup> Ave. NE pond, also known as BMP #3 was conducted on December 13, 2023. The weather during the inspection was sunny and 50 degrees Fahrenheit. Overall, the condition of the pond was determined to be in good condition. During the inspection there were three items identified that need to be addressed.

During the inspection, sediment in the inlet structures and flow lines was observed. The deposited sediment in the flow line prevents water from exiting the pond as designed. The sediment should be removed from both the structures and flow lines.

Natural debris was also observed in the flow lines and inlet and outlet structures. This prevents water from entering and exiting the pond as designed. This also allows some water to stand in the flow lines and structures. This should be removed from structures and flow line.

Finally, standing water was observed in the flow lines and inlet/outlet structures. The standing water is caused by deposited sediment and natural debris. Both of these issues cause the water to not exit the pond as designed. Removing the vegetation and deposited sediment would prevent the standing water.

### Recommendations

- Recommend cleaning sediment from inlets, outlets, and flow line of the pond. This will prevent vegetation from establishing and standing water.
- Recommend removing the establish vegetation in the flow line and structures. This will prevent standing water in the pond.



**Photo 1**

This photo shows standing water in the flow line of the pond. This is caused from sediment depositing in the flow line.



**Photo 2**

Photo shows the outlet structure of the pond. Sediment and leaves have been deposited near structure causing water to stand in the flow line.



**Photo 3**

Photo shows vegetation growing in flow line. The vegetation can establish due to sediment being deposited in the flow line.



**Photo 4**

This photo show an inlet that drains into flow line. The inlet has vegetation and leaves in the pipe, which prevents water from entering the flow line of the pond.

**Investigator: Broden**  
**Location: 36<sup>th</sup> Ave NE**

**Weather: Sunny and 50**  
**Camera: Various**



**Photo 5**

This photo is of the inlet structure in the northeast corner of the pond. Bare soil and standing water can be seen in flowline.

**Investigator: Broden**  
**Location: 36<sup>th</sup> Ave NE**

**Weather: Sunny and 50**  
**Camera: Various**



# Chowen Springs, BMP #5

Date: 09/13/2023

Weather: 76 and Sunny

---

## Items of Concern:

- Garbage in structures
- Noxious weeds

## Condition of Pond: Good

### Summary

The annual pond inspection for the Chowen Springs pond, also known as BMP #5 was conducted on September 13<sup>th</sup>, 2023. The weather during the inspection was sunny and 76 degrees Fahrenheit. Overall, the condition of the pond was determined to be good. During the inspection there were two items that should be addressed.

During the inspection it was observed at storm manholes #3206 and #2127 were observed to have debris such as garbage, sticks, grass clippings, or other random items in the structure. These manholes should be cleaned out so that the items do not create any further issues.

Also at the pond, large areas of field bindweed were observed. Field bindweed is a Priority 2B noxious weed in Montana. Priority 2b noxious weeds are considered abundant and widespread throughout many areas of Montana. The local weed district should be contacted to find out what the best herbicide would be to apply to this weed. The weed district should also be able to provide application rates as well as the best time of day to apply the herbicide.

### Recommendations

- Recommend cleaning storm manholes #2127 and #3206 to clean out anything that should not be in them.
- Recommend spraying the field bindweed with proper herbicide to prevent them from expanding further at the pond site.



Photo 1

This photo is of a storm drain inlet #2673, as the photo shows there is garbage and vegetation in the flow line which could find its way into the Storm Main.



Photo 2

This photo is of storm manhole #3206, as the photo shows there is a lot of debris and garbage in the structure that should be cleaned out.



Photo 3

This photo shows a patch of dead grass and weeds. Weeds could be seen throughout the pond and should be addressed.



Photo 4

This photo is of storm manhole #2127. Again a bunch of debris such as garbage, sticks, and other random objects and trash in the structure that should be cleaned out.

Investigator: Cavil  
Location: Chowen Springs Park

Weather: 76 and Sunny  
Camera: Various

## Eagle's Crossing, BMP #51

Date: 12/13/2023

Weather: 50 and Sunny

---

### Items of Concern:

- Noxious weeds
- Inlet growth

### Condition of Pond: Fair

### Summary

The annual inspection for the Eagle's Crossing Pond, also known as BMP #51 was conducted on December 13, 2023. The weather during the inspection was sunny and 50 degrees Fahrenheit. The overall condition of the pond was determined to be fair. Two items were identified during the inspection that should be addressed.

During the inspection all inlets and outlets at the pond were observed having a large amount of vegetation growth in and around the structures. Most of the growth in structures is from established cattails. The outlet on the west end of the pond seems to have the most change from the last year's inspection. The vegetation is so thick that it is difficult locating the structure. All the vegetation in these structures, allows sediment to build up in the structure and not allow water to enter as easily.

### Recommendations

- Recommend cleaning all structures and remove all vegetation growing in and around the structures so incoming water can discharge to pond easier.
- Recommend removing trash from the pond site as it gives it a negative image.
- Recommend removing weeds and trying to establish correct vegetation for region in bare areas



Photo 1

This photo show vegetation growth in the inlet structure that is located in the northeast corner of pond. This prevents water from entering the pond as designed.



Photo 2

This photo shows pond towards the Northwest section of pond. Established vegetation can be seen, some bare soils are also visible.



Photo 3

This photo shows how much vegetation growth covers must of the area. There is areas of bare soils that could lead to unwanted weed growth.



Photo 4

This photo shows Northeast section of the pond. Vegetation can be seen and established.

Investigator: Broden  
Location: Eagle's Crossing

Weather: 50 and Sunny  
Camera: Various

## Garden Home, BMP #52

Date: 09/13/2023

Weather: 76 and Sunny

---

### Items of Concern:

- Noxious weeds
- Garbage
- Bare soils

### Condition of Pond: Good

### Summary

The annual pond inspection for the Garden Home Park Pond, also known as BMP #52 was conducted on September 13, 2023. The weather during this inspection was sunny and 76 degrees Fahrenheit. Overall the condition of the pond was good. During the inspection three items were identified as needing to be addressed.

During the inspection a couple different types of noxious weeds were identified. Leafy spurge and spotted knapweed were identified. Both of these noxious weeds are considered Priority 2B noxious weeds in Montana. Priority 2B weeds are classified as abundant and widespread in many areas. These weeds should be sprayed with the proper herbicide. The local weed department should be able to provide what herbicide would be best to use on these plants.

Throughout the pond area trash was observed. This trash was likely deposited in the pond due to the wind blowing it in there. The trash in the pond area clutters the pond site and gives off a negative image.

Lastly during the inspection it was noted there was multiple areas around the pond that had bare soils exposed to the risk of erosion. This should be addressed by seeding or sodding to help reduce the chance of erosion.

### Recommendations

- Recommend removing trash from the pond site.
- Spray the noxious weeds at the pond site with the proper herbicide to prevent them from spreading.
- Seeding or sodding the areas with bare soil.



**Photo 1**

This photo shows an area of bare soil that could cause erosion or lead to unwanted vegetation such as weeds.



**Photo 2**

In another area along the east side of the pond, spotted knapweed was observed. This is another Priority 2B noxious weed and should be sprayed with the proper herbicide.



**Photo 3**

This photo shows the inlet structure in good condition and clean.



**Photo 4**

This photo shows some garbage that has found its way to the pond site. Garbage was found in multiple areas of the pond and should be removed.

**Investigator: Cavil**  
**Location: Garden Home Park**

**Weather: 76 and Sunny**  
**Camera: Various**

## Horizon Park Pond, BMP #6

Date: 06/26/2023

Weather: 76 and Sunny

---

### Items of Concern:

- Gophers
- Bare and exposed soil
- Sediment
- Noxious weeds

### Condition of Pond: Fair

#### Summary

The annual inspection for the Horizon Park pond, also known as BMP #6 was conducted on June 6<sup>th</sup>, 2023. The weather during the inspection was sunny and 78 degrees Fahrenheit. The condition of the pond was determined to be fair. There were 4 items that were identified during the inspection that should be addressed.

The biggest issue observed at the pond during the inspection were the areas of bare and exposed soils. These areas are at an elevated risk of erosion taking place. These areas are also prime areas for unwanted vegetation such as noxious weeds to establish and eventually outcompete more desirable vegetation.

The next item that seemed to be located in all areas of the pond were gophers. Gopher holes were observed throughout the pond site, which creates other issues such as areas of bare and exposed soils. These gopher holes also make it difficult for desired vegetation to continue growing.

Deposited sediment was also observed at the pond site in the flow line. The deposited sediment was so much that in some areas of the flow line was not even visible due to the sediment. This sediment should be removed so that water can exit the pond in the manner in which it was designed. There was also a fair amount of sediment build up around the inlet structure of the pond.

Finally a couple different types of noxious weeds were identified at the pond. Both Canada thistle and field bindweed were found and are both classified as Priority 2B noxious weeds in Montana. This classification means that these weeds are abundant and widespread throughout many different areas. The local weed district should be contacted to find out what the best herbicide is for each species. The local weed district should be able to provide proper application rates and best times to apply herbicide to these weeds to prevent any further spread of them.

#### Recommendations

## Horizon Park Pond, BMP #6

Date: 06/26/2023

Weather: 76 and Sunny

---

- Recommend monitoring the areas of bare and exposed soils so that no erosion takes place and degrades the area further. Seeding these area might also be a good idea.
- Recommend reducing the gopher population at the pond as they play a crucial role in other issues identified at the pond.
- Recommend cleaning the flow line out so there is no sediment in there allowing water to move through the pond as designed.
- Recommend spraying the noxious weeds with proper herbicide to prevent any further spread.





**Photo 1**

Photo shows an area along the north bank of the pond. Many gopher holes were observed as well as areas of bare and exposed soil.



**Photo 2**

Photo shows the entire north bank of the pond. Numerous gopher holes and areas of bare soil are present along this bank.



**Photo 3**

This photo shows the flow line of the pond. Sediment has been deposited here and needs to be removed. Some areas of the flow line had so much sediment seeing any of the flow line was difficult.



**Photo 4**

This photo shows an area in the northwest corner of the pond. This large area of bare and exposed soil was observed. There were also gopher holes seen here.

**Investigator: Cavil**  
**Location: Horizon Park**

**Weather: Sunny and 74**  
**Camera: Various**



Photo 5

This picture of the inlet to the pond can be seen covered with sediment and grass clippings.



Photo 6

This photo is of areas throughout the pond with bare soils and noxious weeds.



Photo 7

This photo shows a pipe testing ball inflated to block the flow of water in the discharge pipe from the pond. This was done by an unknown person and removed.



Photo 8

Area with previous tracking in last year's report has been corrected and maintained.

Investigator: Cavil  
Location: Horizon Park

Weather: Sunny and 74  
Camera: Various

## LNJ, BMP # 7

Date: 06/26/2023

Weather: 70 and Sunny

---

### Items of Concern:

- Erosion
- Bare and exposed soil
- Gophers
- Noxious weeds

### Condition of Pond: Fair

### Summary

The annual pond inspection for the LNJ pond, also known as BMP #7 was conducted on June 26<sup>th</sup>, 2023. The weather during the inspection was sunny and 70 degrees Fahrenheit. Overall the condition of the pond was determined to be fair. There were 4 items observed during the inspection that should be addressed.

The first item observed during the inspection was some erosion taking place throughout the pond. This issue should be addressed so that no further erosion takes place and erodes the banks of the pond.

Areas of bare and exposed soil were observed at the pond site. Areas of bare and exposed soil are at an elevated risk of erosion. These areas are also prime areas for unwanted vegetation such as noxious weeds to establish.

Noxious weeds were abundant at the pond. Both Canada thistle and field bindweed were observed. These two noxious weeds are classified as Priority 2B noxious weeds in Montana. This classification means that they are abundant and widespread throughout many areas. The local weed district should be contacted to find out what the best herbicides would be to apply to these two noxious weeds. The weed district should also be able to provide application rates as well as best times to apply herbicides.

Gophers were also an issue at this pond site. Gopher holes add to the amount of bare and exposed soil at the pond site. These gopher holes are also prime areas for noxious weeds to establish and out compete more desirable vegetation. The population of gophers should be reduced at the pond.

### Recommendations

- Recommend monitoring the area that is showing signs of erosion so no further erosion takes place.
- Recommend monitoring the areas of bare and exposed soil so that no erosion takes place or that no unwanted vegetation such as noxious weeds establish.
- Recommend applying proper herbicide to the noxious weeds at pond to prevent their spread.
- Recommend reducing population of gophers at the pond site.

**LNJ, BMP # 7**

Date: 06/26/2023

Weather: 70 and Sunny

---



**Photo 1**

This photo is along the East bank of the pond and show erosion and tracking. Trimming with a riding mower has led to both problems



**Photo 2**

This photo is another of the north pond bank. A lot of the bank showed areas of bare and exposed soil.



**Photo 3**

This photo shows sediment build up in flow line of the pond.



**Photo 4**

This photo shows another example of gopher holes and bare soil.

**Investigator: Cavil**  
**Location: LNJ**

**Weather: Sunny and 70**  
**Camera: Various**



**Photo 5**

This photo shows another example of sediment and vegetation build up in the flow line. This needs to be cleaned.



**Photo 6**

This photo also shows an area along the pond bank with weeds and bare soil.

**Investigator: Cavil**  
**Location: LNJ**

**Weather: Sunny and 70**  
**Camera: Various**

## Lower Belview, BMP # 8

Date: 07/31/2023

Weather: 70 and Sunny

---

### Items of Concern:

- Sediment
- Noxious weeds

### Condition of Pond: Good

### Summary

The annual pond inspection for the Lower Belview pond, also known as BMP #8 was conducted on July 31, 2023. The weather during the inspection was sunny and 70 degree Fahrenheit. The condition of the pond was found to be good during the time of inspection. There were two items identified that need to be addressed.

Deposited sediment in the flow line was observed during the inspection. The sediment has also built up around the outlet structure of the pond. Sediment that has deposited prevents the water from exiting the pond as designed and could potentially block the outlet structure.

The other item that was observed at the pond site were the numerous noxious weed species. Spotted knapweed, Canada thistle, and field bindweed were the three noxious weed species identified at the pond site. All three of these weeds are classified as priority 2B noxious weeds in Montana. Priority 2B classification means that these species are abundant and widespread in many areas. The local weed district should be contacted to find out what the best herbicides would be to apply to these noxious weeds. The weed district will also be able to provide application rates and times for best results. If allowed to spread and establish further, these noxious weeds will be difficult to remove from the pond site.

### Recommendations

- Recommend removing all deposited sediment that is in the flow line and built up around the outlet structure.
- Recommend applying proper herbicide to all three of the noxious weeds found at the pond site.



**Photo 1**

This photo shows that spotted knapweed has established at the pond site. Spotted knapweed is a noxious weed in Montana.



**Photo 2**

This photo shows Canada thistle, which is an invasive noxious weed in Montana as well.



**Photo 3**

This photo shows the flow line of the pond. A large amount of sediment has deposited in the flow line preventing water from exiting the pond as designed.



**Photo 4**

This photo shows just how much sediment has been deposited and built up around the outlet structure of the pond.

**Investigator: Cavill**  
**Location: Lower Belview**

**Weather: 70 and Sunny**  
**Camera: Ipad**



## Lower PW Pond, PW #9

Date: 07/31/2023

Weather: 70 and Sunny

---

### Items of Concern:

- Debris on outlet
- Gophers
- Noxious weeds

### Condition of Pond: Fair

#### Summary

The annual inspection for the Lower PW Pond, also known as BMP #9 was conducted on July 31, 2023. The weather during the inspection was sunny and 70 degrees Fahrenheit. Overall, the condition of the pond was determined to be fair. There were three items identified during the inspection that should be addressed.

Gophers were identified as the most observed issue at this pond. There were gopher holes all throughout the pond site. Gopher holes add to the amount of bare and exposed soil, which is prime for unwanted vegetation to establish and outcompete more desirable vegetation.

The outlet structure of the pond was observed to have the structure blocked. It appeared to be blocked by debris and grass build up. This prevents water from exiting the pond as designed and potentially having water back up.

Canada thistle was observed at the pond site during the inspection. Canada thistle is a Priority 2B noxious weed in Montana. Priority 2B classification means the noxious weed is abundant and widespread throughout many areas. The local weed district should be contacted to find out what the best herbicide would be apply to this weed. The weed district should also be able to provide application rates as well as best time to apply herbicide.

#### Recommendations

- Recommend reducing gopher population as they have a negative impact to the pond site.
- Recommend cleaning the outlet structure off so that water can exit the pond as designed.
- Recommend applying proper herbicide to Canada thistle to suppress it from spreading.



Photo 1

This photo shows the southeast corner of the pond. There is Canada thistle on the top of the pond bank, this is a noxious weed. Also, there are gopher holes at the top of the bank. Gopher holes add to the amount of bare and exposed soil at the pond.



Photo 2

This photo shows water flowing from the trench into the outlet structure of the pond.



Photo 3

This photo shows the outlet structure of the pond. The entire structure has been blocked by grass and other debris. This prevents water from exiting the pond efficiently.



Photo 4

This photo shows the southwest corner of the pond. Numerous gopher holes were observed here.

Investigator: Cavill  
Location: Lower PW Pond

Weather: Sunny and 70

## Market Place E, BMP # 10

Date: 07/31/2023

Weather: 96 and Sunny

---

### Items of Concern:

- Noxious weeds
- Gophers
- Bare and exposed soils

### Condition of Pond: Fair

#### Summary

The annual pond inspection for the Market Place E pond, also known as BMP #10 was conducted on July 31<sup>st</sup>, 2023. The weather during the inspection was sunny and 96 degrees Fahrenheit. The condition of the pond at the time of inspection was considered fair. There were 3 items identified during the inspection that should be addressed.

The first item observed at the pond site was the amount of gopher holes present. In all areas of the pond these gopher holes create areas of bare and exposed soil. Bare and exposed soils are at an elevated risk of erosion taking place in those areas. Also, the areas that have gopher holes are prime habitat for unwanted vegetation to establish such as noxious weeds. Measures should be taken to reduce the gopher population at the pond site.

Another item that was observed at the pond site were the numerous noxious weed species. Canada thistle and field bindweed were the three noxious weed species identified at the pond site. Both of these weeds are classified as priority 2B noxious weeds in Montana. Priority 2B classification means that these species are abundant and widespread in many areas. The local weed district should be contacted to find out what the best herbicides would be to apply to these noxious weeds. The weed district will also be able to provide application rates and times for best results. If allowed to spread and establish further, these noxious weeds will be difficult to remove from the pond site.

In numerous areas throughout the pond site bare and exposed soil areas had been observed. These areas that were observed to have bare and exposed soil are at an increased risk of erosion as well as the threat of having noxious weeds and other unwanted plant species establish.

#### Recommendations

- Recommend applying proper herbicide to noxious weeds located at the pond site.
- Recommend reducing the gopher populations at the pond site as they add to the amount of bare and exposed soil at the pond.
- Recommend monitoring the areas of bare and exposed soil at the pond site so that no further damage or erosion occurs at the pond.



Photo 1

This photo shows a large area of bare soil. Also, the white flowers in the photo is field bindweed which is a noxious weed. Also, a gopher hole is shown here.



Photo 2

View looking towards the East side of the pond.



Photo 3

View looking towards the West side of the pond.



Photo 4

This photo is looking West shows more bare soil and noxious weeds on the pond banks.

Investigator: Cavil  
Location: Market Place E

Weather: Sunny and 96  
Camera: Various



**Photo 5**

This photo is of the northeast pond corner. At this location numerous gopher holes were observed here.



**Photo 6**

This photo is of the outfall into the pond. Shown here again we see Canada thistle.

**Investigator: Cavil**  
**Location: Market Place E**

**Weather: Sunny and 96**  
**Camera: Various**

## Merriweather, BMP #53

Date: 07/31/2023

Weather: 96 and Sunny

---

### Items of Concern:

- Noxious weeds
- Bare soil
- Garbage

### Condition of Pond: Good

### Summary

The annual pond inspection for the Merriweather Pond, also known as BMP #53 was conducted on July 31<sup>st</sup>, 2023. The weather during the inspection was sunny and 96 degrees Fahrenheit. Overall, the condition of this pond was deemed to be good. During the inspection there were three items identified that should be monitored or addressed.

During the inspection the most observed issue was bare and exposed soil. These areas of the pond are at an elevated risk of erosion and allowing unwanted vegetation to establish. These areas should be monitored so that no further degradation takes place.

Throughout the pond there was a fair amount of garbage build up in the fence. This should be removed from the pond's fence.

### Recommendations

- Recommend monitoring the areas of bare and exposed soil so that conditions do not become worse.
- Clean all the garbage up at the pond site.
- Clean out all pipes of grass trimmings and over grown vegetation



**Photo 1**

This photo is looking from the West to the East. As shown you can see noxious weeds and bare soil.



**Photo 2**

This photo shows trash and vegetation at the outfall pipe. Both need to be cleaned and removed as this could affect flow rate coming into the pond.



**Photo 3**

Photo shows the trash caught in the fence from the surrounding residential construction.



**Photo 4**

Photo is looking at the overflow inlet and the noxious weeds surrounding it.

**Investigator: Cavil**  
**Location: Merriweather Pond**

**Weather: 96 and Sunny**  
**Camera: Various**

<p>DIRECTION 235 deg(T)      47.48315°N      ACCURACY 5 m 111.27225°W      DATUM WGS84</p>  <p>2023-07-31 11:20:59-06:00</p> <p><b>Photo 5</b></p> <p>Photo is looking down the south pond bank areas of bare and exposed soil were observed. This could lead to erosion problems and more noxious weeds.</p>	

**Investigator:** Cavil  
**Location:** Merriweather Pond

**Weather:** 96 and Sunny  
**Camera:** Various



# Mountain View, BMP #11

Date: 09/15/2023

Weather: 81 and Sunny

---

## Items of Concern:

- Noxious weeds
- Blocked inlet

## Condition of Pond: Good

### Summary

The annual pond inspection for the Mountain View pond, also known as BMP #11 was conducted on September 15<sup>th</sup>, 2023. The weather during the inspection was sunny and 81 degrees Fahrenheit. Overall, the condition of the pond was determined to be good. There were four items found during the inspection that should be addressed.

The biggest issue observed was Canada thistle around the pond site. Canada thistle is a Priority 2B noxious weed in Montana, which means it is abundant and widespread in many areas. Numerous very large patches of Canada thistle were identified. The local weed department should be contacted to find out the best herbicide to apply to this weed. The weed department should be able to provide application rates as well as best time to apply herbicide. If not addressed this weed will continue to out compete more desirable vegetation.

The inlet in the southwest portion of the pond was observed being blocked with sediment, debris, and other vegetation. This needs to be cleaned out so that water can enter the pond as designed and prevent any back up issues.

### Recommendations

- Recommend applying proper herbicide to the large patches of noxious weeds at the pond to prevent them from spreading.
- Recommend cleaning the inlet structure in the southwest corner of the pond.



**Photo 1**

This photo is of an outfall pipe, as seen it is overgrown with noxious weeds and vegetation. The weeds in the picture shown is Canada thistle, which is a noxious weed in Montana.



**Photo 2**

This photo was taken on the way down to the pond. As shown there is vegetation and noxious weeds throughout pond area.



**Photo 3**

This photo is of the lower section of pond. As shown there is a lot of overgrown vegetation and could be trimmed.

**Investigator: Cavil**  
**Location: Mountain View**

**Weather: Sunny and 81**  
**Camera: Various**

## NE Regional, BMP #12

Date: 12/13/2023

Weather: 50 and Sunny

---

### Items of Concern:

- Gophers
- Holes in fence.

### Condition of Pond: Good

### Summary

The annual inspection for the NE Regional Pond, also known as BMP #12 was conducted on December 13, 2023. The weather during the inspection was sunny and 50 degrees Fahrenheit. The condition of the pond was determined to be good. During the inspection four items were observed that should be addressed.

Gopher holes were observed throughout the pond site. Gopher holes were observed under the fence, which can lead to holes under the fence allowing other critters into the pond site that should not be there. Gopher holes create areas of bare and exposed soil that are prime areas for unwanted vegetation to establish. Measures should be taken to reduce gophers at the pond.

In numerous areas around the pond site, it was observed that there are holes under the fence that show signs of critters enter and exiting the pond. These areas seemed to have bare and exposed areas of soil as where the use is. These holes in both the fence and on the ground under should be repaired so that critters are not able to get into the pond site as they don't belong in there.

### Recommendations

- Recommend blocking all holes under the pond site fence so that animals are not able to enter and exit the pond.
- Recommend contacting the weed department and find out the proper herbicides for the noxious weeds at the pond site as well as application rates and best time to apply herbicide.
- Recommend seeding in grassy areas where bare soil spots can be seen to prevent erosion.
- Recommend reducing the number of gophers at the pond site.



Photo 1

Photo shows established vegetation on West banks of pond.



Photo 2

Photo showing holes must likely caused by gophers in area along all of the pond.



Photo 3

View of pond from the Westside looking East. Can see banks of pond are in good shape and vegetation growth is appropriate.



Photo 4

This is a photo of another gopher hole on Eastside of pond.

Investigator: Broden

Weather: Sunny and 50

Location: NE Regional Pond

Camera: Various



Photo 5

Photo shows Westside of pond. Area shown has spots of bare soil and holes caused by gophers



Photo 6

Photo shows another hole going under the fence along the west side of the pond. This hole needs to be repaired.

Investigator: Broden

Weather: Sunny and 50

**Location: NE Regional Pond**

**Camera: Various**

## Sandhills, BMP #13

Date: 09/13/2023

Weather: 76 and Sunny

---

### Items of Concern:

- Gophers
- Deposited sediment
- Vegetation growth
- Noxious weeds

### Condition of Pond: Good

#### Summary

The annual pond inspection for the Sandhills pond, also known as BMP #13 was conducted on September 13<sup>th</sup>, 2023. The weather during the inspection was sunny and 76 degrees Fahrenheit. The condition of the pond at the time of inspection was good. Overall, there were 4 items identified that should be addressed.

Gophers were observed in many areas throughout the pond during the inspection. These gopher holes add to amount of bare and exposed soil. These areas are also prime areas for unwanted vegetation such as noxious weeds to establish and outcompete more desirable vegetation.

Sedimentation in the flow line was another big issue observed during the inspection. Most of the sediment that was deposited occurred in the northeast corner of the pond. In areas of the flow line the deposited sediment was large enough that vegetation has established and started to grow. This sedimentation has also caused some water to stand in the flow line and not exit the pond as designed.

Vegetation growth was observed in various areas of the pond where it should not be established. The first location that vegetation growth was observed was the flow lines in the northeast corner of the pond. The vegetation was able to establish here due to deposited sediment that has allowed water to stand and not exit the pond. This sediment should be removed so that further vegetation growth does not establish. Next vegetation growth was observed in the inlet structures in the south and west portions of the pond. This prevents water from entering the pond as designed.

Field bindweed was observed in various areas of the pond during the inspection. Field bindweed is a Priority 2B noxious weed in Montana. Priority 2B classification means that the noxious weed is abundant and widespread throughout the state. The local weed district should be contacted to find out what the best herbicide would be to apply to this noxious weed. The weed district should also be able to provide application rates as well as best times to apply herbicide to prevent any further spread of the noxious weed.

#### Recommendations

## Sandhills, BMP #13

Date: 09/13/2023

Weather: 76 and Sunny

---

- Recommend reducing the gopher population at the pond.
- Recommend cleaning all deposited sediment from all the flow lines at the pond.
- Recommend cleaning all 4 inlet/outlet structures out at pond of any vegetation growth.
- Recommend applying proper herbicide to field bindweed at the pond to prevent the noxious weed from establishing further at pond.





**Photo 1**

Photo was taken facing East. Noxious weeds have been handled better sense last year's report.



**Photo 2**

Another area in the pond. This photo shows recently dug gopher holes and evidence of noxious weeds.



**Photo 3**

Photo shows outfall coming from the northeast corner of the pond. As the photo shows there is vegetation and trash collecting in the grate.



**Photo 4**

This photo shows the junction of the two flow lines. Deposited sediment has built up in large amounts. This is preventing some water from leaving the pond as designed.

**Investigator: Cavil**  
**Location: Sandhills**

**Weather: Sunny and 76**  
**Camera: Various**



Photo 5

This photo shows trash and debris in the flow line of the pond. This needs to be removed as it is a negative look to the pond and could affect flow.



Photo 6

Another photo of deposited sediment at the outlet. Standing water was abundant in this portion of the flow line.



Photo 7

This is another photo of the flow line. As shown it is full of sediment and has vegetation growing in it.

Investigator: Cavil  
Location: Sandhills

Weather: Sunny and 76  
Camera: Various

## **Skyline Heights, BMP #14**

Date: 12/13/2023

Weather: 50 and Sunny

---

### **Items of Concern:**

- Bare and exposed soil
- Noxious weeds

### **Condition of Pond: Fair**

### **Summary**

The annual inspection for the Skyline Heights, also known as BMP #14 was conducted on December 13, 2023. The weather during the time of inspection was sunny and 50 degrees Fahrenheit. The condition of the pond was determined to be fair. There were two items identified during the inspection that should be addressed.

An issue found during the inspection were areas of bare and exposed soil. These areas are at a greater risk of erosion. Areas of bare and exposed soil are prime areas for unwanted vegetation to establish such as noxious weeds. These areas should be monitored so that no erosion takes place or that no noxious weeds establish further in these areas.

### **Recommendations**

- Recommend monitoring the areas of bare and exposed soil that no erosion takes place or more unwanted vegetation does not establish.



Photo 1

This photo is looking toward the Southwest side of the pond. A lot of bare and exposed soil was observed. This is prime habitat for unwanted vegetation and weeds.



Photo 2

This photo is looking toward the west pond bank. A lot of bare and exposed soil was observed along with some trash.



Photo 3

This photo shows the eastern pond bank at a closer look. The amount of bare and exposed soil can be seen here in this photo. Some trash can be seen.

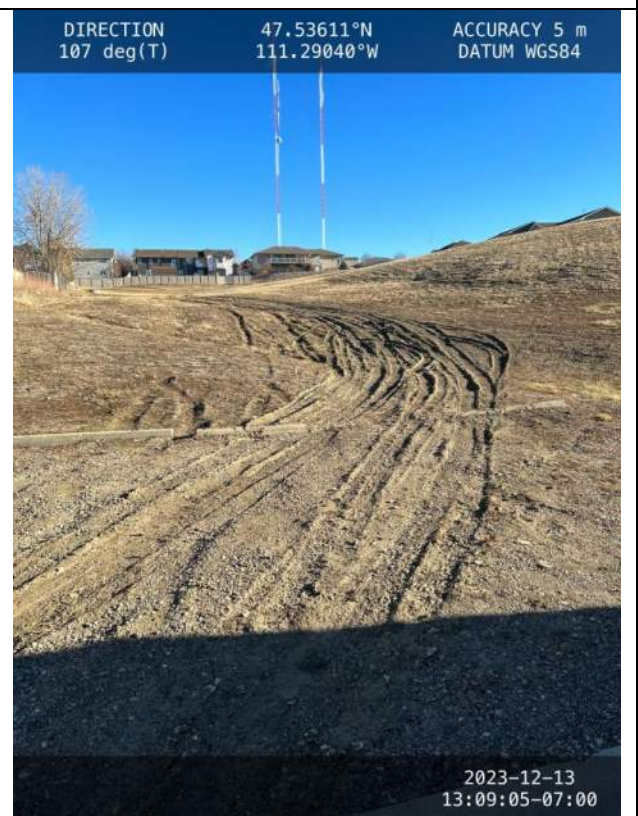


Photo 4

This photo shows tracking from resident construction above Eastside of pond.

Investigator: Broden

Weather: Sunny and 50

Location: Skyline Heights Pond

Camera: Various

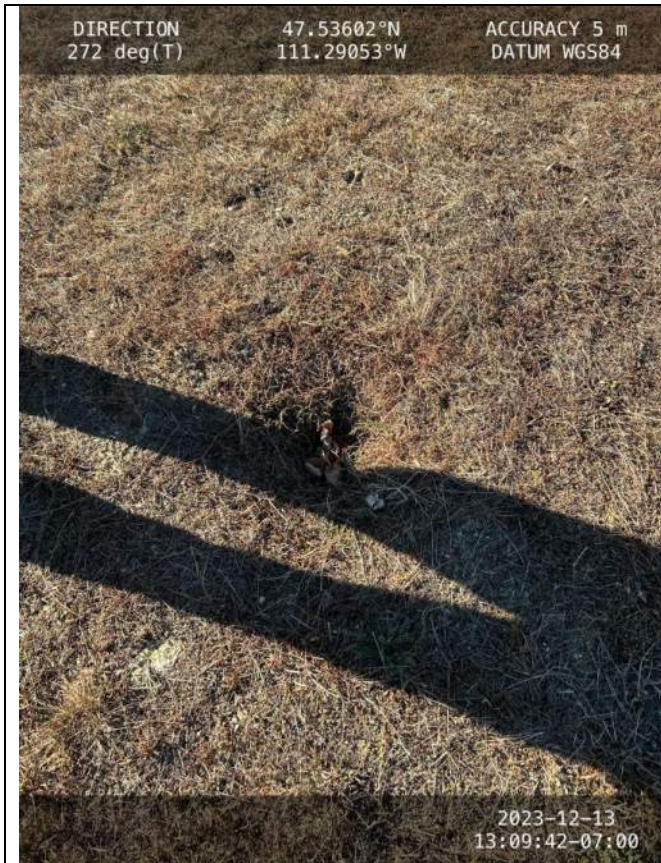


Photo 5

This photo shows bare soil and holes made from gophers.



Photo 6

This photo is of outlet structure on the Southwest corner of the pond.



**Photo 7**

This photo is the overflow outlet structure on Southwest corner of the pond.

**Investigator: Broden**

**Location: Skyline Heights Pond**

**Weather: Sunny and 50**

**Camera: Various**

# Merriweather, BMP #53

Date: 09/19/2023

Weather: 69 and Sunny

---

## Items of Concern:

- Bare soil
- Fallen trees and vegetation
- Sediment
- Erosion

## Condition of Pond: Good

### Summary

The annual pond inspection for the Merriweather Pond, also known as BMP #53 was conducted on September 19<sup>th</sup>, 2023. The weather during the inspection was sunny and 69 degrees Fahrenheit. Overall, the condition of this pond was deemed to be good. During the inspection there were four items identified that should be monitored or addressed.

During the inspection the most observed issue was bare and exposed soil. These areas of the pond are at an elevated risk of erosion and allowing unwanted vegetation to establish. These areas should be monitored so that no further degradation takes place.

In the bottom of the pond it was observed there was multiple fallen trees which have been there for some time. We also observed overgrown vegetation throughout the pond area. Both issues need to be cleaned up and maintained as it poses an eye sore for residents and may affect the flow of water into the pond.

During the inspection it was noted sediment and natural debris were observed in a culvert pipe which collected and drained into the pond. These pose a threat of flow rates into the pond and possible backup situations. These culverts and pipes need to be cleared of all sediment and debris to prevent any possible threats to the pond or system.

Along the banks of the pond, rill erosion was observed. The area where erosion is taking place also had a large area of bare and exposed soil, which may lead to the cause of the rill erosion. This area should be addressed so no further erosion occurs.

### Recommendations

- Recommend monitoring the areas of bare and exposed soil so that conditions do not become worse.
- Clean all fallen trees and maintain vegetation

## Merriweather, BMP #53

Date: 09/19/2023

Weather: 69 and Sunny

---

- Maintain inlets and pipes leading to pond to ensure they are clear of debris
- Address the rill erosion occurring on the west side of the pond. If allowed to get worse further damage could occur.





Photo 1

This photo shows erosion taking place along the downhill slope of the drainage to the pond. This needs to be address with vegetation of placing more rip rap.



Photo 2

This photo shows the amount of bare and exposed soil in the bottom of the pond. This area is at an increased risk of erosion and unwanted weeds.



Photo 3

Photo shows the amount of sediment and natural debris flowing through a culvert into the pond area.



Photo 4

This photo is showing overgrown vegetation in the flow line of water coming from the culvert pipe seen in the photo. This area should be trimmed and maintained in the future to ensure proper flow into the pond.

Investigator: Cavil  
Location: Smith Pond

Weather: 69 and Sunny  
Camera: Various



Photo 5

Photo shows dead trees and vegetation that could be cleaned up. Noxious weeds were also observed throughout pond area.

Investigator: Cavil  
Location: Smith Pond

Weather: 69 and Sunny  
Camera: Various

# Upper Belview, BMP #15

Date: 07/31/2023

Weather: 70 and Sunny

---

## Items of Concern:

- Noxious weeds
- Sediment
- Bare soil

## Condition of Pond: Fair

### Summary

The annual pond inspection for the Upper Belview pond, also known as BMP #15 was conducted on July 31, 2023. The weather during the inspection was sunny and 70 degrees Fahrenheit. The condition of the pond was determined to be fair. During the inspection there were three items identified that should be addressed.

Noxious weeds were observed during the time of inspection. Both field bindweed and leafy spurge were identified during the inspection. These two species of noxious weeds are classified as Priority 2B noxious weeds in the State of Montana. Priority 2B means that they are abundant and widespread throughout many areas. The local weed district should be contacted to find out the proper herbicide to use on each type of noxious weed. The weed district should also be able to provide proper application rates as well as the best time to apply the herbicide. If not addressed noxious weeds will overtake more desirable vegetation, making it very difficult to eradicate in the future.

Areas of bare and exposed soil were observed at the pond site. These areas are at an elevated risk of erosion and are prime areas for unwanted vegetation such as noxious weeds to establish. These areas could be addressed by possibly putting some grass seed in the areas that do have bare soils.

Sediment build up was observed in the flow line of the pond. The sediment build up should be removed from the flow line so that water is able to exit the pond in an efficient manner as designed. The sediment build up was so abundant, that some portions of the flow line could not be seen.

### Recommendations

- Recommend spraying the noxious weeds with the proper herbicide to prevent them from further establishing at the pond.
- Recommend monitoring the areas of bare and exposed soils.
- Recommend removing all sediment from the pond's flow line.



**Photo 1**

Photo shows the area in the northeast corner of the pond with field bindweed. This is a noxious weed.



**Photo 2**

This photo shows the flow line in the pond. The area in the bottom of the photo is near the outlet of the pond, but is completely full of deposited sediment. This causes issues with water flowing in the flow line.



**Photo 3**

Photo shows the outlet blocked with rocks and sediment.



**Photo 4**

This photo shows the northwest corner of the pond. This area also had a fair amount of bare and exposed soil.

**Investigator: Cavill**  
**Location: Upper Belview**

**Weather: Sunny and 70**  
**Camera: Ipad**

## Upper PW, BMP #16

Date: 07/31/2023

Weather: 70 and Sunny

---

### Items of Concern:

- Sediment build up in channel
- Noxious weeds
- Gopher

### Condition of Pond: Fair

#### Summary

The annual pond inspection for the Upper Public Works pond, also known as BMP #16 was conducted on July 31, 2023. The weather during the inspection was sunny and 70 degrees Fahrenheit. The condition of the pond at the time of inspection was determined to be fair. During the inspection three items were identified that should be addressed.

Sediment build up in front of west outlet, north inlet and channel. The sediment build up can prevent water from exiting the pond as designed and potentially having water back up.

Gopher holes were observed in both east and west cells of the Upper Public Works pond. These gopher holes lead to increased areas of bare and exposed soil, which is also great areas for unwanted vegetation such as noxious weeds to establish. The number of gopher holes observed seemed to be much less than in previous years at this site.

Field bindweed was found on the east bank of the pond. Field bindweed is classified as a Priority 2B noxious weed in the State of Montana. Priority 2B classification means the noxious weed is abundant and widespread in many areas throughout the state. The local weed district should be contacted to find out the best herbicide to apply to this weed. The weed district should also be able to provide application rates and best time to apply herbicide. If not addressed this weed will continue to establish and outcompete more desirable vegetation, which leads to difficult eradication.

#### Recommendations

- Recommend cleaning sediment out of channel and from around inlet and outlet.
- Recommend trying to reduce the gopher population at the pond site.
- Recommend applying proper herbicide to the noxious weed located in the pond site.



Photo 1

This photo shows gopher holes along the south bank of the west cell of the pond. Gopher holes add to the amount of bare and exposed soil in the area.



Photo 2

Sediment build up in front of west outlet.



Photo 3

Sediment build up needs cleaned in channel.



Photo 4

Sediment build up coming in of north inlet. Needs to be cleaned.

Investigator: Cavill  
Location: Upper PW

Weather: Sunny and 70  
Camera: Ipad

MCM-6 ATTACHMENTS




# Summary of MCM-6 SOPs update for MTR040000 Permit Year 2023

## City of Great Falls

- **Format update of all existing Stormwater SOPs for relevant City Departments/Divisions. Reconfigured to Division/Department specific trainings instead of shared SOPs for multiple Divisions/Departments**
  - Number of SOPs updated: 57
  - Current number of SOPs for all relevant facilities/departments: 58\* (CourseCo. golf management supplies their own Storm SOPs)
- **Personnel/Chain of Command update**
  - Up-to-date information of all current leadership and chain-of-command information for all divisions/departments requiring stormwater SOPs
  - All chain-of-command updates include name, title, and contact information for relevant personnel
- **Organization updates**
  - Removal of facilities no longer under City supervision:
    - Great Falls Housing Authority
  - Former City managed organizations now under third party management but still under City ownership and oversight:
    - Eagles Falls Golf Club and Anaconda Hills Golf Course (now under management of CourseCo.) – continued collaboration and adherence to City Parks and Recreation oversight
- **Required trainings**
  - The following departments/division received Stormwater SOPs training in 2023/early 2024, included here are the dates the trainings were reported to be complete.
    - *Great Falls Fire Department* – all trainings completed on 11/16/23
    - *City of Great Falls Public Works Department:*
      - Streets/Traffic Division – 12/29/23
      - Central Garage – 11/7/23
      - Sanitation – 11/28/23
      - Utilities – 12/1/23
      - Environmental – 11/8/23
      - Water Plant – 11/28/23
    - *City of Great Falls Parks & Recreation Department* – all trainings completed on 01/05/24
      - CourseCo Great Falls Golf – self training performed with own SOPs (included in the Annual Report MCM-6 attachment)



	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b></p> <p align="center"><b>Central Garage</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP# GAR-1
		Revision # 002
		Effective Date: 11/03/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Metal Recycling Procedures</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <b>#6 <u>Pollution Prevention/Good Housekeeping</u></b></p>
---	--

<p><b>Introduction:</b></p>	<p>Stockpiles of metals, waiting to be recycled, have the potential to contribute pollutants to the storm water system.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Store metal to be recycled in a closed container (i.e., 15/30 cyd bins) away from any storm water controls (i.e., storm inlets).</li> <li>2. Locate collection containers in an area protected from storm events (i.e., inside or outside under a roof).</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Schedule frequent transfers to recycler so metal stockpile is limited in size.</li> <li>2. Schedule routine for inspections of bins/containers (i.e.,leakage, structural damage).</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (steel toe boots, ear protection, safety glasses, hard hat, field gloves).</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Laborer, Foreman</p>
<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p>Total Suspended Solids (TSS)          Nutrients: Phosphorus, Nitrogen  <u><b>Metals</b></u>          Bacteria          Salinity  <u><b>Oil and Grease</b></u></p>

## SOP# GAR-1

<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>
--------------------------	---

### References:

#### Chain-of-command:

1. **Central Garage Superintendent:** Cory Gilcher
  - Office Number: (406) 455–8131
2. **Central Garage Manager:** Doug Alm
  - Office Number: (406) 455–8130

### Revision History:

Revision Number	Effective Date	Significant Changes
001 (NB)	12/2/21	Transitioned to Garage specific format & changed from SOP #19 to SOP# Garage-1
002 (JW)	09/12/23	Included Chain-of-command

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b></p> <p align="center"><b>Central Garage</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP# GAR-2
		Revision # 002
		Effective Date: 11/03/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Oil Cleanup Procedures</b></p>		

**Control Measure:**

- |  |   |
|--|---|
| #1 Public Education and Outreach                 | #2 Public Involvement and Participation                 |
| #3 IDDE  | #4 Construction Site Storm Water Management             |
| #5 Post-Construction Site Storm Water Management | <b>#6 <u>Pollution Prevention/Good Housekeeping</u></b> |

<b>Introduction:</b>	Oil, when mixed with stormwater, adds harmful pollutants to the environment.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>Determine size of spill (minor = less than 25 gallons; major = greater than 25 gallons).</li> <li><b>Minor spills</b>, which occur near a storm inlet, need inlet protection.</li> <li><b>Major spills</b> (greater than 25 gallons), call 911 and MDEQ (<u>M-F: 1-800-457-0568; After hours and holidays: 1-406-324-4777</u>)</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>Training on proper cleanup and safety procedures.</li> <li>For a minor spill (25 gallons or less), staff uses clean-up kits which include multiple clearly marked containers of floor dry located by each trash can.</li> <li>For a major spill (greater than 25 gallons), call 911 and MDEQ (<u>M-F: 1-800-457-0568; after hours and holidays: 1-406-324-4777</u>). MDEQ must be notified of releases of greater than 25 gallons of any petroleum product such as: crude oil, gasoline, diesel fuel, aviation fuel, asphalt, road oil, &amp; kerosene.</li> <li>If a major spill occurs, notify personnel following chain-of-command.</li> <li>Spill kits are in the Central Garage (shop) and on the Fuel Island.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>PPE (steel toe boots, safety glasses, hard hat, field gloves, long sleeve shirt).</li> </ol>
<b>Responsible Staff:</b>	Technician, Laborer

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p>Total Suspended Solids (TSS)                  Nutrients: Phosphorus, Nitrogen  <u><b>Metals-Waste Oil</b></u>                  Bacteria                  Salinity  <u><b>Oil and Grease</b></u></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**References:**

MDEQ must be notified of releases of **greater than 25 gallons** of any petroleum product such as: crude oil, gasoline, diesel fuel, aviation fuel, asphalt, road oil, & kerosene (800-457-0568). Petroleum product releases **less than 25 gallons** in volume must be contained and cleaned up within 24 hours. If cleanup cannot be completed within 24 hours, owners and operators must report the release to DEQ (800-457-0568). Outside normal business hours, releases must be reported to the DES 24-hour phone number at (406) 324-4777. Releases must be reported to a live person - voice mails are not adequate notification.

**Spill Report form (see attached):**

<https://deq.mt.gov/files/DEQAdmin/ENF/Documents/StandardizedCleanupReport.pdf>

**Spill Management & Reporting Policy (see attached):**

[https://deq.mt.gov/files/DEQAdmin/ENF/Documents/SpillPolicy\\_02\\_2016.pdf](https://deq.mt.gov/files/DEQAdmin/ENF/Documents/SpillPolicy_02_2016.pdf)

Chain-of-command:

1. **Central Garage Superintendent:** Cory Gilcher
  - Office Number: (406) 455–8131
2. **Central Garage Manager:** Doug Alm
  - Office Number: (406) 455–8130

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (NB)	12/2/21	Transitioned to Garage specific format & changed from SOP #20 to SOP# Garage-2
002 (JW)	09/12/23	Updated Chain of Command and spill report links

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b></p> <p align="center"><b>Central Garage</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP# GAR-3
		Revision # 002
		Effective Date: 11/03/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Oil Filter Recycling</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p> <p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <u><b>#6 Pollution Prevention/Good Housekeeping</b></u></p>
--

<p><b>Introduction:</b></p>	<p>Stockpiles of oil filters, waiting to be recycled, have the potential to contribute pollutants to the environment.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Locate collection container (i.e., 55-gallon drum) away from storm water controls (i.e., storm inlets, drainage ditches).</li> <li>2. Label oil filter collection container.</li> <li>3. Do not overfill collection container.</li> <li>4. Provide secondary containment; sized to hold 1.5 times the storage capacity of oil filter collection container.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Schedule frequent transfers to recycler so oil filter collection is limited in size.</li> <li>2. Schedule inspection routine to ensure collection container (i.e., 55-gallon drum) are structurally sound (i.e., without cracks, leaks, degradation).</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (steel toe boots, ear protection, safety glasses, hard hat, field gloves).</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Laborer, other</p>

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p>Total Suspended Solids (TSS)                  Nutrients: Phosphorus, Nitrogen  <u><b>Metals</b></u>                  Bacteria                  Salinity  <u><b>Oil and Grease</b></u></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek   <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**References:**

EPA Storm Water O&M Fact Sheet Handling and Disposal of Residuals – Available Online through EPA-portals

Chain-of-command:

1. **Central Garage Superintendent:** Cory Gilcher
  - Office Number: (406) 455–8131
2. **Central Garage Manager:** Doug Alm
  - Office Number: (406) 455–8130

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (NB)	12/2/21	Transitioned to Garage specific format & changed from SOP #21 to SOP# Garage-3
002 (JW)	09/12/23	Updated Chain of Commands



**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b></p> <p align="center"><b>Central Garage</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP# GAR-4
		Revision # 002
		Effective Date: 11/03/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Spent Fluids Storage &amp; Disposal</b></p>		

**Control Measure:**

- |  |  |
|--|--|
| #1 Public Education and Outreach                 | #2 Public Involvement and Participation          |
| #3 IDDE  | #4 Construction Site Storm Water Management      |
| #5 Post-Construction Site Storm Water Management | <b>#6 Pollution Prevention/Good Housekeeping</b> |

<b>Introduction:</b>	Spent (or waste) fluids (i.e., oil, antifreeze) if they not property managed, are pollutants and are harmful to water quality and the environment.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Excess oil will be properly disposed of in waste oil tank (set on impervious surface) and recycled through Emerald Recycling.</li> <li>2. Transferring oil shall be performed away from any storm water controls (i.e. storm inlets, drainage ditch).</li> <li>3. Antifreeze (Propylene Glycol) is disposed of in the sanitary sewer with final disposal at the Great Falls Waste Water Treatment Plant.</li> <li>4. Place a collection pan under vehicles waiting for repairs.</li> <li>5. Store excess fluids upright in original labeled containers.</li> <li>6. Store excess fluids indoors or outside under a covered structure on an impervious surface.</li> <li>7. Store excess fluids in a labeled storage area off the ground (i.e., on a spill containment pallet).</li> <li>8. Secondary containment, sized to hold 1.5 times the storage capacity of the container, is recommended.</li> <li>9. Apply absorbent material/pad liberally and immediately to spend fluid spills. Follow up with collection of material/pad and disposal in a landfill.</li> <li>10. Spill kits are in the Central Garage (shop) and on the Fuel Island.</li> </ol>

## SOP# GAR-4

<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Schedule frequent transfers of spent fluids (i.e., waste oil) to recycler.</li> <li>2. Routinely inspect collection containers (i.e., tanks and drums) to ensure they are structurally sound (i.e., check for cracks, leaks, degradation).</li> <li>3. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (boots, gloves, safety glasses, long sleeve shirt).</li> <li>2. Review SDS; route of entry will vary for each fluid and/or chemical.</li> </ol>
<b>Responsible Staff:</b>	Laborer, teamster
<b>Target pollutants this BMP helps to reduce:</b>	<p><b><u>Chemicals</u></b> Total Suspended Solids (TSS) Nutrients: Phosphorus, Nitrogen</p> <p><b><u>Metals</u></b> Bacteria Salinity</p> <p><b><u>Oil and Grease</u></b></p>
<b>Receiving Waters:</b>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

### References:

#### Chain-of-command:

1. **Central Garage Superintendent:** Cory Gilcher
  - Office Number: (406) 455–8131
2. **Central Garage Manager:** Doug Alm
  - Office Number: (406) 455–8130

### Revision History:

Revision Number	Effective Date	Significant Changes
001 (NB)	12/2/21	Transitioned to Garage specific format & changed from SOP #22 to SOP# Garage-4
002 (JW)	09/12/23	Added Chain-of-commands

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b></p> <p align="center"><b>Central Garage</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP# GAR-5
		Revision # 002
		Effective Date: 11/03/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Vehicle Washing</b></p>		

**Control Measure:**

- |  |   |
|--|---|
| #1 Public Education and Outreach                 | #2 Public Involvement and Participation                 |
| #3 IDDE  | #4 Construction Site Storm Water Management             |
| #5 Post-Construction Site Storm Water Management | <b>#6 <u>Pollution Prevention/Good Housekeeping</u></b> |

<b>Introduction:</b>	Vehicle wash water contains pollutants and if not properly managed can be harmful to water quality and the environment.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Ensure wash water does not enter storm water controls (i.e. storm inlets, drainage ditches).</li> <li>2. Wash water is disposed via the sanitary system to the Great Falls Waste Water Treatment Plant.</li> <li>3. Wash debris/sediment is collected in sumps and cleaned routinely with a jet truck with material placed in drying beds to dewater.</li> <li>4. Vehicle cleaning chemicals are stored and labeled in a separate room (away from the wash bay).</li> <li>5. Ensure no vehicles are leaking fluids prior to washing.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Visually inspect oil-water-separator and sumps routinely.</li> <li>2. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE, as necessary (suit, gloves, eye protection)</li> </ol>
<b>Responsible Staff:</b>	Laborer, Teamster

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  <b><u>Metals</u></b>          Bacteria  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

Chain-of-command:

1. **Central Garage Superintendent:** Cory Gilcher
  - Office Number: (406) 455–8131
2. **Central Garage Manager:** Doug Alm
  - Office Number: (406) 455–8130

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (NB)	12/2/21	Transitioned to Garage specific format & changed from SOP #23 to SOP# Garage-5
002 (JW)	09/12/23	Updated Chain of Command

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p><b>CITY OF GREAT FALLS</b></p> <p><b>Public Works Department</b> <b>Environmental Division</b></p> <p><b>Standard Operating Procedure</b></p>	SOP # ENV-1
		Revision # 002
		Effective Date: 11/08/23
		Authored By: PW-SWMT
		Approved By:
<b>Title: Annual Review of Existing SOPs / BMPs</b>		

<b>Control Measure:</b>	
#1 Public Education and Outreach	#2 Public Involvement and Participation
#3 IDDE	#4 Construction Site Storm Water Management
#5 Post-Construction Site Storm Water Management	<b>#6 <u>Pollution Prevention/Good Housekeeping</u></b>

<b>Introduction:</b>	The Standard Operating Procedures (SOPs) and/or Best Management Practices (BMPs) need to be reviewed on an annual basis for accuracy and relevancy.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Distribute current copies of existing SOPs/BMPs to City Supervisors.</li> <li>2. Supervisors will review SOP/BMP for accuracy and relevancy, and then revise.</li> <li>3. Revised draft copies will be returned to Public Works, Environmental Division to be finalized.</li> <li>4. Public Works, Environmental Division will distribute revised copies.</li> <li>5. Track/document: Revision Number, Effective Date, and Significant Changes in the "Revision History" section of the SOP form.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Schedule reviews to be conducted annually.</li> </ol>
<b>Safety:</b>	Not Applicable
<b>Responsible Staff:</b>	Environmental Division staff, manager



## SOP# ENV-1

Target pollutants this BMP helps to reduce:	<u>Total Suspended Solids (TSS)</u> <u>Nutrients: Phosphorus, Nitrogen</u> <u>Metals</u> <u>Bacteria</u> <u>Salinity</u> <u>Oil and Grease</u> <u>Chemicals</u>
---	---

Receiving Waters:	Missouri River, Lower Sun River, Sand Coulee Creek  <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>
-------------------	---

### References:

### Revision History:

Revision Number	Effective Date	Significant Changes
001	9/11/20	Transitioned to ENV standard format → changed from SOP #25 to SOP# ENV-1
002	11/08/23	Updated Chain-of-Command personnel

**Signatures after training:**

**Date:** \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



## SOP# ENV-2

<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>
--------------------------	---

### References:

MS4 CoGF construction and post-construction inspection frequency  
MS4 CoGF construction and post-construction inspection checklists  
Chain-of-command – Environmental Division – Current  
MS4 CoGF Enforcement Response Plan (ERP) – Current

### Revision History:

Revision Number	Effective Date	Significant Changes
001	11/13/20	Transitioned to ENV standard format → changed from SOP #26 to SOP# ENV-2 (NB)
002	06/07/23	Updated Chain-of-command to include new members of the Division and Public Works (JW)

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b> <b>Environmental Division</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP # ENV-3
		Revision # 002
		Effective Date: 06/07/23
		Authored By: PW-SWMT
		Approved By:
<b>Title: Outfall Inspections</b>		

<b>Control Measure:</b>	
#1 Public Education and Outreach	#2 Public Involvement and Participation
#3 IDDE	#4 Construction Site Storm Water Management
#5 Post-Construction Site Storm Water Management	<b>#6 <u>Pollution Prevention/Good Housekeeping</u></b>

<b>Introduction:</b>	Outfalls to the municipal storm water system need to be inspected during dry weather conditions to ensure illicit discharges are not evident/present.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Use inspection form on mobile Cartegraph and document with photographs.</li> <li>2. If flow is present use inspection form to document details; collect lab sample as appropriate.</li> <li>3. Determine enforcement response if an illicit source is present.</li> <li>4. Create Cartegraph task and complete as applicable.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Schedule inspection during dry-weather conditions.</li> <li>2. Establish notification chain-of-command (emergency vs. non-emergency) if illicit discharge is present.</li> <li>3. Coordinate enforcement efforts with involved agencies/jurisdictions (as necessary) and in accordance with the Enforcement Response Plan (ERP).</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (steel toe boots, ear protection, safety glasses, hardhat, field gloves, high visibility clothing, etc.).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. Hepatitis B shot.</li> <li>4. Surface water safety/awareness.</li> <li>5. Environmental hazard awareness.</li> </ol>
<b>Responsible Staff:</b>	Environmental Division Staff, Manager

## SOP# ENV-3

<b>Target pollutants this BMP helps to reduce:</b>	<u>Total Suspended Solids (TSS)</u> <u>Nutrients: Phosphorus, Nitrogen</u> <u>Metals</u> <u>Bacteria</u> <u>Salinity</u> <u>Oil and Grease</u>
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>

### References:

- Mobile Cartograph Inspection Form
- Enforcement Response Plan (ERP)
- Chain-of-command (attached) – Current

### Revision History:

Revision Number	Effective Date	Significant Changes
001	11/13/20	Transitioned to ENV standard format → changed from SOP# 27 to SOP# ENV-3 (NB)
002	06/07/23	Updated chain-of-command to include new members of the Division and Public Works (JW)

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



	<p><b>CITY OF GREAT FALLS</b></p> <p><b>Public Works Department</b> <b>Environmental Division</b></p> <p><b>Standard Operating Procedure</b></p>	SOP # ENV-4
		Revision # 002
		Effective Date: 11/08/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Sampling (Outfall, Post-Construction Controls, MS4 Permit Part IV Monitoring, Dry Weather Screening, TMDL, Etc.)</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach  <b>#3 IDDE</b>  <b>#5 Post-Construction Site Storm Water Management</b></p>	<p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <b>#6 Pollution Prevention/Good Housekeeping</b></p>
---	---

<b>Introduction:</b>	Chosen locations to the municipal storm water system need to be sampled during a storm water event twice yearly. Post-Construction storm water and / or dry weather sampling may be necessary if compliance issues occur.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Use equipment checklist and current Sampling Location Map.</li> <li>2. Follow MS4 Permit Part IV Monitoring, Recording, and Reporting Requirements (pages 42-49 of 63), Sampling Analysis Plan (SAP).</li> <li>3. Package and ship samples utilizing appropriate preservation techniques.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Training on proper sampling techniques.</li> <li>2. Implement proper sample storage and/or preservation techniques.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (steel toe boots, ear protection, safety glasses, hardhat, field gloves, respirator may be needed for dust).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. Surface water safety/awareness.</li> <li>4. Environmental hazard awareness.</li> </ol>
<b>Responsible Staff:</b>	Environmental Division Staff, Manager

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><u>Total Suspended Solids (TSS)</u>  <u>Nutrients: Phosphorus, Nitrogen</u>  <u>Metals</u>  <u>Bacteria</u>  <u>Salinity</u>  <u>Oil and Grease</u></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

Spreadsheet – Combined Stormwater Sampling Data (current)

Sampling Location Map (current)

General Permit('22-'27) for Storm Water Discharges Associated with Small Municipal Separate Storm Sewer Systems, Part IV Monitoring, Recording, and Reporting Requirements, pages 25-30 of 41.

[https://deq.mt.gov/files/Water/WQInfo/Documents/2021%20Public%20Notices/PN-MT-21-25/2022\\_FPER\\_MTR040000\\_S%20Sign.pdf](https://deq.mt.gov/files/Water/WQInfo/Documents/2021%20Public%20Notices/PN-MT-21-25/2022_FPER_MTR040000_S%20Sign.pdf)

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	11/13/20	Transitioned to ENV standard format → changed from SOP# 28 to SOP# ENV-4; No longer utilize checklist, instead use log book along with probe software and Cartegraph
002	11/8/23	Updated Chain-of-Command personnel and new MS4 general permit

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b>  <b>Public Works Department</b>  <b>Environmental Division</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP # ENV-5
		Revision # 002
		Effective Date: 06/07/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Illicit Discharge Detection &amp; Elimination</b></p>		

**Control Measure:**

- |  |   |
|--|---|
| #1 Public Education and Outreach                 | #2 Public Involvement and Participation     |
| #3 IDDE  | #4 Construction Site Storm Water Management |
| #5 Post-Construction Site Storm Water Management | #6 Pollution Prevention/Good Housekeeping   |

<p><b>Introduction:</b></p>	<p>Illicit discharges to the municipal storm water system (i.e., storm inlets, drainage ditches) and/or area surface waters are harmful to water quality and the environment.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Illicit discharge investigations include tools/methods (i.e., IDDE inspection plan, IDDE inspection form, Cartegraph asset management, live inspection, DVDs, photographs, dye-testing, Closed-Circuit Television-CCTV).</li> <li>2. Cartegraph 'Request' entry procedures: <ol style="list-style-type: none"> <li>a. Click on request tab</li> <li>b. Click create request button</li> <li>c. If new contact, fill in appropriate information fields</li> <li>d. If existing contact, select requester from menu</li> <li>e. If contact would like to remain anonymous, click anonymous check box</li> <li>f. Select next</li> <li>g. Select issue type (illicit discharge)</li> <li>h. Place pin on map where location of incident was reported</li> <li>i. Provide brief description of reported incident</li> <li>j. Select 'Environmental' from department menu</li> <li>k. Enter appropriate employee number in owner field (whoever received the report of incident)</li> <li>l. Click finish and save</li> <li>m. In Request, click 'Edit' to modify 'Request ID' from auto-generated ID to ENV standard naming convention <ol style="list-style-type: none"> <li>i. XX (year) XX (sequential incident number) IDDE</li> </ol> </li> </ol> </li> <li>3. Cartegraph 'Task' creation procedures: <ol style="list-style-type: none"> <li>a. Click create task button</li> <li>b. Initially select 'non-asset' as asset type</li> <li>c. Select 'Initial Response' as 'Activity type'</li> </ol> </li> </ol>

<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ul style="list-style-type: none"> <li>d. Select 'Environmental' from department menu</li> <li>e. Assign task to staff members conducting 'Initial Response'</li> <li>f. Click 'Next' and then 'Finish'</li> </ul> <ol style="list-style-type: none"> <li>4. Conduct further investigation as necessary. Create new task utilizing 'Investigate' activity task under the initial 'Request'. <ul style="list-style-type: none"> <li>a. If a specific asset type can be associated to the incident, it should be associated to all tasks from this point onward.</li> </ul> </li> <li>5. Determine enforcement response if an illicit source is present. Utilize current ERP to determine applicable enforcement response.</li> <li>6. Provide enforcement action.</li> <li>7. Monitor corrective action, as applicable.</li> <li>8. Upon completion of all applicable tasks associated with 'Request' and resolution of the IDDE, enter summary of IDDE into 'Notes' section of request &amp; upload representative photo &amp; final IDDE report (includes field notes and photo logs) in 'Attached Files' section. <ul style="list-style-type: none"> <li>a. IDDE summary should include how IDDE was resolved and date of resolution.</li> </ul> </li> <li>9. An emergency incident, as protection of life priority duties allow, includes protection storm inlets, drainage ditches from spilled material.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Training on safety procedures associated with illicit discharges.</li> <li>2. The chain-of-command includes: First Responders, Dispatch, and Incident Control (IC) personnel if illicit discharge is present.</li> <li>3. Coordinate an enforcement response plan (ERP) with involved agencies/jurisdictions.</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (boots, high-visibility clothing, gloves)</li> <li>2. Hepatitis B awareness training</li> <li>3. Traffic awareness</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Environmental Division Staff, Manager</p>
<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Chemicals</u></b>  <b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  <b><u>Metals</u></b>  <b><u>Bacteria</u></b>  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><b><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></b></p>

**References:**

IDDE Photo-log & Cartegraph IDDE report  
Enforcement Response Plan (ERP) – current  
Chain-of-command (current)

**Revision History:**

<b>Revision Number</b>	<b>Effective Date</b>	<b>Significant Changes</b>
<b>001</b>	<b>7/17/20</b>	<b>Transitioned to ENV standard format &amp; modified to reflex only ENV division SOP components → changed from SOP #24 to SOP # ENV-5 (NB)</b>
<b>002</b>	<b>06/07/23</b>	<b>Updated chain-of-command to include new members of the Division and Public Works (JW)</b>

**Signatures after training:**

**Date:** \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

	<b>CITY OF GREAT FALLS</b> <b>Public Works Department</b> <b>Environmental Division</b>  <b>Standard Operating</b> <b>Procedure</b>	SOP # ENV-6
		Revision # 002
		Effective Date: 11/08/23
		Authored By: PW-SWMT
		Approved By:
<b>Title: Materials Management / Chemical Storage</b>		

<b>Control Measure:</b>  #1 Public Education and Outreach #3 IDDE #5 Post-Construction Site Storm Water Management #2 Public Involvement and Participation #4 Construction Site Storm Water Management <b>#6 Pollution Prevention/Good Housekeeping</b>
--

<b>Introduction:</b>	Materials and chemicals have the potential to add pollutants to the environment. It is critical to properly store and manage all chemicals to ensure no materials enter the storm water system.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Store materials/chemicals away from storm water controls (i.e., drain inlets).</li> <li>2. Store chemicals indoors or outside under a covered structure.</li> <li>3. Store upright in original labeled containers.</li> <li>4. Hazardous materials - store in original containers, provide secondary containment, &amp; store off the ground (i.e., on a spill containment pallet).</li> <li>5. Liquid materials &amp; petroleum products - store in original covered containers and provide secondary containment (sized to hold 1.5 times the storage capacity of the container).</li> <li>6. Lists of materials and chemicals used are attached.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Training on proper materials/chemical handling and safety procedures.</li> <li>2. Personnel are directed to call 911 in case of an emergency.</li> <li>3. If an emergency occurs, notify personnel following the chain-of-command.</li> <li>4. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<b>Safety:</b>	PPE (nitrile gloves, safety glasses, hard hat).
<b>Responsible Staff:</b>	Environmental Division staff, manager



<p>Target pollutants this BMP helps to reduce:</p>	<p><b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  <b><u>Metals</u></b>  <b><u>Bacteria</u></b>  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b>  <b><u>Chemicals</u></b></p>
<p>Receiving Waters:</p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

PW Environmental

A small amount of chemicals associated with Water Quality and Sample Preparation Lab are stored on-site and include:

- pH Buffer solutions 4, 7 and 10,
- Sample preservation hydrochloric (HCl) and sulfuric (H<sub>2</sub>SO<sub>4</sub>) acids,
- Decontamination soap.

SDS sheets are attached.

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	7/17/20	Transitioned to ENV standard format & modified to reflex only ENV division SOP components → changed from SOP #6 to SOP# ENV-6
002	11/8/23	Updated Chain-of-command personnel and minor changes to language on responsible staff

**Signatures after training:**

**Date:** \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---


---

---

---

---

---

	<p><b>CITY OF GREAT FALLS</b></p> <p><b>Public Works Department</b> <b>Environmental Division</b></p> <p><b>Standard Operating Procedure</b></p>	SOP # ENV-7
		Revision # 002
		Effective Date: 11/08/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Annual Review of Storm Water Management Plan/Erosion Control Permit</b></p>		

<p><b>Control Measure:</b></p>	
<p>#1 Public Education and Outreach</p> <p>#3 IDDE</p> <p><u>#5 Post-Construction Site Storm Water Management</u></p>	<p>#2 Public Involvement and Participation</p> <p><u>#4 Construction Site Storm Water Management</u></p> <p><u>#6 Pollution Prevention/Good Housekeeping</u></p>

<p><b>Introduction:</b></p>	<p>The Storm Water Management Plan (SWMP) and Erosion Control Permit form need to be reviewed on an annual basis for accuracy and relevancy.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Review SWMP/Erosion Control Permit and revise, if needed.</li> <li>2. Distribute updated copies.</li> <li>3. Track/document: Revision Number, Effective Date, and Significant Changes in the "Revision History" section of the SOP form.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Schedule reviews to be conducted annually.</li> </ol>
<p><b>Safety:</b></p>	<p>Not Applicable</p>
<p><b>Responsible Staff:</b></p>	<p>Environmental Compliance Staff, Manager</p>

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><u>Total Suspended Solids (TSS)</u>  <u>Nutrients: Phosphorus, Nitrogen</u>  <u>Metals</u>  <u>Bacteria</u>  <u>Salinity</u>  <u>Oil and Grease</u></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

City of Great Falls Environmental SWMP (current)  
 Erosion Control Permit (current)

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	11/13/20	Transitioned to ENV standard format → changed from SOP# 28 to SOP# ENV-7
002	11/08/23	Updated Chain-of-command personnel

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Great Falls Fire Rescue

To: All Personnel

From: Captain Zaremski

Date: 6/1/2019

Re: Hydrant Program procedures

### **PLEASE READ BEFORE INSPECTING HYDRANTS**

Hydrant areas will be the same as the response areas for the most part. Every hydrant in your assigned station's area will be flowed once every three years at a minimum. We will no longer do "drive by" Hydrant inspections. However, areas that are known to have vegetation problems should be checked during the summer growing season and maintained accordingly so that they can be easily identified if needed. As always, when flowing hydrants assure that weeds are trimmed and shrubs cut back to allow for operation of the hydrant.

There will be a separate map book that can be used to help locate hydrants. When the hydrants have been flowed please circle them with a pen or pencil and log that it was flowed in your book. If there is a hydrant that's not on the map, write it in with **RED** ink. Any changes need to be noted in the map books. If your area is next to a new subdivision, draw in the new hydrants. This will help to update our hydrant data base. If the hydrant is on the map, but not in your book, please write it in also. The numbers that were stamped on each hydrant will no longer be used. The number in the map book is the number assigned to that hydrant and should be used to reference a hydrant.

We will **NOT FLOW** hydrants on Fridays, Saturdays, or Sunday. You will need to **FLOW**  $\frac{1}{3}$  (one third) of your assigned hydrants each year. We should start with dead end hydrants first.

BEFORE flowing hydrants, contact Paula Baroch at Water Distribution at 727-8045 first thing in the morning (8:00am) to let them know what area you would like to flow in. If they tell you not to flow hydrants, note this on the bottom of your Fire Hydrant Inspection Record with the date. (DO NOT call the Water Plant). Use caution when opening and closing hydrants. **TURN VALVES VERY SLOWLY AND DO NOT OVER-TIGHTEN WHEN CLOSING. Any hydrants that are found to be inoperative or become inoperative need to be reported to Water Distribution immediately. If after hours call the water plant at 727-1325.**

In the new hydrant map books, **city owned hydrants are RED**, **private hydrants are GREEN**, and **BLUE hydrants are other municipalities**. You will need to have a release form signed prior to flowing blue or green hydrants. We will not flow hydrants in Great Falls Housing Authority, but we will flow hydrants on Great Falls Public School property. Please turn hydrant report forms with problems in on a daily basis so maintenance can be scheduled. If there are any questions, please contact me.

# Hazard Communications 2023

For Your Training Pleasure

# Hazard Communications: What is it, Why do we have it?

- 1. 29 CFR (Code of Federal Regulations) 1910.1200 specifies that any place of employment must maintain a program educating employees on chemical hazards present in the workplace and on ways to limit or prevent exposures.
- 2. OSHA's HCS (Hazard Communications Standard) specifies basic requirements for labeling chemicals and for informing/educating workers regarding those hazards.
- 3. GFFR's Hazard Communication Program is in place in order to meet these requirements and keep all employees safe (see GFFR SOG HM-007, which will be reviewed later as a part of this training.)



# How Does GFFR Achieve These Requirements?

- 1. New Employee Training: SOG HM 007 specifies that all new employees must receive Hazard Communications training as part of their initial training.
- 2. Yearly Employee Training: 29 CFR 1910.1200 and SOG HM 007 specify that all GFFR employees receive yearly Hazard Communications training.
- 3. SDS Binders: SOG HM 007 specifies that a binder containing SDS (Safety Data Sheets) for all on-site chemicals must be kept at GFFR facilities. A binder is to be located in each station watchroom and in the office of the A.C. of Operations.
- 4. Labeling: All manufacturers and distributors are required to place labeling on their packaging. Since 2012 OSHA has specified that these labels must meet the requirements of the Global Harmonized Standard (GHS).
- Once the product is opened and placed in other containers (e.g. spray bottles) employers and employees must ensure the containers are marked and labeled. These labels are allowed to follow the OSHA 1994 requirements, including NFPA and HMIS labels that include the product name and associated hazards.

# HCS Alphabet Soup:

- 1. HCS: OSHA's term for Hazard Communication Standard
- 2. GHS: Global Harmonized Standard (More on this later)
- 3. NFPA 704: Diamond-shaped labeling or placarding used primarily on fixed tanks or facilities to alert First Responders to hazards of substances stored in large quantities on the premises.
- HMIS: Hazard Management Information System: A labeling system established under OSHA's 1994 standard that uses the same numbering and colored warning system as NFPA 704 but uses bars and a written label rather than diamonds. **GFFR uses this system for any spray bottles or other containers into which we have transferred or mixed chemicals such as cleaning or disinfecting agents. It is required only for agents that will be kept and used beyond the current work period (e.g. not mop water).**

# Global Harmonized System

- International Labeling system adopted by OSHA in 2012 and required on all packaged products coming in from manufacturers, distributors or suppliers.
- This system requires six (6) elements on each label:
  - 1. Name, address and phone number of the manufacturer, importer or other responsible party
  - 2. Product Identifier: this can be the chemical name, code number or batch number
  - 3. Signal Word: Either “Danger” or “Warning” to indicate the relative severity of the hazard
  - 4. Hazard Statement: Describes the nature of the hazard e.g. “Causes Damage to Kidneys with prolonged exposure.”
  - 5. Precautionary Statement: Brief Guidelines for either Prevention, Response (to release or spill), Storage or Disposal e.g. “Do Not Breathe Dust/Fumes/Vapors etc.”, “Seek Medical Attention/Advice if you begin to feel Dizzy” or “Dispose in Accordance with Local/National Regulations.”
  - 6. Pictograms: A Red Diamond-Shaped frame around a black hazard symbol on a white background
- Uses a system of 9 pictograms to represent various hazards (similar to, but not identical to, DOT’s nine hazard classes).
- Each pictogram is surrounded by a red diamond. **NOTE: If used, the GHS numerical hazard rating system is exactly opposite of the HMIS/NFPA 704 system. GHS’s highest danger rating is 0 and its lowest is 4. This number rating system rarely seems to appear on labels.**
- The following slide shows a sample label containing the six elements noted above:

# The following label shows an example with all six elements required for GHS labeling.

**1** **Chemical Name**

UN No. 1234  
CAS No. 43-21-0

**2** **DANGER**


**3** **Highly flammable liquid and vapor. May cause liver and kidney damage.**

**4** Keep container tightly closed. Store in a cool, well-ventilated place that is locked. Keep away from heat/sparks/open flame. No smoking. Only use non-sparking tools. Use explosion-proof electrical equipment. Take precautionary measures against static discharge. Ground and bond container and receiving equipment. Do not breathe vapors. Wear protective gloves. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Dispose of in accordance with local, regional, national, international regulations as specified.

Fill Weight: 22.45 lbs.      Lot Number: F455644      Directions for Use:  
Gross Weight: 25 lbs.      Fill Date: 8/31/2017      \_\_\_\_\_  
Expiration Date: 8/31/2022      \_\_\_\_\_

**5** Example Company • 123 Main Street • Somewhere, NY 12345 • www.example.com • (123) 456-7890

**6**



# What is GFFR's role in GHS labelling?

- 1. GFFR personnel must be aware of GHS labeling elements and must be able to recognize pertinent information on packaging coming in from manufacturers, distributors and suppliers.
- 2. For a quick reference to GHS labeling, consult pages 14 and 15 of the 2016 Emergency Response Guide.
- 3. Page 15 gives a quick reference for recognizing hazard symbols in GHS pictograms.

# HMIS: Hazard Management Information System

- This is the system used by GFFR for labeling containers into which we transfer or mix chemicals for use during and beyond the current work period.
- Colored bars:
  - Red - Flammability
  - Blue - Health Hazards
  - Yellow - Reactivity or Special Hazards such as radioactivity
- Number Ratings for Hazards: 0 - 4, with 4 being the highest hazard level
  - These labels are available in the Hazard Communication binder found in each station watchroom, along with SDS for each chemical/product
  - These labels must be filled out and affixed to any unlabeled container into which we are transferring or mixing chemical solutions

# Exposure Concerns: Why Should We Be Concerned About Workplace Exposures?

- Four Potential Routes of Exposure:
  - Inhalation
  - Absorption
  - Ingestion
  - Injection
- Any chemical or substance foreign to the human body may constitute an exposure hazard
  - Exposure may be acute, or it may be chronic over time (i.e. a career)
- Target Organs:
  - Some chemicals may target or affect specific organs in specific ways
  - NIOSH specifies organs targeted by listed chemicals, but not all compounds in our stations are listed in NIOSH
  - Target Organs may be specified in SDS also

# More ACRONYMS, Abbreviations and Terminology: Hazmat Awareness Review

- PEL/REL: Permissible Exposure Limit (OSHA) or Recommended Exposure Limit (NIOSH)
  - Basically the same as a Time-Weighted Average (TWA)
- TWA: Time-Weighted Average
  - An average exposure concentration of a given chemical over a 10-hour workday that should not be exceeded during a 40-hour work week
- STEL: Short-term Exposure Limit
  - A 15-minute exposure limit that should not be exceeded at any time during a workday
- Ca: A chemical known or suspected to cause cancer in those exposed
- Teratogen:
  - A substance that can cause malformations in a developing embryo or fetus.
  - This can affect more than just ourselves and co-workers; it can affect families.



# SDS: Safety Data Sheets

- Formerly known as MSDS, or Material Safety Data Sheets
- Must be readily accessible to employees
- Found in a binder in each station's watchroom
- For those handy with a computer, smart phone, etc., these are usually easy to find via internet as well.
- Each station's Hazard Communications binder should contain SDS for each chemical product we use and store in that station
- The more standardized we keep our cleaning supplies, etc. throughout the department, the easier it is to keep SDS up-to-date and complete.
- Each new product brought in requires a new SDS in the binder.

# SDS: What Information Do They Contain?

- OSHA requires 16 standard sections:
  - **1. Identification:** includes product identifier; manufacturer or producer name, address and phone number; emergency phone number; recommended use; usage restrictions
  - **2. Hazard(s) Identification:** includes all hazards regarding the chemical and also includes required label elements
  - **3. Composition/Information:** Ingredients: includes information on chemical ingredients and any trade secret claims
  - **4. First-aid Measures:** includes important symptoms/effects, acute or delayed; includes required treatment for any exposures

# SDS Contents, Continued

- 16 Standard Sections required by OSHA, Continued:
  - 5. **Fire-fighting Measures:** Lists suitable extinguishing techniques and equipment; chemical hazards resulting from fire involving the product
  - 6. **Accidental Release Measures:** appropriate emergency procedures, protective equipment, and proper methods of containment/cleanup specific to the chemical listed.
  - 7. **Handling and storage:** precautions for safe handling and storage, including incompatibilities.
  - 8. **Exposure Controls/Personal Protection:** Lists OSHA's PELs; TLVs; and any other exposure limit used or recommended by the chemical manufacturer, importer or employer preparing the SDS; also covers appropriate PPE

# SDS Contents, Continued:

- 16 Standard Sections required by OSHA, Continued:
  - 9. **Physical and Chemical Properties**: Lists the chemical's characteristics
  - 10. **Stability and Reactivity**: Lists chemical stability and possibility of hazardous reactions
  - 11. **Toxicological Information**: Includes Routes of Exposure; related symptoms; acute and chronic effects; numerical measures of Toxicity

# SDS Contents, Continued

- 16 Standard Sections required by OSHA, Continued:
  - 12. Ecological Information\*
  - 13. Disposal Considerations\*
  - 14. Transport Information\*
  - 15. Regulatory Information\*
- \*Note: As other Agencies regulate these categories, OSHA does not enforce Sections 12 -15. However, these may still be pertinent to GFFR in relation to how we use, store and dispose of on-site chemicals.
- 16. Other Information: Includes the date of SDS preparation or last revision

# Now, Choose an SDS from a binder or off the Internet and Review It.

- Members Mark Lemon Fresh Disinfectant is widely used in our stations. It makes a good example, but any SDS will work fine.
- 1. Familiarize with the 16 sections.
- 2. Where would you look to find First Aid measures?
- 3. Where would you look to find disposal considerations?
- 4. Where would you look to find labeling/hazard-rating guidelines for NFPA and HMIS labeling for the product
  - a. as it is sold (as a concentrate)?
  - b. when mixed according to manufacturer instructions (diluted in dispensers and used in spray bottles)?

# GFFR SOG HM-007: Hazard Communication Program

- Now Review our department's Hazard Communication SOG. Please review the entire SOG thoroughly. The following questions hit a few high points:
  1. Section 1) B): What issues or health effects might result from exposures to or improper use/storage of workplace chemicals?
  2. Section 2) B) iii: Incoming chemicals will already have GHS-compliant labels provided by the manufacturer or distributor. When must GFFR personnel label containers?
  3. Section 2) C) iii and iv: Where will each station's SDS be stored, and who is responsible for making sure each station's binder is kept current?

# GFFR SOG HM-007, Continued

4. Section 3) in its entirety: When must employee training be conducted, and by whom?

(This course is designed to accomplish both new-employee training and OSHA's required annual employee training. Please make sure it is properly logged in our First-Due program, which will serve as the roster of employees who have received the required training.)

5. Section 6) A) ii: Who shares the responsibility for ensuring that all containers are marked according to HMIS per GFFR SOG HM-007?

6. Section 6) A) iv: What simple purpose does the HMIS serve within the GFFR Hazard Communication Program, and why should we all comply?

-



# General Precautions to Limit/Prevent Exposures:

- 1. Use common safety items already provided by GFFR, including eye protection, gloves and splash protection when using, transferring or mixing chemicals.
- 2. Read and follow manufacturer guidelines when mixing solutions from concentrates.
- 3. Use measuring cups and dispensers provided in the stations for mixing solutions rather than “eyeballing” or “ballparking” mixtures or solutions in spray bottles.
- 4. Mix, store and use chemicals with the long-term health and safety of yourself and all co-workers **and their families** in mind.

# Summary:

- Please briefly review the multiple-choice quiz written into SOG HM-007 by former Assistant Chief Hester (our original Hazard Communications officer).
- And Finally, once again, please log your crew's training into our First Due training log using the template. Again, this will serve as our training roster for verifying our department's yearly Hazard Communications training for all personnel.

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b></p> <p align="center"><b>Fire Department</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP# Fire-3
		Revision # 001
		Effective Date: 11/8/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Vehicle Washing</b></p>		

**Control Measure:**

- |  |   |
|--|---|
| #1 Public Education and Outreach                 | #2 Public Involvement and Participation                 |
| #3 IDDE  | #4 Construction Site Storm Water Management             |
| #5 Post-Construction Site Storm Water Management | <b>#6 <u>Pollution Prevention/Good Housekeeping</u></b> |

<b>Introduction:</b>	Vehicle wash water contains pollutants and if not properly managed can be harmful to water quality and the environment.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Ensure wash water does not enter storm water controls (i.e. storm inlets, drainage ditches).</li> <li>2. Wash water is disposed via the sanitary system to the Great Falls Waste Water Treatment Plant.</li> <li>3. Wash debris/sediment is collected in sumps and cleaned routinely with a jet truck with material placed in drying beds to dewater.</li> <li>4. Vehicle cleaning chemicals are stored and labeled in a separate room (away from the wash bay).</li> <li>5. Ensure no vehicles are leaking fluids prior to washing.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Visually inspect oil-water-separator and sumps routinely.</li> <li>2. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE, as necessary (suit, gloves, eye protection)</li> </ol>
<b>Responsible Staff:</b>	Fire Department staff

**SOP# Fire-3**

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  <b><u>Metals</u></b>          Bacteria  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

Chain-of-command:

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (JW)	11/8/23	Transitioned to Fire specific format & changed from SOP #23 to SOP# Fire-3

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

**Date:** \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



# GREAT FALLS FIRE RESCUE

## Standard Operating Guide

<b>SECTION: Operations</b>	<b>GUIDE NUMBER: OPS-002</b>
<b>SUBJECT: Standing Orders for Incidents</b>	<b>EFFECTIVE DATE: 3/1/2023</b>

### SCOPE

Standing Orders is intended provide minimum guide lines for Company officers to identify acceptable practice for incidents.

Great Falls Fire Department Risk Management Policy:

***Risk a Lot to Save a Lot,  
Risk a Little to Save a Little, and  
Risk Nothing for What Is Already Lost.***

### PROCEDURE

- 1) Company Officers will ensure:
  - A) Actions are consistent with department risk management policy
  - B) Incident priorities: life safety, incident stabilization and property conservation.  
Understanding that when we put the fire out all things improve.
  - C) Personal safety gear provided will be worn to standard practice.
    - (1) Eye protection and gloves are the minimum for EMS calls.
    - (2) All provided structure gear will be worn on all structure calls.
  - D) Compliance with mandatory respiration protection.
    - (1) Any time there exists a possibility of breathing in hazardous air quality to include dust and particulates, members will wear SCBA during overhaul unless air monitoring and ventilation has ruled out an IDLH environment and the IC feels it reasonable to doff.
- 2) Crews will operate within a Command system with clear lines of accountability. Supervisors should always be able to identify who they are responsible to, and for, within the system.  
***\*The Great Falls Fire Department will not tolerate free lancing\****

- 3) Crew integrity will be a priority for all members on all fires. As a minimum, Company Officers will maintain line of sight with assigned members.
  - A) Within IDLH and/or reduced visibility, physical contact should be maintained. This is by definition Personnel Accountability and should be a priority for all supervisors.
- 4) Shift integrity is a priority. At all times the Incident Commander should be able to identify task, location and objective of all resources.
- 5) Apparatus will be positioned with first priority to protect the members from traffic, then protect apparatus from the incident hazard and last to protect threatened property.
- 6) After the incident, Company officers will make apparatus ready and where deficiencies are identified will communicate to his relief the requirement to bring the unit back to full service.
- 7) Post Incident Analysis (PIA)
  - A) The Battalion Chief will conduct and document a PIA of all working structure fires and other significant incidents where the BC responds.
  - B) PIS's should focus on evaluating the effectiveness of current training and department SOG's at the incident providing feedback to Admin staff for possible changes needed.
  - C) At a minimum, written documentation of PIA's will be provided to the Deputy Chief of training and Assistant Chief. (a folder on fireshare will be maintained to save these to.)

*NOTE:*

This Guide as with all guides may be changed or edited by the Administrative Staff at any time and for any or all of the following reasons;

- Improve the quality of the guide
- Policy or procedural changes
- Improve customer service delivery
- Safety issues



# GREAT FALLS FIRE RESCUE

## Standard Operating Guide

<b>SECTION: Operations</b>	<b>GUIDE NUMBER: OPS-022</b>
<b>SUBJECT: Motor Vehicle Incidents</b>	<b>EFFECTIVE DATE: 3/9/2023</b>

### SCOPE

The following guide gives members and dispatchers information for the dispatch, response, and handling of motor vehicle emergencies.

### PROCEDURE

#### 1) Dispatch Procedure

A) The dispatch center will attempt to obtain the following information:

- i) Location of incident
- ii) Nature of incident
- iii) Number of vehicles involved
- iv) Number of patients involved
- v) Number of patients trapped (requiring extrication)

B) It is imperative that this information is relayed to Great Falls Fire Rescue to assist in pre-arrival size-up.

C) Per standard practice any updates shall be transmitted to the commander responding to the incident.

#### 2) Response requirements; the following provides the situation and required apparatus dispatch configurations.

A) 3 Engine Companies and the Battalion Chief will be sent to the following vehicle incidents.

- i) Any entrapped patient requiring extrication



B) Two (2) Engine Companies and the Battalion Chief will be sent to the following vehicle incidents;

- i) Unknown number of patients or vehicles
- ii) 2 vehicles or more or with injured victims
- iii) Single vehicle with multiple victims

C) One (1) Engine Company will be sent to the following vehicle incidents;

- i) Vehicle leaking fluid
- ii) Infant or child locked in vehicle
- iii) Single vehicle with one injured patient but not requiring extrication
- iv) The incident commander can request assistance as needed.

3) On-Scene Size-up

A) After first arriving apparatus signs on-scene and positions the apparatus to provide a safety zone between the crew and traffic, the Incident Commander (IC) will name the incident provide a brief description of the incident and determine what resources are needed.

B) Dispatch shall retransmit pertinent information to responding EMS ambulance(s). Examples are as follows:

- i) Number of injured
- ii) Request for additional ambulances
- iii) Stage location
- iv) Safety precautions

4) Command functions:

A) Create no further harm, safety, accountability, traffic hazards

B) Control response personnel and equipment

C) Resource management

D) Incident action plan

D)E) When the incident nature warrants a need for a forward deployed company officer who is in the position to best manage and assign resources for specific tasks the IC may designate that officer as Ops and the IC will assign resources to Ops upon his/her request.

5) Incident Stabilization & patient stabilization

A) Ensure vehicles are stabilized and other precautions are taken to ensure EMS staff can safely approach wreckage.

B) EMS staff will stage until command allows them to approach the wreckage.

C) Patient care shall not be turned over to EMS staff until it is safe to do so. When conditions dictate, firefighters will have to move patients to the EMS staff.

6) Patient access and extrication

- A. As soon as safety permits fire crews will gain access to the patient and begin treatment. Every attempt shall be made to provide a one to one ratio for trapped patients. Many circumstances may make this impossible.
- B. Incident Command will assign a triage officer to prioritize the order in which patients are extricated and will work with the transport agency to ensure that patients are transported in the proper order.
- C. Obviously deceased patients should not be moved unless authorized by Law Enforcement. This is necessary for investigative purposes. Follow standard protocol to determine if patient is deceased, (examples; decapitation, incineration, or morbidity)

7) Vehicles leaking fluids

- A) Single Engine Company will determine what is leaking and if safe to do so, contain any products before they enter storm-drains or private property.
- B) The wrecker service will clean up debris and fluids per Montana Code Annotated Section 61-9-416, (e), (f). They are not required to clean up hazardous chemical spills. The responsible party must ensure the spill they created is properly clean-up.
- C) If a spill occurs or an orphaned product is found, it is the property owner's responsibility for clean-up. City, State and Federal governments are responsible for the roads under their jurisdiction. The IC shall notify the proper agency to inform them of the situation. Vehicle owners will be invoiced for any work done where a motor vehicle incident required HazMat containment.

8) Children locked in vehicles.

- A. Quickly determine condition of trapped patient.
- B. Forcible entry shall be applied when the safety of the child is in question.

*NOTE:*

This Guide as with all guides may be changed or edited by the Administrative Staff at any time and for any or all of the following reasons;

- Improve the quality of the guide
- Policy or procedural changes
- Improve customer service delivery
- Safety issues

	<b>CITY OF GREAT FALLS</b> <b>Parks and Recreation</b> <b>Forestry Division</b> <b>Standard Operating Procedure</b>	SOP # PKR-Frst-1
		Revision # 001
		Effective Date: 12/01/23
		Approved By:
<b>Title: Pesticide and Herbicide Storage, Handling, Application, &amp; Cleanup</b>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p> <p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management          #6 <b><u>Pollution Prevention/Good Housekeeping</u></b></p>
--

<p><b>Introduction:</b></p>	<p>Pesticides, herbicides, and dyes if not properly handled can be harmful to the environment if they enter the storm water system.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<p><b><u>Storage</u></b></p> <ol style="list-style-type: none"> <li>1. Store away from storm water controls (i.e., storm inlets).</li> <li>2. Store in a dry enclosure separated from other chemicals.</li> <li>3. Secondary containment, sized to hold 1.5 times the storage capacity of the container, is recommended.</li> <li>4. Lock and label storage area.</li> <li>5. Store upright in original labeled containers.</li> </ol> <p><b><u>Handling</u></b></p> <ol style="list-style-type: none"> <li>6. Clean-up/spill response equipment should be readily available. Liquids need absorbent materials; solids need shovel, dust pan, broom and/or buckets.</li> </ol> <p><b><u>Application</u></b></p> <ol style="list-style-type: none"> <li>7. Follow directions provided by manufacturer.</li> <li>8. Pesticides and herbicides are applied when weather conditions are not windy.</li> <li>9. Pesticides and herbicides are applied when people and/or animals (i.e., dogs) are not present.</li> <li>10. Aquatic certification is acquired prior to dye application.</li> </ol> <p><b><u>Cleanup</u></b></p> <ol style="list-style-type: none"> <li>11. Excess pesticides and herbicides are removed from impervious surfaces (i.e., sidewalks, driveways).</li> </ol>

## SOP# PKR-Frst-1

<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Training on proper pesticide/herbicide handling and safety procedures.</li> <li>2. Personnel are directed to call 911 in case of an emergency.</li> <li>3. If an emergency occurs, notify personnel following the chain-of-command.</li> <li>4. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (nitrile gloves, long sleeve shirt, safety glasses, respirator may be needed for certain chemicals).</li> <li>2. Pesticide/herbicide awareness. Ensure proper handling and application procedures are followed, as chemicals may enter the body through absorption and inhalation.</li> </ol>
<b>Responsible Staff:</b>	Technician
<b>Target pollutants this BMP helps to reduce:</b>	Total Suspended Solids (TSS) <b><u>Nutrients: Phosphorus, Nitrogen</u></b> Metals Bacteria Salinity Oil and Grease
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i>

### References:

Parks and Rec Office (general): (406) 771-1265

#### Forestry

Chain-of-command:

1. **City Forester:** Todd Seymanski
  - Cell Number: (406) 781-8963
2. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
3. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/05/23	Transitioned to ENV standard format → changed from SOP #8 to SOP# PKR-Frst-1; Updated key personnel info (JW)

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

	<b>CITY OF GREAT FALLS</b>  <b>Parks and Recreation</b> <b>Forestry Division</b> <b>Standard Operating Procedure</b>	SOP # PKR-Frst-2
		Revision # 001
		Effective Date: 10/26/23
		Authored By: PW-SWMT
		Approved By:
<b>Title: Grass, Leaf, and Branch Storage &amp; Disposal</b>		

**Control Measure:**

- |  |   |
|--|---|
| #1 Public Education and Outreach                 | #2 Public Involvement and Participation                 |
| #3 IDDE  | #4 Construction Site Storm Water Management             |
| #5 Post-Construction Site Storm Water Management | <b>#6 <u>Pollution Prevention/Good Housekeeping</u></b> |

<b>Introduction:</b>	Grass clippings and leaf litter/branches have the potential to add excess nutrients (nitrogen and phosphorus) to storm water.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Keep grass clippings and leaf litter/branches away from storm water controls (i.e., storm inlets).</li> <li>2. Grass clippings and leaf litter/branches are removed from impervious surfaces (i.e., sidewalks, driveways).</li> <li>3. Avoid sweeping clippings/litter into storm inlets.</li> <li>4. The City of Great Falls compost locations are attached</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Training on proper storage/disposal and safety procedures.</li> <li>2. Personnel are directed to call 911 in case of an emergency.</li> <li>3. Press release to inform public to move vehicles.</li> <li>4. Absorbent material is immediately applied to minor fuel/bar oil spills to contain the spill, then swept, and disposed at the landfill.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (safety chaps, boots, harness, ear protection, hard hat, safety glasses).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. Equipment awareness.</li> </ol>
<b>Responsible Staff:</b>	Technician, Laborer

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  Metals  Bacteria  Salinity  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek   <b><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></b></p>

**References:**

Figure 1-SOP#10

Parks and Rec Office (general): (406) 771-1265

Forestry

Chain-of-command:

1. **City Forester:** Todd Seymanski
  - Cell Number: (406) 781-8963
2. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
3. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/06/23	Transitioned to ENV standard format → changed from SOP #10 to SOP# PKR-Frst-2 (JW)



**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---


---

---

---

---

# SOP# PKR-Gen-1

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Parks and Recreation</b></p> <p align="center"><b>General and Misc. Items</b></p> <p align="center"><b>Standard Operating Procedure</b></p> <p align="center"><i>PKR-Gen-1</i></p>	SOP # PKR-Gen-1
		Revision # 001
		Effective Date: 12/01/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Copper Sulfate Storage &amp; Handling</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach                      #2 Public Involvement and Participation</p> <p>#3 IDDE    #4 Construction Site Storm Water Management</p> <p>#5 Post-Construction Site Storm Water Management      <b>#6 <u>Pollution Prevention/Good Housekeeping</u></b></p>
--

<p><b>Introduction:</b></p>	<p>Copper sulfate is a pollutant which is harmful to the environment.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Store/handle copper sulfate in a dry area away from storm water controls (i.e., storm inlets, drainage ditches).</li> <li>2. Store copper sulfate in a locked/labeled dry area; use original labeled containers.</li> <li>3. Secondary containment, sized to hold 1.5 times the storage capacity of the container, is required.</li> <li>4. Store copper sulfate away from food and drink.</li> <li>5. Avoid accidental exposure to applicators and/or bystanders by following manufacturer’s directions for handling and safety.</li> <li>6. Post copper sulfate safety procedures (see CDC- Copper Sulfate -NIOSH Information).</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Training on proper copper sulfate handling and safety procedures (see CDC- Copper Sulfate -NIOSH Information).</li> <li>2. Personnel are directed to call 911 in case of an emergency.</li> <li>3. Establish notification chain-of-command if an emergency occurs.</li> <li>4. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>

## SOP# PKR-Gen-1

<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (long-sleeved shirt, long pants, socks, close-toed shoes, safety glasses, chemical-resistant gloves).</li> <li>2. Avoid contact with skin or eyes; eye wash station/flushing materials are available at Park &amp; Recreation Department.</li> <li>3. Use copper sulfate only with adequate ventilation.</li> <li>4. Avoid breathing dust/fume/gas/mist/vapors/spray &amp; prolonged exposure.</li> <li>5. Consult and post chlorine safety procedures (see CDC- Copper Sulfate - NIOSH Information).</li> </ol>
<b>Responsible Staff:</b>	Operator
<b>Target pollutants this BMP helps to reduce:</b>	<p><b><u>Copper Sulfate</u></b>            Total Suspended Solids (TSS)            Nutrients: Phosphorus, Nitrogen            Metals            Bacteria            Salinity            Oil and Grease</p>
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i>

### References:

Parks and Rec General Office: (406) 771-1265

P & R – Parks

Chain-of-command:

1. **Park Foreman:** Jay Rowton
  - Cell Number: (406) 455-0068
2. **Park Supervisor:** Kevin Vining
  - Office Number: (406) 791-8982
3. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
4. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/06/23	Transitioned to ENV standard format → changed from SOP #14 to SOP# PKR-Gen-1; Updated personnel info

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



## SOP# PKR-Gen-2

<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>
--------------------------	---

### References:

Parks and Rec General Office: (406) 771-1265

Chain-of-command:

1. **Trails Coordinator:** Olivia Hollis
  - Cell Number: (406) 781-8959
2. **Park Foreman:** Jay Rowton
  - Cell Number: 406-455-0068
3. **Parks Supervisor:** Kevin Vining
  - Office Number: (406) 791-8982
4. **Park and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
5. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

### Revision History:

Revision Number	Effective Date	Significant Changes
001	06/06/23	Transitioned to ENV standard format → changed from SOP #15 to SOP# PKR-Gen-2; Updated personnel info







**References:**

Parks and Rec General Office: (406) 771-1265

P & R – Parks


Chain-of-command:

- 1. Park Foreman:** Jay Rowton
  - Cell Number: (406) 455-0068
- 2. Parks Supervisor:** Kevin Vining
  - Office Number: (406) 791-8982
- 3. Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
- 4. Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/06/23	Transitioned to ENV standard format → changed from SOP #16 to SOP# PKR-Misc-3; Updated personnel info



	<p align="center"> <b>CITY OF GREAT FALLS</b>  <b>Parks and Recreation</b>  <b>General and Misc. Items</b>  <b>Standard Operating Procedure</b>  <i>PKR-Gen-4</i> </p>	SOP # PKR-Gen-4
		Revision # 001
		Effective Date: 12/01/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Recreation Center Maintenance</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <b>#6 Pollution Prevention/Good Housekeeping</b></p>
---	---

<p><b>Introduction:</b></p>	<p>The Recreation Center requires maintenance; cleaning products must not enter the storm water system, as they have the potential to harm the environment.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Ensure cleaning products/wastewater <u>are not</u> disposed of in storm water controls (i.e. storm inlets, drainage ditches).</li> <li>2. Store cleaning products in a locked/labeled dry area; use original labeled containers.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Follow manufacturers handling and safety procedures.</li> <li>2. Personnel are directed to call 911 in case of an emergency.</li> <li>3. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (safety glasses, nitrile gloves, long sleeve shirt).</li> <li>2. Chemical awareness.</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Laborer</p>
<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b>Chemicals</b>          Total Suspended Solids (TSS)  <b>Nutrients: Phosphorus, Nitrogen</b>  <b>Metals</b>  <b>Bacteria</b>          Salinity          Oil and Grease</p>

## SOP# PKR-Gen-4

<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i>
--------------------------	--

### References:

Parks and Rec General Office: (406) 771-1265

#### P & R – Parks

Chain-of-command:

1. **Aquatics and Rec Center Manager:** Erica McNamee
  - Office Number: (406) 727-6099
2. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
3. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

### Revision History:

Revision Number	Effective Date	Significant Changes
001	06/06/23	Transitioned to ENV standard format → changed from SOP #18 to SOP# PKR-Misc-4; Updated key personnel info

**Signatures after training:**

**Date:** \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



<b>Responsible Staff:</b>	All Staff
<b>Target pollutants this BMP helps to reduce:</b>	<p><b><u>Total Suspended Solids (TSS)</u></b>                  Nutrients: Phosphorus, Nitrogen                  Metals                  Bacteria                  Salinity  <b><u>Oil and Grease</u></b></p>
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>

**References:**

Figure 1-SOP#2

MTDEQ Statement:

MTDEQ must be notified of releases of **greater than 25 gallons** of any petroleum product such as: crude oil, gasoline, diesel fuel, aviation fuel, asphalt, road oil, kerosene, and fuel oil (800-457-0568)

Petroleum product releases **less than 25 gallons** in volume must be contained and cleaned up within 24 hours. If cleanup cannot be completed within 24 hours, owners and operators must report the release to MTDEQ (800-457-0568). Outside normal business hours, releases must be reported to the DES 24-hour phone number at (406) 324-4777. **Releases must be reported to a live person** - voice mails are not adequate notification.

**Spill Report Form url:**

<https://deq.mt.gov/files/DEQAdmin/ENF/Documents/StandardizedCleanupReport.pdf>

**Spill Management & Reporting Policy url:**

[https://deq.mt.gov/files/DEQAdmin/ENF/Documents/SpillPolicy\\_02\\_2016.pdf](https://deq.mt.gov/files/DEQAdmin/ENF/Documents/SpillPolicy_02_2016.pdf)

**Reference continued:**

P & R - Parks

Chain-of-command for Fuel Spills:

1. **Park Foreman:** Jay Rowton
  - Cell Number: (406) 455-0068
2. **Park Supervisor:** Kevin Vining
  - Office Number: (406) 791-8982
3. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
4. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971
5. **Public Works Shop Superintendent:** Cory Gilcher
  - Office Number: (406) 455-8131
6. **Public Works Shop Manager:** Doug Alm
  - Cell Number: (406) 781-8993
7. **Fire Chief:** Jeremy Jones
  - Cell Number: (406) 899-4054



**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/08/23	Transitioned to ENV standard format → changed from SOP #2 to SOP# PKR-Parks-1; Updated key personnel info

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center">Parks and Recreation <i>Parks Division</i></p> <p align="center"><b>Standard Operating Procedure</b> <i>PKR-Parks-2</i></p>	SOP # PKR-Parks-2
		Revision # 001
		Effective Date: 12/01/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Fertilizer Storage, Handling, Application &amp; Cleanup</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach                      #2 Public Involvement and Participation          #3 IDDE    #4 Construction Site Storm Water Management          #5 Post-Construction Site Storm Water Management      <b>#6 <u>Pollution Prevention/Good Housekeeping</u></b></p>
--

<p><b>Introduction:</b></p>	<p>Fertilizer is a pollutant which can be harmful to the environment if it enters the storm water system.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<p><b><u>Storage</u></b></p> <ol style="list-style-type: none"> <li>1. Store fertilizer away from storm water controls (i.e., storm inlets).</li> <li>2. Store in a dry enclosure separated from other chemicals.</li> <li>3. Secondary containment, sized to hold 1.5 times the storage capacity of the container, is recommended.</li> <li>4. Lock and label storage area.</li> <li>5. Store upright in original labeled containers.</li> </ol> <p><b><u>Handling</u></b></p> <ol style="list-style-type: none"> <li>6. Spill response equipment is readily available. Liquid fertilizers need absorbent materials; solid fertilizers need shovel, dust pan, broom and/or buckets.</li> </ol> <p><b><u>Application</u></b></p> <ol style="list-style-type: none"> <li>7. Follow directions provided by manufacturer.</li> <li>8. Fertilizer is applied when weather conditions are not windy.</li> <li>9. Fertilizer is applied when people and/or animals (i.e., dogs) are not present.</li> <li>10. If required, certification is acquired prior to application.</li> </ol> <p><b><u>Cleanup</u></b></p> <ol style="list-style-type: none"> <li>11. Excess fertilizer is swept from impervious surfaces (i.e., sidewalks, driveways).</li> </ol>

## SOP# PKR-Parks-2

<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Training on proper fertilizer handling and safety procedures.</li> <li>2. Personnel are directed to call 911 in case of an emergency.</li> <li>3. If an emergency occurs, notify personnel following the chain-of-command.</li> <li>4. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (nitrile gloves, safety glasses, steel toe boots, long sleeve shirt).</li> <li>2. Traffic awareness.</li> <li>3. Chemical awareness.</li> </ol>
<b>Responsible Staff:</b>	Technician
<b>Target pollutants this BMP helps to reduce:</b>	Total Suspended Solids (TSS) <u><b>Nutrients: Phosphorus, Nitrogen</b></u> Metals Bacteria Salinity Oil and Grease
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i>

### References:

#### P & R - Parks

#### Chain-of-command:

1. **Park Foreman:** Jay Rowton
  - Cell Number: (406) 455-0068
2. **Park Supervisor:** Kevin Vining
  - Office Number: (406) 791-8982
3. **City Forester:** Todd Seymanski
  - Cell Number: (406) 781-8963
4. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
5. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

## SOP# PKR-Parks-2

### Revision History:

Revision Number	Effective Date	Significant Changes
001	06/08/23	Transitioned to ENV standard format → changed from SOP #3 to SOP# PKR-Parks-2; updated key personnel info

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---


---

---

---

---

## SOP# PKR-Parks-3

	<b>CITY OF GREAT FALLS</b>  <b>Parks and Recreation</b> <b>Parks Division</b> <b>Standard Operating Procedure</b> <i>PKR-Parks-3</i>	SOP # PKR-Parks-3
		Revision # 001
		Effective Date: 12/01/23
		Authored By: PW-SWMT
		Approved By:
<b>Title: Mowing Procedures/Grass Disposal</b>		

<p><b>Control Measure:</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">                 #1 Public Education and Outreach                  #3 IDDE                  #5 Post-Construction Site Storm Water Management             </td> <td style="width: 50%; border: none;">                 #2 Public Involvement and Participation                  #4 Construction Site Storm Water Management                  #6 <b><u>Pollution Prevention/Good Housekeeping</u></b> </td> </tr> </table>	#1 Public Education and Outreach #3 IDDE #5 Post-Construction Site Storm Water Management	#2 Public Involvement and Participation #4 Construction Site Storm Water Management #6 <b><u>Pollution Prevention/Good Housekeeping</u></b>
#1 Public Education and Outreach #3 IDDE #5 Post-Construction Site Storm Water Management	#2 Public Involvement and Participation #4 Construction Site Storm Water Management #6 <b><u>Pollution Prevention/Good Housekeeping</u></b>	

<b>Introduction:</b>	Grass clippings have the potential to add pollutants to the environment. It is critical to ensure no grass clippings are directed towards the storm water system.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Keep grass clippings out of streets and storm water controls (i.e., storm inlets).</li> <li>2. Grass clippings are removed from impervious surfaces (i.e., sidewalks, driveways) using a broom or leaf blower.</li> <li>3. Golf Course grass clippings are disposed of in the golf course rough.</li> <li>4. Parks Division grass clippings are disposed of at the City of Great Falls Compost Site as shown in Figure 1.</li> <li>5. Avoid having equipment wash water enter storm water controls (i.e., storm inlets).</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Training on proper mowing/grass disposal and safety procedures.</li> <li>2. Personnel are directed to call 911 in case of an emergency.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (steel toe boots, ear protection, safety glasses, hard hat, field gloves).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. Equipment awareness (i.e., mower blades).</li> </ol>
<b>Responsible Staff:</b>	Technician, Laborer

## SOP# PKR-Parks-3

<b>Target pollutants this BMP helps to reduce:</b>	<b><u>Total Suspended Solids (TSS)</u></b> <b><u>Nutrients: Phosphorus, Nitrogen</u></b> Metals Bacteria Salinity Oil and Grease
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <b><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></b>

### References:

Figure 1

### P & R - Parks

Chain-of-command:

1. **Park Foreman:** Jay Rowton
  - Cell Number: (406) 455-0068
2. **Park Supervisor:** Kevin Vining
  - Office Number: (406) 791-8982
3. **City Forester:** Todd Seymanski
  - Cell Number: (406) 781-8963
4. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
5. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

### External References:

- <https://extensionpublications.unl.edu/assets/pdf/g1855.pdf>
- [https://cfpub.epa.gov/npstbx/files/tbsd\\_yard\\_work.pdf](https://cfpub.epa.gov/npstbx/files/tbsd_yard_work.pdf)

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/08/23	Transitioned to ENV standard format → changed from SOP #2 to SOP# PKR-Parks-3

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



## SOP# PKR-Parks-4

	<b>CITY OF GREAT FALLS</b>  <b>Parks and Recreation</b> <i>Parks Division</i> <b>Standard Operating Procedure</b> <i>PKR-Parks-4</i>	SOP # PKR-Parks-4
	Revision # 001	
	Effective Date: 12/01/23	
	Authored By: PW-SWMT	
	Approved By:	
<b>Title: Pesticide and Herbicide Storage, Handling, Application, &amp; Cleanup</b>		

<p><b>Control Measure:</b></p> <table style="width: 100%;"> <tr> <td style="width: 50%;">#1 Public Education and Outreach</td> <td style="width: 50%;">#2 Public Involvement and Participation</td> </tr> <tr> <td>#3 IDDE</td> <td>#4 Construction Site Storm Water Management</td> </tr> <tr> <td>#5 Post-Construction Site Storm Water Management</td> <td><b>#6 <u>Pollution Prevention/Good Housekeeping</u></b></td> </tr> </table>	#1 Public Education and Outreach	#2 Public Involvement and Participation	#3 IDDE	#4 Construction Site Storm Water Management	#5 Post-Construction Site Storm Water Management	<b>#6 <u>Pollution Prevention/Good Housekeeping</u></b>
#1 Public Education and Outreach	#2 Public Involvement and Participation					
#3 IDDE	#4 Construction Site Storm Water Management					
#5 Post-Construction Site Storm Water Management	<b>#6 <u>Pollution Prevention/Good Housekeeping</u></b>					

<p><b>Introduction:</b></p>	<p>Pesticides, herbicides, and dyes if not properly handled can be harmful to the environment if they enter the storm water system.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<p><u><b>Storage</b></u></p> <ol style="list-style-type: none"> <li>1. Store away from storm water controls (i.e., storm inlets).</li> <li>2. Store in a dry enclosure separated from other chemicals.</li> <li>3. Secondary containment, sized to hold 1.5 times the storage capacity of the container, is recommended.</li> <li>4. Lock and label storage area.</li> <li>5. Store upright in original labeled containers.</li> </ol> <p><u><b>Handling</b></u></p> <ol style="list-style-type: none"> <li>6. Clean-up/spill response equipment should be readily available. Liquids need absorbent materials; solids need shovel, dust pan, broom and/or buckets.</li> </ol> <p><u><b>Application</b></u></p> <ol style="list-style-type: none"> <li>7. Follow directions provided by manufacturer.</li> <li>8. Pesticides and herbicides are applied when weather conditions are not windy.</li> <li>9. Pesticides and herbicides are applied when people and/or animals (i.e., dogs) are not present.</li> <li>10. Aquatic certification is acquired prior to dye application.</li> </ol> <p><u><b>Cleanup</b></u></p> <ol style="list-style-type: none"> <li>11. Excess pesticides and herbicides are removed from impervious surfaces (i.e., sidewalks, driveways).</li> </ol>

## SOP# PKR-Parks-4

<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Training on proper pesticide/herbicide handling and safety procedures.</li> <li>2. Personnel are directed to call 911 in case of an emergency.</li> <li>3. If an emergency occurs, notify personnel following the chain-of-command.</li> <li>4. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (nitrile gloves, long sleeve shirt, safety glasses, respirator may be needed for certain chemicals).</li> <li>2. Pesticide/herbicide awareness. Ensure proper handling and application procedures are followed, as chemicals may enter the body through absorption and inhalation.</li> </ol>
<b>Responsible Staff:</b>	Technician
<b>Target pollutants this BMP helps to reduce:</b>	Total Suspended Solids (TSS) <u><b>Nutrients: Phosphorus, Nitrogen</b></u> Metals Bacteria Salinity Oil and Grease
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i>

### References:

Parks and Rec General Office: (406) 771-1265

### Chain-of-command:

1. **Park Supervisor:** Kevin Vining
  - Office Number: (406) 791-8982
2. **Park Foreman:** Jay Rowton
  - Cell Number: (406) 455-0068
3. **City Forester:** Todd Seymanski
  - Cell Number: (406) 781-8963
4. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
5. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/08/23	Transitioned to ENV standard format → changed from SOP #8 to SOP# PKR-Parks-4; Updated key personnel info

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---


---

---

---

---

---

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Parks and Recreation</b></p> <p align="center"><b>Parks Division</b></p> <p align="center"><b>Standard Operating Procedure</b></p> <p align="center"><i>PKR-Parks-5</i></p>	SOP # PKR-Parks-5
		Revision # 001
		Effective Date:
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Grass, Leaf, and Branch Storage and Disposal</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <b>#6 Pollution Prevention/Good Housekeeping</b></p>
---	---

<p><b>Introduction:</b></p>	<p>Grass clippings and leaf litter/branches have the potential to add excess nutrients (nitrogen and phosphorus) to storm water.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Keep grass clippings and leaf litter/branches away from storm water controls (i.e., storm inlets).</li> <li>2. Grass clippings and leaf litter/branches are removed from impervious surfaces (i.e., sidewalks, driveways).</li> <li>3. Avoid sweeping clippings/litter into storm inlets.</li> <li>4. The City of Great Falls Compost Site location is shown on Figure 1.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Training on proper storage/disposal and safety procedures.</li> <li>2. Personnel are directed to call 911 in case of an emergency.</li> <li>3. Press release to inform public to move vehicles.</li> <li>4. Absorbent material is immediately applied to minor fuel/bar oil spills to contain the spill, then swept, and disposed at the landfill.</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (safety chaps, boots, harness, ear protection, hard hat, safety glasses).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. Equipment awareness.</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Technician, Laborer</p>

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>                  Metals                  Bacteria                  Salinity  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek   <b><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></b></p>

**References:**

Figure 1

P & R - Parks

Chain-of-command:

1. **Park Foreman:** Jay Rowton
  - Cell Number: (406) 455-0068
2. **Park Supervisor:** Kevin Vining
  - Office Number: (406) 791-8982
3. **City Forester:** Todd Seymanski
  - Cell Number: (406) 781-8963
4. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
5. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/06/23	Transitioned to ENV standard format → changed from SOP #10 to SOP# PKR-Parks-5

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---


---

---

---

---

## SOP# PKR-Parks-6

	<b>CITY OF GREAT FALLS</b>  <b>Parks and Recreation</b> <b>Parks Division</b> <b>Standard Operating Procedure</b> <i>PKR-Parks-6</i>	SOP # PKR-Parks-6
		Revision # 001
		Effective Date:
		Authored By: PW-SWMT
		Approved By:
<b>Title: Pet Waste Management</b>		

<p><b>Control Measure:</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">                 #1 Public Education and Outreach                  #3 IDDE                  #5 Post-Construction Site Storm Water Management             </td> <td style="width: 50%; border: none;">                 #2 Public Involvement and Participation                  #4 Construction Site Storm Water Management                  #6 <b><u>Pollution Prevention/Good Housekeeping</u></b> </td> </tr> </table>	#1 Public Education and Outreach #3 IDDE #5 Post-Construction Site Storm Water Management	#2 Public Involvement and Participation #4 Construction Site Storm Water Management #6 <b><u>Pollution Prevention/Good Housekeeping</u></b>
#1 Public Education and Outreach #3 IDDE #5 Post-Construction Site Storm Water Management	#2 Public Involvement and Participation #4 Construction Site Storm Water Management #6 <b><u>Pollution Prevention/Good Housekeeping</u></b>	

<b>Introduction:</b>	Pet waste is a pollutant which contains bacteria and nutrients and is harmful to water quality.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Avoid putting pet waste in storm water controls (i.e., storm inlets, drainage ditches).</li> <li>2. Collect using waste bags, seal, and dispose in waste receptacle.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Post signs at dog-friendly locations to “Clean up after your dog”.</li> <li>2. Pet waste station locations are shown in Figure 1.</li> <li>3. Waste receptacle are checked and restocked routinely.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (boots, gloves, safety glasses, long sleeve shirt).</li> <li>2. Hepatitis B shot recommended.</li> </ol>
<b>Responsible Staff:</b>	Laborer
<b>Target pollutants this BMP helps to reduce:</b>	Total Suspended Solids (TSS) <b><u>Nutrients: Phosphorus, Nitrogen</u></b> Metals Bacteria Salinity <b><u>Oil and Grease</u></b>

## SOP# PKR-Parks-6

<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>
--------------------------	---

### References:

Parks and Rec General Office: (406) 771-1265

### P & R - Parks

Chain-of-command:

1. **Park Foreman:** Jay Rowton
  - Cell Number: (406) 455-0068
2. **Park Supervisor:** Kevin Vining
  - Office Number: (406) 791-8982
3. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
4. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

Posters (CA, GA, MI, NV) - Permission for other organizations to modify and use for their own outreach campaigns varies – check website: Category - Pet Care  
<https://cfpub.epa.gov/npstbx/searchMaterials.cfm?GroupID=62>

### Revision History:

Revision Number	Effective Date	Significant Changes
001	06/09/23	Transitioned to ENV standard format → changed from SOP #17 to SOP# PKR-Parks-6; Updated key personnel info (JW)



**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

	<p><b>CITY OF GREAT FALLS</b></p> <p><b>Parks and Recreation Parks Division</b></p> <p><b>Standard Operating Procedure</b> <i>PKR-Parks-7</i></p>	SOP # PKR-Parks-7
		Revision # 001
		Effective Date:
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Open Space Management</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach                                      #2 Public Involvement and Participation          #3 IDDE    #4 Construction Site Storm Water Management          #5 Post-Construction Site Storm Water Management            <b>#6 <u>Pollution Prevention/Good Housekeeping</u></b></p>
--

<p><b>Introduction:</b></p>	<p>The open spaces within the City of Great Falls are used by the public and their pets, therefore pet waste management and trash/debris are potential pollutants that have detrimental effects on storm water. Pet waste contains bacteria and nutrients and is harmful to water quality.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Avoid putting pet waste and trash/debris in storm water controls (i.e., storm inlets, drainage ditches).</li> <li>2. Collect using waste bags, seal, and dispose in waste receptacle.</li> <li>3. Collect trash/debris and dispose in waste receptacle.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Pet waste station locations are shown in Figure 1-SOP.</li> <li>2. Waste receptacle are checked and restocked routinely.</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (boots, gloves, safety glasses, long sleeve shirt).</li> <li>2. Hepatitis B shot recommended.</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Laborer</p>
<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p>Total Suspended Solids (TSS)  <u><b>Nutrients: Phosphorus, Nitrogen</b></u>          Metals  <u><b>Bacteria</b></u>          Salinity  <u><b>Oil and Grease</b></u></p>

## SOP# PKR-Parks-7

<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>
--------------------------	---

### References:

Parks and Rec General Office: (406) 771-1265

### P & R - Parks

Chain-of-command:

1. **Park Foreman:** Jay Rowton
  - Cell Number: (406) 455-0068
2. **Park Supervisor:** Kevin Vining
  - Office Number: (406) 791-8982
3. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
4. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

### Revision History:

Revision Number	Effective Date	Significant Changes
001	06/09/23	Transitioned to ENV standard format → changed from SOP #46 to SOP# PKR-Parks-7; Updated contact info (JW)



## SOP# PKR-Pools-1

	<b>CITY OF GREAT FALLS</b>  <b>Parks and Recreation</b> <b>Aquatic Center/Pools</b> <b>Standard Operating Procedure</b>	SOP # PKR-Pools-1
		Revision # 001
		Effective Date:
		Authored By: PW-SWMT
		Approved By:
<b>Title: Swimming Pool Drain-Down</b>		

<p><b>Control Measure:</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">                 #1 Public Education and Outreach                  #3 IDDE                  #5 Post-Construction Site Storm Water Management             </td> <td style="width: 50%; border: none;">                 #2 Public Involvement and Participation                  #4 Construction Site Storm Water Management                  #6 <b><u>Pollution Prevention/Good Housekeeping</u></b> </td> </tr> </table>	#1 Public Education and Outreach #3 IDDE #5 Post-Construction Site Storm Water Management	#2 Public Involvement and Participation #4 Construction Site Storm Water Management #6 <b><u>Pollution Prevention/Good Housekeeping</u></b>
#1 Public Education and Outreach #3 IDDE #5 Post-Construction Site Storm Water Management	#2 Public Involvement and Participation #4 Construction Site Storm Water Management #6 <b><u>Pollution Prevention/Good Housekeeping</u></b>	

<b>Introduction:</b>	Proper procedures for draining the swimming pool are critical. Ensure all water is properly drained to the sanitary sewer with no leakage, as chlorine has the potential to impact the storm water system.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Pool water drains to sanitary sewer with treatment at the Great Falls Waste Water Treatment Plant.</li> <li>2. Locations of pools are shown on Figure 1.</li> <li>3. Utilize checklist for season close-out tasks.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Pool drain-down schedule. Outdoor pools are drained after Labor Day weekend.                      Note: To prevent damage to the <b>Mitchell Pool</b> it is never completely emptied. Partial draining is governed by pump performance, typically 200,000 gallons is removed over 96 hours. The <b>Natatorium</b> is drained at a rate of 150,000 gallons over 22 hours.</li> <li>2. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (steel toe boots, ear protection, safety glasses, hard hat, nitrile gloves, apron).</li> </ol>
<b>Responsible Staff:</b>	Technician

## SOP# PKR-Pools-1

<b>Target pollutants this BMP helps to reduce:</b>	Total Suspended Solids (TSS) <u><b>Nutrients: Phosphorus, Nitrogen</b></u> Metals Bacteria Salinity Oil and Grease <u><b>Chlorine</b></u>
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i>

### References:

Figure 1

Parks and Rec General Office: (406) 771-1265

Chain-of-command:

1. **Pool Specialist:** Nick Hocevar
  - Office Number: (406) 455-9837
2. **Recreational Manager:** Erica McNamee
  - Office Number: (406) 727-6099
3. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
4. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971

### Revision History:

Revision Number	Effective Date	Significant Changes
001	06/09/23	Transitioned to ENV standard format → changed from SOP #12 to SOP# PKR-Pools-1; Updated key personnel info

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

## SOP# PKR-Pools-2

	<b>CITY OF GREAT FALLS</b>  <b>Parks and Recreation</b> <b>Aquatic Center/Pools</b> <b>Standard Operating Procedure</b>	SOP # PKR-Pools-2
		Revision # 001
		Effective Date: 12/01/23
		Authored By: PW-SWMT
		Approved By:
<b>Title: Chlorine Storage &amp; Handling</b>		

<p><b>Control Measure:</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">                 #1 Public Education and Outreach                  #3 IDDE                  #5 Post-Construction Site Storm Water Management             </td> <td style="width: 50%; vertical-align: top;">                 #2 Public Involvement and Participation                  #4 Construction Site Storm Water Management                  #6 <b><u>Pollution Prevention/Good Housekeeping</u></b> </td> </tr> </table>	#1 Public Education and Outreach #3 IDDE #5 Post-Construction Site Storm Water Management	#2 Public Involvement and Participation #4 Construction Site Storm Water Management #6 <b><u>Pollution Prevention/Good Housekeeping</u></b>
#1 Public Education and Outreach #3 IDDE #5 Post-Construction Site Storm Water Management	#2 Public Involvement and Participation #4 Construction Site Storm Water Management #6 <b><u>Pollution Prevention/Good Housekeeping</u></b>	

<b>Introduction:</b>	Chlorine is a pollutant which is harmful to the humans and the environment.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Store/handle chlorine in a dry area away from stormwater controls (i.e., storm inlets, drainage ditches).</li> <li>2. Store chlorine in a locked/labeled dry area; use original labeled containers. Secondary containment, sized to hold 1.5 times the storage capacity of the container, is required.</li> <li>3. Avoid accidental exposure to applicators and/or bystanders by following manufacturer’s directions for handling and safety.</li> <li>4. Post chlorine safety procedures (see CDC-Chlorine-NIOSH Information).</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Training on proper chlorine handling and safety procedures (see CDC-Chlorine-NIOSH Information).</li> <li>2. Chlorine levels in the pool are tested and documented every 4 hours by the on-duty life guard. During off-duty hours, the Controllers monitor Chlorine levels.</li> <li>3. Personnel are directed to call 911 in case of an emergency.</li> <li>4. Establish notification chain-of-command if an emergency occurs.</li> <li>5. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>



## SOP# PKR-Pools-2

<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (long-sleeved shirt, long pants, socks, close-toed shoes, safety glasses, chemical-resistant gloves such as nitrile or butyl).</li> <li>2. Eye flush materials.</li> <li>3. Consult and post chlorine safety procedures (see CDC-Chlorine-NIOSH Information).</li> </ol>
<b>Responsible Staff:</b>	Operator
<b>Target pollutants this BMP helps to reduce:</b>	<p><b>Chlorine</b></p> <p>Total Suspended Solids (TSS)</p> <p>Nutrients: Phosphorus, Nitrogen</p> <p>Metals</p> <p>Bacteria</p> <p>Salinity</p> <p>Oil and Grease</p>
<b>Receiving Waters:</b>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

### References:

CDC- Chlorine -NIOSH Information

[https://www.cdc.gov/niosh/ershdb/emergencyresponsecard\\_29750024.html](https://www.cdc.gov/niosh/ershdb/emergencyresponsecard_29750024.html)

General Chlorine gas information, pool page 8, (EPA)

[https://www3.epa.gov/pesticides/chem\\_search/reg\\_actions/reregistration/fs\\_PC-020501\\_1-Feb-99.pdf](https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/fs_PC-020501_1-Feb-99.pdf)

General de-chlorination information focuses on wastewater (EPA)

<https://www3.epa.gov/npdes/pubs/dechlorination.pdf>

Parks and Rec General Office: (406) 771-1265

Chain-of-command:

1. **Pool Specialist:** Nick Hocevar
  - Office Number: (406) 455-9837
2. **Recreational Manager:** Erica McNamee
  - Office Number: (406) 727-6099
3. **Parks and Rec Deputy Director:** Jessica Compton
  - Office Number: (406) 791-8981
4. **Parks and Rec Director:** Steve Herrig
  - Cell Number: (406) 781-8971



# Best Management Practices Great Falls Golf LLC



Peaks & Prairies Chapter



# BMP Best Management Practices

## Best Management Practices Planning Guide & Template



*In partnership with the PGA TOUR*

*Disclaimer: The information contained in this document is provided on an "as is" basis with no guarantees of completeness, accuracy, usefulness or timeliness and is solely at the discretion of and/or the opinion of the author. The opinions expressed in this publication are those of the authors. They do not purport to reflect the opinions or views of the GCSAA, USGA, PGA TOUR.*



Copyright free

Permission to copy and distribute content from the Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses has been granted by the Florida Department of Environmental Protection, January 2007

# Table of Contents

Introduction .....	4
Acknowledgement .....	5
Additional Acknowledgement.....	7
BMP Index .....	8
Planning, Design and Construction .....	11
Irrigation.....	21
Surface Water Management.....	43
Water Quality Monitoring and Management .....	53
Nutrient and Soils Management .....	62
Cultural Practices.....	74
Integrated Pest Management .....	79
Pesticide Management .....	91
Pollinator Protection.....	99
Maintenance Operations.....	102
Landscape .....	110
Energy .....	114
References .....	121

## Introduction



## Introduction

---

The golf course maintenance industry has long recognized environmental stewardship as playing a vital role in the short and long-term success of managing golf properties. The GCSAA (Golf Course Superintendents Association of America) has offered environmental programs and education as part of its member services for decades. After a few of GCSAA's affiliated chapters developed golf course BMPs (Best Management Plans) for their states, it became apparent to GCSAA's leadership that it was important for this to be completed in all 50 states. The USGA (United States Golf Association) leadership also saw the need for development of this type of information to serve the game of golf and the properties on which it is played.

Working together to fund the BMPs were the USGA, EIFG (Environmental Institute for Golf) and the PGA Tour. All of these entities are committed to the long-term health of the game and the environment. The development of the BMP template serves as the tool for GCSAA affiliated chapters to either develop new, or refine an existing, BMPs for the state(s) of their members. The goal is to have a BMP in place for all 50 states by the end of 2020.

The Peaks & Prairies GCSA is an affiliated chapter of GCSAA with members primarily from Montana and Wyoming. A committee of 12 PPGCSA members (six from each state) volunteered to help develop the content for the Montana/Wyoming BMPs. Using the GCSAA developed template, information was customized to practices relevant in this geographic region. Consideration was given, but not limited, to Montana/Wyoming weather, plant materials, soils, water resources and features, regulatory requirements, weeds, disease and insect problems.

After this information was cross reviewed by all members of the committee, a draft was produced and distributed to several groups and individuals for review and feedback. Primarily, these included the Montana Department of Environmental Quality, Montana Department of Agriculture, the Montana State Golf Association and the Northern Plains Resource Council.

Our goal is to provide a resource helping to guide golf facilities as environmental stewards in their development, maintenance, and management of their recreational property.

## Acknowledgement



## Who We Are/ Acknowledgments

---

### Golf Course Superintendents Association of America

The Golf Course Superintendents Association of America (GCSAA) is the professional association for the men and women who manage and maintain the game's most valuable resource — the golf course. Today, GCSAA and its members are recognized by the golf industry as one of the key contributors in elevating the game and business to its current state.

Since 1926, GCSAA has been the top professional association for the men and women who manage golf courses in the United States and worldwide. From its headquarters in Lawrence, Kansas, the association provides education, information and representation to more than 17,000 members in more than 72 countries. GCSAA's mission is to serve its members, advance their profession and enhance the enjoyment, growth and vitality of the game of golf.

### Environmental Institute for Golf

The Environmental Institute for Golf (EIFG) fosters sustainability by providing funding for research grants, education programs, scholarships and awareness of golf's environmental efforts. Founded in 1955 as the GCSAA Scholarship & Research Fund for the Golf Course Superintendents Association of America, the EIFG serves as the association's philanthropic organization. The EIFG relies on the support of many individuals and organizations to fund programs to advance stewardship on golf courses in the areas of research, scholarships, education, and advocacy. The results from these activities, conducted by GCSAA, are used to position golf courses as properly managed landscapes that contribute to the greater good of their communities. Supporters of the EIFG know they are fostering programs and initiatives that will benefit the game and its environment for years to come.

### United States Golf Association

The United States Golf Association (USGA) provides governance for the game of golf, conducts the U.S. Open, U.S. Women's Open and U.S. Senior Open as well as 10 national amateur championships, two state team championships and international matches, and celebrates the history of the game of golf. The USGA establishes

equipment standards, administers the Rules of Golf and Rules of Amateur Status, maintains the USGA Handicap System and Course Rating System, and is one of the world's foremost authorities on research, development and support of sustainable golf course management practices.

## Acknowledgments

The GCSAA and EIFG wish to thank the **University of Florida**, Institute of Food and Agricultural Sciences, faculty, Dr. J. Bryan Unruh, Dr. Travis Shaddox, Dr. Jason Kruse, and Mr. Don Rainey, who worked on this project, providing their knowledge and expertise to help the golf course industry; the **USGA** for their grant to fund this important project; the **volunteers who served on the task group** to review BMP and provide technical assistance; and the **Florida Department of Environmental Protection** for permission to copy its publication, "Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses





## Additional Acknowledgement



Thanks to the following Peaks & Prairies GCSA BMP Steering Committee members for their time and effort to develop this document.

Tom Bengtson - Glacier View Golf Club, West Glacier, MT

Jason Busch - The Powder Horn Golf Club, Sheridan, MT

Dwayne Dillinger, CGCS - Bell Nob Golf Course, Gillette, WY

Dane Gamble - Bridger Creek Golf Course, Bozeman, MT

Peter Grass, CGCS - Hilands Golf Club, Billings, MT

Stephen Grass - Hilands Golf Club, Billings, MT

Rick Hathaway - Rock Creek Cattle Company, Deer Lodge, MT

Jory Horsley - The Powder Horn Golf Club, Sheridan, MT

Jason Lamb - Sidney Country Club, Sidney, MT

Zac Leader - Sidney Country Club, Sidney, MT

Dan Tolson, CGCS - 3 Creek Ranch Golf Club, Jackson, WY

Garrett Turner - The Reserve at Moonlight Basin, Big Sky, MT

# BMP Index

Planning, Design and Construction .....	11
Introduction .....	11
Planning .....	11
Design .....	12
Construction .....	13
Grow-in.....	14
Erosion and Sediment Control .....	14
Wetlands .....	15
Drainage.....	16
Surface Water: Stormwater, Ponds, Lakes .....	17
Maintenance Facilities.....	17
External Certification Programs .....	19
Wildlife Considerations.....	19
Irrigation.....	21
Water Management Approaches .....	21
Regulatory Considerations.....	22
Irrigation Water Suitability .....	22
Water Conservation and Efficient Use Planning.....	23
Irrigation System Design.....	24
Irrigation Pumping System.....	26
Irrigation System Program and Scheduling .....	27
Turf Drought Response.....	28
Irrigation System Quality .....	29
Pond Location and Design .....	30
Pond Use and Maintenance.....	32
Pond Water-Level Monitor .....	33
Metering .....	34
Irrigation Leak Detection .....	34
Sprinkler Maintenance .....	35
System Maintenance.....	36
Winterization and Spring.....	38
Sensor Technology .....	39
Maintained Turf Areas.....	40
Non-Play and Landscape Areas .....	41
Surface Water Management.....	43
Stormwater Capture .....	43
Regulatory Considerations.....	44
Water Quality Protection .....	45
Dissolved Oxygen .....	47
Aquatic Plants .....	49
Human Health Concerns.....	50
Floodplain Restoration .....	50
Stormwater, Ponds, and Lakes .....	51
Water Quality Monitoring and Management .....	53

Regulatory Considerations.....	53
Local Involvement.....	53
Site Analysis.....	54
Water Quality Sampling Program.....	54
Sampling Parameters, Collection, and Analysis.....	55
Buffer Zones.....	56
Wetland Protection.....	58
Stormwater Management.....	58
Sediment.....	59
Sodic/Saline Conditions.....	59
Nutrient and Soils Management.....	62
Introduction.....	62
Soil Health.....	63
Soil Testing.....	64
Plant Tissue Analysis.....	65
Fertilizers Used in Golf Course Management.....	65
Soil pH.....	71
Nutrient Management.....	71
Cultural Practices.....	74
Mowing.....	74
Cultivation.....	76
Shade and Tree Management.....	77
Integrated Pest Management.....	79
Introduction.....	79
IPM Overview.....	80
Written Plan.....	81
Pest Thresholds.....	82
Monitoring.....	82
Record Keeping.....	83
Turfgrass Selection.....	84
Biological Controls.....	85
Pollinators.....	85
Conventional Pesticides.....	86
Disease.....	87
Weeds.....	88
Nematodes.....	89
Pesticide Management.....	91
Introduction.....	91
Human Health Risks.....	91
Environmental Fate and Transport.....	92
Pesticide Transportation, Storage, and Handling.....	92
Emergency Preparedness and Spill Response.....	93
Pesticide Record Keeping.....	93
Sprayer Calibration.....	94
Types of Sprayers.....	94
Inventory.....	95

Shelf Life .....	95
Leaching Potentials.....	95
Mixing/Washing Station.....	96
Disposal .....	96
Personal Protective Equipment.....	97
Pesticide Container Management.....	97
Pollinator Protection.....	99
Introduction .....	99
Pollinator Habitat Protection.....	100
Maintenance Operations.....	102
Introduction .....	102
Storage and Handling of Chemicals .....	102
Waste Handling.....	103
Equipment Storage and Maintenance.....	104
Equipment Washing.....	105
Fueling Facilities .....	105
Pollution Prevention .....	105
Landscape .....	110
Species Selection and Size Considerations .....	110
Design and Function .....	111
Planting Methods .....	112
Energy .....	114
Energy Conservation.....	114
Evaluation .....	115
Efficiency.....	115
Design and Renovation.....	117
Implementation Plan .....	117
Infrastructure.....	117
Alternative products, operations, and practices .....	118
Course Management Plan .....	118
Irrigation .....	119

# Planning, Design and Construction

## *Introduction*



The construction phase of any industry's infrastructure poses the greatest risk of ecosystem alteration. With proper planning and design, golf facilities can be constructed and maintained with minimal impact to existing wildlife and their habitat. Facilities should be designed and constructed to maximize energy efficiency.

## *Regulatory Issues*

Local and state regulations may be in place in your location. Early engagement among developers, designers, local community groups, and permitting agencies is essential to designing and constructing a golf facility that minimizes environmental impact and meets the approval process.

## *Planning*

Proper planning will minimize expenses resulting from unforeseen construction requirements. Good planning provides opportunities to maximize/integrate environmentally favorable characteristics into the property. This often requires the involvement of golf course architects, golf course superintendents, state and local agencies, civil engineers, soil scientists, agronomists, irrigation designers, ecologists, etc.

## **Best Management Practices**

- Assemble a qualified team
  - Golf course architect
  - Golf course superintendent
  - Clubhouse architect
  - Irrigation engineer
  - Environmental engineer
  - Energy analyst
  - Economic consultant
  - Civil engineer

- Soil scientist
  - Geologist
  - Golf course builder
  - Legal team
- Determine objectives
- Complete a feasibility study
  - Are needs feasible given existing resources?
  - Financial
  - Environmental
  - Water
  - Energy
  - Labor
  - Materials
  - Governmental regulatory requirements/restrictions
- Consider ADA compliance during planning phase. The ADA Accessibility Guidelines (ADAAG) is the standard applied to buildings and facilities. Recreational facilities, including golf courses, are among the facilities required to comply with the ADA. Reference: <https://www.access-board.gov/guidelines-and-standards/recreation-facilities/guides/golf-courses>
- Select an appropriate site that is capable of achieving the needs of stakeholders.
- Identify strengths and weakness of the selected site.
- Identify any rare, protected, endangered or threatened plant or animal species on the site
- Identify any water quality impaired waterbodies on/adjacent to the site. Impaired waterbodies in Montana can be found through the Clean Water Information Center. <http://deq.mt.gov/water/resources/cwaic>

## ***Design***

### **Principles**

Proper design will meet the needs of the stakeholders, protect the location's environmental resources, and be economically sustainable.

### **Best Management Practices**

- Retain a qualified golf course superintendent/project manager at the beginning of the design and construction process to integrate sustainable maintenance practices in the development, maintenance, and operation of the course.
- Design the course to minimize the need to alter or remove existing native landscapes including streams/rivers. The routing should identify the areas that provide opportunities for restoration.
- Design the course to retain as much natural vegetation as possible. Where appropriate, consider enhancing existing vegetation through the supplemental

- planting of native vegetation/materials next to long fairways, out-of-play areas, and along water sources supporting fish and other water-dependent species.
- Design out-of-play areas to retain or restore existing native vegetation where possible. Nuisance, invasive, and exotic plants should be removed and replaced with native species that are adapted to that particular site.
  - Greens
    - Select a location that has adequate sunlight to meet plant specific needs and provides sufficient drainage.
    - Choose a green size and sufficient number of hole locations that are large enough to accommodate traffic and play damage, but not so large that they are not sustainable with your resources.
    - Select an appropriate root-zone material as designated by the USGA.
    - Consider the number of bunkers as it relates to resources available for daily maintenance.
    - Irrigate greens separately from surrounding turf.
  - Select a turf species/variety that meets the desired playing conditions while suitable for the site's growing conditions.
  - Plant only certified turfgrass.
  - Decide whether bunkers will contain drainage.
  - Consider bunker entry and exit points. Consider wear patterns and create adequate space for ingress/egress points on greens, tees, fairways, and bunkers.
  - Select the proper color, size, and shape of bunker sand that meets your needs.
  - Define play and non-play maintenance boundaries.

## ***Construction***

### **Principles**

Construction should be completed with care to minimize environmental impact and financial ramifications.

### **Best Management Practices**

- Conduct a pre-construction conference with stakeholders and permitting entities. Reference: <http://dnrc.mt.gov/licenses-and-permits>
- Schedule construction to maximize turfgrass establishment and site drainage.
- Use environmentally sound construction techniques.
- Use soil stabilization techniques to minimize soil erosion and maximize sediment containment.
- Identify any environmentally sensitive areas such as streams, ponds, lakes, or wetlands on the site and construct sediment & stormwater control barriers prior to disturbing any soil around these areas.
- Maintain a construction progress report and communicate the report to the proper permitting agencies.

- Use only qualified contractors who are experienced in the special requirements of golf course construction.
- Schedule construction and turf establishment to allow for the most efficient progress of the work, while optimizing environmental conservation and resource management.
- Build temporary construction compounds in a way that minimizes environmental impacts.

## ***Grow-in***

### **Principles**

Turfgrass establishment is a unique phase in turfgrass growth, which can require greater quantities of water and nutrients than established turfgrasses. To this end, the establishment phase should be considered carefully to minimize environmental risk.

### **Best Management Practices**

- Prepare the area to be established and clear the area of pests (weeds, pathogens, etc.).
- Ensure erosion and sediment control devices are in place and properly maintained.
- Topdress the sod to fill in the gaps between sod pieces. This promotes quicker establishment and provides a smoother surface.
- Use appropriate seeding methods for your conditions. When using sod, nutrient applications should be delayed until sod has sufficiently rooted.
- Use slow-release nitrogen or light, frequent soluble-nitrogen sources during grow-in.
- Apply nutrients — in either foliar or granular formulations — to the turf surface. Incorporating nutrients into the root zone does not result in more rapid establishment and increases environmental risk.
- Mow as soon as sod has knitted-down or seedlings have reached a height of one-third greater than intended height-of-cut. This will hasten establishment.

## ***Erosion and Sediment Control***

### **Principles**

- Soil carried by wind and water erosion transports contaminants with it. Contaminants can dislodge, especially on entering water bodies, where they can cause pollution.
- Erosion and sediment control is a critical component of construction and grow-in of a golf course. Many types of construction in or near water will require a MPDES storm water permit from DEQ.

### **Best Management Practices**



- Develop a working knowledge of erosion and sediment control management.
- Reference the Montana Department of Environmental Quality field guide for best management practices for storm water management during construction to ensure erosion control measures are being constructed properly.
- Develop and implement strategies to effectively control sediment, minimize the loss of topsoil, protect water resources, and reduce disruption to wildlife, plant species, and designed environmental resource areas.
- Use seeding, erosion control blankets, straw mulch & hydro-seeding to offer soil stabilization.

## **Wetlands**

### **Principles**

- Montana considers wetlands as “waters of the state,” a designation that carries significant legal ramifications. Furthermore, permitting requirements for wetlands can have multiple overlapping jurisdictions of federal, state, and local agencies. At the federal level alone, the U.S. Army Corps of Engineers (USACOE), EPA, U.S Fish and Wildlife Service (FWS), National Oceanic and Atmospheric Administration (NOAA), and maritime agencies may all be involved.
- Wetlands act both as filters for pollutant removal and as nurseries for many species of birds, insects, fish, and other aquatic organisms. The biological activity of plants, fish, animals, insects, and especially bacteria and fungi in a healthy, diverse wetland is the recycling factory of our ecosystem.
- When incorporated into a golf course design, wetlands should be maintained as preserves and separated from managed turf areas with native vegetation or structural buffers. Constructed or disturbed wetlands may need to be permitted to be an integral part of the stormwater management system.

### **Best Management Practices**

- Ensure that proper permitting has been obtained before working on any wetlands.
- Ensure that wetlands have been properly delineated before working in and around any wetlands.



Whitefish Lake Golf Club - Whitefish, MT

## ***Drainage***

### **Principles**

- Adequate drainage is necessary for growing healthy turfgrass.
- A high-quality BMP plan for drainage addresses the containment of runoff, adequate buffer zones, and filtration techniques in the design and construction process to achieve acceptable water quality.
- Drainage of the golf course features is only as good as the system's integrity. Damaged, improperly installed, or poorly maintained drainage systems will result in inferior performance that negatively impacts play and increases risks to water quality.

### **Best Management Practices**

- Pay close attention to engineering details such as subsoil preparation, the placement of gravel, slopes, and backfilling when constructing drainage systems.
- Discharge internal golf course drains through pre-treatment zones and/or vegetative buffers, rather than directly into an open waterbody, in order to help remove nutrients and sediments.
- Discharge drainage through proper drainage and stormwater management devices, for example, vegetative buffers, swales, etc.
- Inspect the drainage system routinely to ensure proper function.
- Drain cart paths away from areas in play and follow hard surface runoff guidelines.

## ***Surface Water: Stormwater, Ponds, Lakes***

### **Principles**

- Stormwater is the conveying force behind nonpoint source pollution.
- Controlling stormwater on a golf course is more than preventing the flooding of facilities and play areas. In addition to controlling the amount and rate of water leaving the course, stormwater control also involves storing irrigation water, controlling erosion and sediment, enhancing wildlife habitat, removing waterborne pollutants, and addressing aesthetic and playability concerns. Keep in mind that not all stormwater on a golf course originates there; some may be from adjoining lands, including residential or commercial developments.
- In general, construction activities which disturb more than one acre may require a National Pollutant Discharge Elimination System (NPDES) Permit. Contact the Montana Department of Environmental Quality to determine any requirements.

### **Best Management Practices**

- Create stormwater treatment, best accomplished by a “treatment train” approach, in which water is conveyed from one treatment to another by conveyances that themselves contribute to the treatment.
- Include a Storm Water Pollution Prevention Plan (SWPPP) which will consider all sources & remedies of storm water pollution that should be monitored in all construction activities.
- Eliminate or minimize as much directly connected impervious area (DCIA) as possible.
- Use vegetated swales to slow and infiltrate water and trap pollutants in the soil, where they can be naturally destroyed by soil organisms.
- Use depressed landscape islands in parking lots to catch, filter, and infiltrate water, instead of letting it run off. When hard rains occur, an elevated stormwater drain inlet allows the island to hold the treatment volume and settle out sediments, while allowing the overflow to drain away.
- Maximize the use of pervious pavements, such as brick or concrete pavers separated by sand and planted with grass. Special high-permeability concrete is available for cart paths or parking lots.
- Disconnect runoff from gutters and roof drains from impervious areas, so that it flows onto permeable areas that allow the water to infiltrate near the point of generation.

## ***Maintenance Facilities***

### **Principles**

The maintenance facilities must incorporate BMP to minimize the potential for contamination of soil and water resources. The pesticide mixing and storage facility, the equipment wash pad, and the fuel center are focal points.

## Best Management Practices

- Design and build pesticide storage structures to keep pesticides secure and isolated from the surrounding environment.
- Store pesticides in a roofed concrete or metal structure with a lockable door.
- Construct floors of seamless metal or concrete sealed with a chemical-resistant paint.
- Ensure that flow from floor drains does not discharge directly to the ground and that drains are not connected to the sanitary sewer line or septic system.
- Equip the floor with a continuous curb to retain spilled materials.
- Avoid storing pesticides near burning materials or hot work (welding, grinding), or in shop areas.
- Provide storage for personal protective equipment (PPE) where it is easily accessible in the event of an emergency, but do not store in the pesticide storage area.
- Provide adequate space and shelving to segregate herbicides, insecticides, and fungicides.
- Use shelving made of plastic or reinforced metal. Keep metal shelving painted.
- Provide appropriate exhaust ventilation and an emergency wash area.
- Place dry materials above liquids, never liquids above dry materials.
- Prevent placing liquids above eye level.
- Locate operations well away from groundwater wells and areas where runoff may carry spilled pesticides into surface waterbodies.
- Avoid building new facilities on potentially contaminated sites.
- Build an open building with a roof with a substantial overhang (minimum 30° from vertical, 45° recommended) on all sides.
- Construct a concrete mixing and loading pad, paying critical attention to the water-to-cement ratio (no higher than 0.45:1 by weight).
- Use a sump that is small and easily accessible for cleaning.
- Ensure that workers always use all personal protection equipment as required by the pesticide label and are provided appropriate training.
- Assess the level of training and supervision required by staff.
- Determine any material that collects on the pad as a pesticide, according to the label, or dispose of as a potentially hazardous waste, according to Montana state law and regulations.
- Clean up spills immediately!
- Store nitrogen-based fertilizers separately from solvents, fuels, and pesticides, since many fertilizers are oxidants and can accelerate a fire. Ideally, fertilizer should be stored in a concrete building with a metal or other type of flame-resistant roof.
- Store fertilizers in an area that is protected from rainfall. The storage of dry bulk materials on a concrete or asphalt pad may be acceptable if the pad is adequately protected from rainfall and from water flowing across the pad.
- Sweep up any spilled fertilizer immediately.
- Avoid washing equipment unnecessarily.

- Clean equipment over an impervious area, and keep it swept clean.
- Brush or blow equipment with compressed air before, or instead of, washing.
- Use spring shutoff nozzles.
- Use a closed-loop recycling system for wash water.
- Recycle system filters, treat sludge and dispose of appropriately.
- Give each piece of equipment an assigned parking area. This allows oil or other fluid leaks to be easily spotted and attributed to a specific machine so that it can be repaired.
- Use solvent-recycling machines or water-based cleaning machines to cut down on the use of flammable and/or toxic solvents.
- Use a service to remove the old solvents and dispose of them properly.
- Design pesticide storage to keep pesticides secure and isolated from the environment.

## ***External Certification Programs***

### **Principles**

- Golf-centric environmental management programs or environmental management systems can help golf courses protect the environment and preserve the natural heritage of the game.
- These programs help people enhance the natural areas and wildlife habitats that golf courses provide, improve efficiency, and minimize potentially harmful impacts of golf course operations.
- Golf courses can gain valuable recognition for their environmental education and certification efforts.

### **Best Management Practices**

- Obtain and review materials to ascertain whether the facility should seek certification.
- Work with staff to establish facility goals that lead to certification.
- Establish goals to educate facility decision makers about the certification program.

## ***Wildlife Considerations***

### **Principles**

- Golf courses occupy large land areas, generally in urban areas, providing critical links between urban and rural/natural environments.
- Maintaining wildlife habitat on golf courses better maintains biological diversity, which is especially important in the urban environment.
- Most golfers enjoy observing non-threatening wildlife as they play the game.

## Best Management Practices

- Identify the different types of habitat specific to the site.
- Identify the habitat requirements (food, water, cover, space) for identified wildlife species.
- Identify species on the site that are considered threatened or endangered by the federal or state government, including species the state deems “of special concern.”
- Preserve critical habitat.
- Identify and preserve regional wildlife and migration corridors.
- Avoid or minimize crossings of wildlife corridors. Design unavoidable crossings to accommodate wildlife movement.
- Remove nuisance and exotic/invasive plants and replace them with native species that are adapted to a particular site.
- Maintain clearance between the ground and the lowest portion of a fence or wall to allow wildlife to pass, except in areas where feral animals need to be excluded.
- Retain dead tree snags for nesting and feeding sites, provided they pose no danger to people or property.
- Construct and place birdhouses, bat houses, and nesting sites in out-of-play areas.
- Plant pollinator gardens around the clubhouse and out-of-play areas.
- Retain riparian buffers along waterways to protect water quality and provide food, nesting sites, and cover for wildlife.
- Minimize stream or river crossings to protect water quality and preserve stream banks.



Wilderness Club - Eureka, MT

# Irrigation

## *Water Management Approaches*



The supplemental use of water for course play and non-play areas is essential to supporting healthy turfgrass and landscape plant health. It is also necessary to sustaining optimal course playability, aesthetics, marketability, and golfer participation.

The purpose of this section is to identify best management practices related to water use that conserve and protect water resources. It is important to keep in mind that, while new technology makes many tasks easier or less labor-intensive, the principles discussed in this section are important to understand and apply to protect water quality and quantity and surrounding natural resources.

Additionally, irrigation BMP may provide an economic, regulatory compliance, and environmental stewardship advantage to those who consider them part of their irrigation management plan. BMP are not intended to increase labor or place an undue burden on the owner/superintendent. If applied appropriately, BMP can help stabilize labor cost, extend equipment life, and limit repair and overall personal and public liability.

The monetary investment in non-structural, BMP costs little to nothing to implement in a daily course water-use plan. Other advantages to using BMP include: reduced administrative management stress, improved employee communication and direction, and effective facilities training procedures.

Several benefits of adopting BMP are:

- Conserving the water supply
- Protecting existing water quality
- Maintaining optimal ball roll and playing conditions
- Saving water and electricity
- Increasing pump and equipment life longevity
- Demonstrating responsible environmental stewardship
- Retaining knowledgeable and effective employees

### **Conservation and Efficiency**

Conservation and efficiency considers the strategic use of appropriate course and irrigation design, plant selection, computerized and data-integrated scheduling, and alternative water quality/supply options that maximize plant health benefits and reduce the potential for negative impacts on natural resources.

### **Resource Protection**

Resource protection is an integrated approach that includes irrigation practices as part of the course design, pesticide and nutrient practices, and regulatory compliance plus structural measures as they concern environmental stewardship and policy.

## ***Regulatory Considerations***

### **Principles**

- Golf course owners are responsible for contacting federal, state, and local water use authorities at the pre-and post-construction phase to determine annual or specific water consumption (water rights), permitting guidelines, and other requirements allowed by regulators.
- Superintendents have a responsibility to adhere to water-quality standard rules regarding groundwater and surface water flows resulting from the removal of water for irrigation use.

### **Best Management Practices**

- Design and/or maintain a system to meet site's peak water requirements under normal conditions and also be flexible enough to adapt to various water demands and local restrictions.
- Develop an annual water budget for the golf course.
- Look for ways to increase efficiency and reduce energy use associated with irrigation systems and practices.
- Demonstrate good stewardship practices by supplementing watering only for the establishment of new planting and new sod, hand watering of critical hot spots, and watering-in of chemicals and fertilizers (if permissible).
- Protect aquatic life and impairment of water systems by adhering to state and local water withdrawal allocations (gallons/day).
- Design an irrigation system that delivers water with maximum efficiency.

## ***Irrigation Water Suitability***

### **Principles**

- Golf course designers and managers should endeavor to identify and use alternative supply sources to conserve freshwater drinking supplies, promote plant health, and protect the environment.



- The routine use of potable water supply is not a preferred practice; therefore, municipal drinking water should be considered only when there is no alternative.
- Studies of water supplies are recommended for irrigation systems, as are studies of waterbodies or flows on, near and under the property. These may be helpful to properly design a course's stormwater systems, water features, and to protect water resources.
- When necessary, sodic water system treatment options should be included in the budget to address water quality and equipment maintenance.

### **Best Management Practices**

- Use alternative water supplies/sources that are appropriate and sufficiently available to supplement water needs.
- Use salt-tolerant varieties of turf and plants to mitigate saline conditions resulting from an alternative water supply or source, if necessary.
- Amend sodic water systems appropriately (with gypsum or an appropriate ion) to minimize sodium buildup in soil.
- Flush with freshwater or use amending materials regularly to move salts out of the root zone.
- Monitor sodium and bicarbonate buildup in the soil using salinity sensors.
- Monitor shallow groundwater table for contamination of heavy metals and nutrients.
- Guarantee reclaimed, effluent, and other non-potable water supply mains have a thorough and correctly operating cross-connection and backflow prevention device in place.
- Post signage in accordance with local utility and state requirements when reclaimed water is in use.
- Account for the nutrients in effluent (reuse/reclaimed) water when making fertilizer calculations. Excess nutrients are more likely to runoff.
- Monitor reclaimed water tests regularly for dissolved salt content.
- Use, where practical, reverse-osmosis filtration systems to reduce chlorides (salts) from saline groundwater.
- Monitor the quantity of water withdrawn to avoid aquatic life impairment.
- Identify appropriate water supply sources that meet seasonal and bulk water allocations for grow-in and routine maintenance needs.

## ***Water Conservation and Efficient Use Planning***

### **Principles**

- Document actual watering practices, especially to show savings in water use over averages. Communication should be maintained with water managers, ownership, golfers and the public to explain what you are doing and why.

- Potable water supplies in many areas of the United States are limited, and demand continues to grow. Our challenge is to find solutions to maintain the quality of golf while using less water.
- BMP and educational programs are necessary to change the public's mind-set toward the inevitable changes in water-related issues.
- Some courses are being designed using a "target golf" concept that minimizes the acreage of irrigated turf. Existing golf courses can make an effort to convert out-of-play areas turf to naturally adapted native plants, grasses, or ground covers to reduce water use and augment the site's aesthetic appeal.

### **Best Management Practices**

- Select drought-tolerant varieties of turfgrasses to help maintain an attractive and high-quality playing surface, while minimizing water use.
- Plant non-play areas with drought-resistant native or other well-adapted, noninvasive plants that provide an attractive and low-maintenance landscape.
- Provide native plant species which are important in providing wildlife with habitat and food sources. After establishment, site-appropriate plants normally require little to no irrigation.
- Operate the system to provide only the water that is actually needed by the plants, or to meet occasional special needs such as salt removal.
- Design properly, so rain and runoff captured in water hazards and stormwater ponds may provide supplemental water under normal conditions, though backup sources may be needed during severe drought.
- Monitor soil moisture levels closely during a drought. Whenever practical, irrigate at times when the least amount of evaporative loss will occur.
- Control invasive plants or plants that use excessive water.

## ***Irrigation System Design***

### **Principles**

- A well designed irrigation system should operate at peak efficiency to reduce energy, labor and natural resources.
- Irrigation systems should be properly designed and installed to improve water use efficiency.
- An efficient irrigation system maximizes water use, reduces operational cost, conserves supply and protects water resources.

### **Best Management Practices**

- Design a system with optimal distribution efficiency and effective root-zone moisture coverage. Target 80% or better Distribution Uniformity (DU).
- Design a system to allow the putting surface and slopes and surrounds to be watered independently.

- Include in the design package a general irrigation schedule with recommendations and instructions on modifying the schedule for local climatic soil and growing conditions. It should include the base ET rate for the particular location.
- Conduct saturated hydraulic conductivity tests periodically. The application rate must not exceed the infiltration rate (ability of the soil to absorb and retain the water applied during any one application).
- Establish a procedure where the design operating pressure is not greater than the available source pressure.
- Account for peak-use times and supply line pressures at final buildout for the entire system, using proper design operating pressure.
- Create a system flexible enough to meet a site's peak water requirements and allow for operating modifications to meet seasonal irrigation changes or local restrictions.
- Zone turf and landscape areas separately. Specific use areas zoned separately; greens, tees, primary roughs, secondary roughs, fairways, native, trees, shrubs, etc.
- Design an irrigation system to account for the need to leach out salt buildup from poor-quality water sources by providing access to freshwater.
- Install the irrigation system using only qualified specialists.
- Keep construction consistent with the design.
- Seek approval from the designer for any design changes before construction.
- Ensure construction and materials meet existing standards and criteria.
- Identify, prior to construction, all underground cables, pipes, and other obstacles, and flag their locations.
- Space permanent irrigation sprinklers and other distribution devices according to the manufacturer's recommendations.
- Base spacing on average wind conditions during irrigation. For variable wind directions, triangular spacing is more uniform than square spacing.
- Design distribution devices and pipe sizes for optimal uniform coverage.
- Ensure the first and last distribution device has no more than a 10% difference in flow rate. This usually corresponds to about a 20% difference in pressure.
- Ensure distribution equipment (such as sprinklers, rotors, and micro-irrigation devices) in a given zone has the same precipitation rate.
- Space heads for turf areas for head-to-head coverage.
- Design water supply systems (for example, wells, and pipelines) for varying control devices, rain shutoff devices, and backflow prevention.
- Design water conveyance systems with thrust blocks and air-release valves.
- Ensure flow velocity is 5 feet per second or less.
- Design pipelines to provide the system with the appropriate pressure required for maximum irrigation uniformity.
- Use pressure-regulating or compensating equipment where the system pressure exceeds the manufacturer's recommendations.
- Use equipment with check valves in low areas to prevent low head drainage.
- Install isolation valves in a manner that allows critical areas to remain functional.

- Install manual quick-coupler valves near greens, tees, and bunkers so these can be hand-watered to conserve when automated irrigation is not warranted.
- Install part-circle heads along lakes, ponds, and wetlands margins.
- Use part-circle or adjustable heads to avoid overspray of impervious areas such as roadways and sidewalks.
- Update multi-row sprinklers with single head control to conserve water and to enhance efficiency.
- Incorporate multiple nozzle configurations to add flexibility and enhance efficiency/distribution.
- Ensure heads are set at level ground and not on slopes.



Meadow Lark Country Club - Great Falls, MT

## ***Irrigation Pumping System***

### **Principles**

- Pump stations should be sized to provide adequate flow and pressure. They should be equipped with control systems that protect distribution piping, provide for emergency shutdown necessitated by line breaks, and allow maximum system scheduling flexibility.
- Variable frequency drive (VFD) pumping systems should be considered if dramatically variable flow rates are required, if electrical transients (such as spikes and surges) are infrequent, and if the superintendent has access to qualified technical support.
- Design pumping systems for energy conservation.

### **Best Management Practices**

- Ensure the design operating pressure is not greater than the available source pressure.
- Ensure the design operating pressure accounts for peak-use times and supply-line pressures at final buildout for the entire system.

- Maintain the air-relief and vacuum-breaker valves by using hydraulic-pressure-sustaining valves.
- Install VFD systems to lengthen the life of older pipes and fittings until the golf course can afford a new irrigation system.
- Operate an irrigation system with high-and low-pressure sensors that shut down the system in case of breaks and malfunctions.
- Size pumps to provide adequate flow and pressure.
- Equip pumps with control systems to protect distribution piping.
- Follow system checks and routine maintenance on pumps, valves, programs, fittings, and sprinklers, based on the manufacturer's recommendations.
- Monitor pumping station power consumption.
- Monitor monthly bills over time to detect a possible increase in power usage.
- Compare the power used with the amount of water pumped. Requiring more power to pump the same amount of water may indicate a problem with the pump motor(s), control valves, or distribution system.
- Check amperage quarterly. Qualified pump personnel may more accurately indicate increased power usage and thus potential problems.

## ***Irrigation System Program and Scheduling***

### **Principles**

- Irrigation scheduling must take plant water requirements and soil intake capacity into account to prevent excess water use that could lead to leaching and runoff.
- Plant water needs are determined by evapotranspiration (ET) rates, recent rainfall, recent temperature extremes and soil moisture.
- Irrigation should not occur on a calendar-based schedule, but should be based on ET rates and soil moisture replacement.
- An irrigation system should be operated based only on the moisture needs of the turfgrass, or to water-in a fertilizer or chemical application as directed by the label.
- Responsible irrigation management conserves water, reduces nutrient and pesticide movement.
- Time-clock-controlled irrigation systems preceded computer-controlled systems, and many are still in use today. Electric/mechanical time clocks cannot automatically adjust for changing ET rates. Frequent adjustment is necessary to compensate for the needs of individual turfgrass areas.

### **Best Management Practices**

- Calibrate the reliability of older clock-control station timing devices. This should be done periodically, but at least seasonally.

- Monitor rain sensors on an irrigation system to shut off the system after 0.25 to 0.5 inch of rain is received. Computerized systems allow a superintendent to call in and cancel the program if it is determined that the course has received adequate rainfall.
- Install control devices to allow for maximum system scheduling flexibility.
- Minimize runoff by making sure the granular fertilizer applications receive 0.25 inch of irrigation to move the particles off the leaves.
- Ensure irrigation quantities do not exceed the available moisture storage in the root zone.
- Ensure irrigation rates do not exceed the maximum ability of the soil to absorb and hold the water applied at any one time.
- Coordinate the irrigation schedule to coincide with other cultural practices (for example, the application of nutrients, herbicides, or other chemicals).
- Account for nutrients in effluent supply when making fertilizer calculations.
- Use irrigation in the early morning hours before air temperatures rise and relative humidity drops.
- Determine base plant water needs by ET rates, recent rainfall, recent temperature extremes, and soil moisture.
- Use mowing, verticutting, aeration, nutrition, and other cultural practices to control water loss and to encourage conservation and efficiency.
- Monitor visually localized dry conditions or hot spots to identify poor irrigation efficiency or a failed system device.
- Use predictive models to estimate soil moisture and the best time to irrigate.
- Avoid use of a global setting; make adjustments to watering times per head.
- Base water times on actual site conditions for each head and zone.
- Adjust irrigation run times based on current local meteorological data.
- Use computed daily ET rate to adjust run times to meet the turf's moisture needs. Adjust automated ET data to reflect wet and dry areas on the course.
- Use soil moisture sensors to assist in scheduling or to create on-demand irrigation schedules.
- Use multiple soil moisture sensors to reflect soil moisture levels.
- Install soil moisture sensors in the root zone for each irrigation zone to enhance scheduled timer-based run times.
- Place soil moisture sensors in a representative location within the irrigation zone. Install a soil moisture sensor in the driest irrigation zone of the irrigation system.
- Install wired soil moisture systems to prevent damage from aerification.
- Perform catch-can uniformity tests periodically.
- Improve water infiltration by reducing dry spots and soil compaction, which in turn reduces water use and runoff in other areas.
- Install emergency shutdown devices to address line breaks.

## ***Turf Drought Response***

### **Principles**

- The presence of visual symptoms of moisture stress is a simple way to determine when irrigation is needed.
- Use a soil moisture meter to determine irrigation needs of in play areas.
- Managers of golf greens cannot afford to wait until symptoms occur, because unacceptable turf quality may result.
- Be prepared for extended drought/restrictions by developing a written drought management plan.
- For golf greens and tees, the majority of roots are in the top several inches of soil.

### **Best Management Practices**

- Wait until visual symptoms appear before irrigating - a method best used for low-maintenance areas, such as golf course roughs and, possibly, fairways.
- Use soil moisture meters to determine moisture thresholds and plant needs.
- Avoid irrigating too shallowly, which encourages shallow rooting, increases soil compaction, and favors pest outbreaks.
- For golf greens and tees, the majority of roots are in the top several inches of soil.
- Use infrequent, deep irrigation for fairways and roughs, to supply sufficient water for plants and to encourage deep rooting.
- Employ proper cultural practices, such as mowing height, irrigation frequency and irrigation amounts to promote healthy, deep root development and reduce irrigation requirements.
- Create a drought management plan for the facility that identifies steps to be taken to reduce irrigation/water use and protects critical areas, etc.
- Use appropriate turfgrass species adapted to the location of the golf course being managed.

## ***Irrigation System Quality***

### **Principles**

- Irrigation system maintenance on a golf course involves four major efforts: calibration or auditing, preventive maintenance (PM), corrective maintenance, and record keeping.
- Personnel charged with maintaining any golf course irrigation system face numerous challenges. This is particularly true for courses with older or outdated equipment.
- Good system management starts with good preventive maintenance (PM) procedures and recordkeeping. Maintaining a system is more than just fixing heads.
- Corrective maintenance is simply the act of fixing what is broken. It may be as simple as cleaning a clogged orifice, or as complex as a complete renovation of the irrigation system.

- As maintenance costs increase, the question of whether to renovate arises. Renovating a golf course irrigation system can improve system efficiencies, conserve water, improve playability, and lower operating costs.

### **Best Management Practices**

- Respond to day-to-day failures in a timely manner, maintain the integrity of the system as designed, and keep good records.
- Follow the manufacturer's recommendations for system checks and routine maintenance on pumps, valves, programs, fittings, and sprinklers.
- Inspect the system daily for proper operation by checking computer logs and visually inspecting the pump station, remote controllers, and irrigation heads. A visual inspection should be carried out for leaks, misaligned or inoperable heads, and chronic wet or dry spots, so that adjustments can be made.
- Observe systems in operation at least weekly. This can be done during maintenance programs such as fertilizer or chemical applications where irrigation is required, or the heads can be brought on-line for a few seconds and observed for proper operation. This process detects controller or communications failures, stuck or misaligned heads, and clogged or broken nozzles.
- Check filter operations frequently. An unusual increase in the amount of debris may indicate problems with the water source.
- Keep filters operating properly to prolong the life of an existing system and reduce pumping costs.
- Keep records of filter changes, as this could be an early sign of system corrosion, well problems, or declining irrigation water quality.
- Check application/distribution efficiencies annually. Implement a PM program to replace worn components before they waste fertilizer, chemicals, and water.
- Conduct a periodic professional irrigation audit at least once every five years.
- Document equipment run-time hours. Ensure that all lubrication, overhauls, and other preventive maintenance are completed according to the manufacturer's schedule.
- Gather together all of the documentation collected as part of the PM program, along with corrective maintenance records for analysis.
- Identify problems and their costs help determine what renovations are appropriate.
- Collect information on the cost of maintaining the system as part of system overall evaluation, which allows for planning necessary upgrades, replacement, etc. Compare after changes are made.

### ***Pond Location and Design***

#### **Principles**

- Understanding natural lake processes and accommodating them in the design and management of a pond can create significant aesthetic value and reduce operational costs.



- Lakes and ponds have several distinct defining characteristics. Their size, shape, and depth may all affect how they respond to various environmental inputs.
- Most golf courses plan their lakes and water hazards to be a part of the stormwater control and treatment system. This usually works well for all concerned. However, natural waters may not be considered treatment systems and must be protected.
- Lakes and ponds may be used as a source of irrigation water. It is important to consider these functions when designing and constructing the ponds.
- Careful design may significantly reduce future operating expenses for lake and aquatic plant management.

### **Best Management Practices**

- Consult with a qualified golf course architect, working in conjunction with a stormwater engineer, to develop an effective stormwater management system that complies with the requirements of the water management district/department or other permitting agency. There are additional permitting requirements for pond construction within a floodplain.
- Consider engineering details such as subsoil preparation, the placement of gravel, slopes, and backfilling when constructing drainage systems.
- Create, where practical, internal golf course drains that discharge through pretreatment zones and/or vegetative buffers to help remove nutrients and sediments.
- Perform studies of water supplies needed for irrigation systems. Studies of waterbodies or flows on, near, or under the property are needed to properly design a course's stormwater systems and water features, and to protect water resources.
- Prevent peninsular projections and long, narrow fingers into ponds that may prevent water mixing.
- Ponds that are too shallow may reach high temperatures, leading to low oxygen levels and promoting algal growth and excess sedimentation.
- Use aeration equipment in shallow or nutrient-impacted ponds to maintain acceptable dissolved oxygen (DO) levels in the water.



Stock Farm Club - Hamilton, MT

## ***Pond Use and Maintenance***

### **Principles**

- Successful pond management should include a clear statement of goals and priorities to guide the development of the BMP necessary to meet those goals. Some of the challenges facing superintendents in maintaining the quality of golf course ponds are as follows:
  - Low dissolved oxygen
  - Sedimentation
  - Changes in plant populations
  - Nuisance vegetation
  - Maintenance of littoral shelves
  - Vegetation on the lakeshore
- Each pond has regions or zones that significantly influence water quality and are crucial in maintaining the ecological balance of the system. It is important for the manager to understand their function and how good water quality can be maintained if these zones (riparian zone, littoral zone, limnetic zone, and benthic zone) are properly managed.

- Surface water sources can present problems with algae and bacteria growth. Algal cells and organic residues of algae can pass through irrigation system filters and form aggregates that may plug emitters.
- Pond leaks should be controlled and managed properly.
- Use an expert in aquatic management to help develop and monitor pond management programs.

### **Best Management Practices**

- Use leak controls in the form of dike compaction, natural-soil liners, soil additives, commercial liners, drain tile, or other approved methods.
- Maintain a riparian buffer to filter the nutrients and sediment in runoff.
- Reduce the frequency of mowing at the lake edge and collect or direct clippings to upland areas.
- Prevent overthrowing fertilizer into ponds. Practice good fertilizer management to reduce nutrient runoff into ponds, which causes algae blooms and ultimately reduces dissolved oxygen levels.
- Establish a special management zone around pond edges.
- Dispose of grass clippings where runoff will not carry them back to a water body.
- Encourage clumps of native emergent vegetation at the shoreline.
- Maintain water flow through lakes, if they are interconnected.
- Establish wetlands where water enters lakes to slow water flow and trap sediments.
- Maintain appropriate silt fencing and BMP on projects upstream to reduce erosion and the resulting sedimentation.
- Manipulate water levels to prevent low levels that result in warmer temperatures and lowered dissolved oxygen levels.
- Aerate ponds and dredge or remove sediment before it becomes a problem.

### ***Pond Water-Level Monitor***

#### **Principle**

Evaporation losses are higher in some regions than others and vary from year to year and within the year. However, evaporative losses could approach 6 inches per month during the summer. Aquatic plants are more difficult to control in shallow water.

#### **Best Management Practices**

- Ensure a pond should hold surplus storage of at least 10 percent of full storage.
- Provide an alternative source for ponds that may require supplemental recharge from another water source such as a well during high-demand periods.
- Estimate losses from evaporation and seepage. These estimates should be added to the recommended depth of the pond.

## ***Metering***

### **Principles**

- Rainfall may vary from location to location on a course; the proper use of rain gauges, rain shut-off devices, flow meters, soil moisture sensors, and/or other irrigation management devices should be incorporated into the site's irrigation schedule.
- It is also important to measure the amount of water that is actually delivered through the irrigation system, via a water meter or a calibrated flow-measurement device.
- Knowing the flow or volume will help determine how well the irrigation system and irrigation schedule are working.

### **Best Management Practices**

- Calibrate equipment periodically to compensate for wear in pumps, nozzles, and metering systems.
- Manage irrigation using properly calibrated flow meters, soil moisture sensors, rain shut-off devices, and/or other automated methods.
- Prevent turbulence and bad readings by using flow meters that have a run of pipe that is straight enough — both downstream and upstream.
- Use flow meters to determine how much water is applied.
- For electromagnetic flow meters, if fertigation is used, ensure that injection ports are downstream of the flow meter.

## ***Irrigation Leak Detection***

### **Principle**

- Irrigation systems are complex systems that should be closely monitored to ensure leaks are quickly detected and corrected.
- Golf courses without hydraulic pressure-sustaining valves are much more prone to irrigation pipe and fitting breaks because of surges in the system, creating more downtime for older systems. A good preventive maintenance program is very important.

### **Best Management Practices**

- Monitor water meters or other measuring devices for unusually high or low readings to detect possible leaks or other problems in the system. Make any needed repairs.
- Install in an irrigation system high- and low-pressure sensors that shut down the system in case of breaks and malfunctions.
- Monitor the system daily for malfunctions and breaks. Also log the amount of water pumped each day.

- Document and periodically review the condition of infrastructure (such as pipes, wires, and fittings). If the system requires frequent repairs, determine why these failures are occurring. Pipe failures may be caused not only by material failure, but also by problems with the pump station.
- Install automated emergency control systems to shut down pumps in the event of a line break. They must be tested and serviced on a regular schedule.

## ***Sprinkler Maintenance***

### **Principles**

- Good system management starts with good preventive maintenance (PM) procedures and record keeping. This can be done during maintenance programs such as fertilizer or chemical applications where irrigation is required, or the heads can be brought on-line for a few seconds and observed for proper operation.
- Maintaining a system is more than just fixing heads. It also includes documenting system- and maintenance-related details so that potential problems can be addressed before expensive repairs are needed. It also provides a basis for evaluating renovation or replacement options.
- Be proactive; if the system requires frequent repairs, it is necessary to determine why these failures are occurring.
  - Pipe failures may be caused not only by material failure, but also by problems with the pump station.
  - Wiring problems could be caused by corrosion, rodent damage, or frequent lightning or power surges.
  - Control tubing problems could result from poor filtration.

### **Best Management Practices**

- Follow the manufacturer's recommendations for system checks and routine maintenance on pumps, valves, programs, fittings, and sprinklers.
- Inspect the system routinely for proper operation by checking computer logs and visually inspecting the pump station, remote controllers, and irrigation heads.
- Inspect the system visually for leaks, misaligned or inoperable heads, and chronic wet or dry spots, so that adjustments can be made or replaced.
- Flush irrigation lines regularly to minimize emitter clogging. To reduce sediment buildup, make flushing part of a regular maintenance schedule. If fertigating, prevent microbial growth by flushing all fertilizer from the lateral lines before shutting down the irrigation system.
- Clean and maintain filtration equipment.
- Observe systems in operation at least weekly. This process detects controller or communication failures, stuck or misaligned heads, and clogged or broken nozzles.
- Check filter operations frequently. An unusual increase in the amount of debris may indicate problems with the water source.

- Keep filters operating properly, even under routine conditions. This prolongs the life of an existing system and reduces pumping costs.
- Keep records of filter changes, as this could be an early sign of system corrosion, well problems, or declining irrigation water quality.
- Check application/distribution efficiencies annually. Conduct a periodic professional irrigation audit at least once every five years. Implement a PM program to replace worn components before they waste fertilizer, chemicals, and water.
- Document equipment run-time hours.
- Ensure that all lubrication, overhauls, and other preventive maintenance are completed according to the manufacturer's schedule.
- Monitor pump station power consumption. Monthly bills should be monitored over time to detect a possible increase in power usage. Compare the power used with the amount of water pumped. Requiring more power to pump the same amount of water may indicate a problem with the pump motor(s), control valves, or distribution system. Quarterly checks of amperage by qualified pump personnel may more accurately indicate increased power usage and thus potential problems.
- Monitor and record the amount of water being applied, including system usage and rainfall. By tracking this information, you can identify areas where minor adjustments can improve performance. Not only is this information essential in identifying places that would benefit from a renovation, but it is also needed to compute current operating costs and compare possible future costs after a renovation.
- Document and periodically review the condition of infrastructure (such as pipes, wires, and fittings).

## ***System Maintenance***

### **Principles**

- Course owners/superintendents do routine maintenance to ensure water quality and responsible use of the water supply.
- System checks and routine maintenance include: pumps, valves, programs, fittings, and sprinklers.
- To ensure that it is performing as intended, an irrigation system should be calibrated regularly by conducting periodic irrigation audits to check actual water delivery and nozzle efficiency.

### **Best Management Practices**

- Perform irrigation audits by trained technicians.
- Identify necessary repairs or corrective actions by visual inspection. It is essential to make repairs before carrying out other levels of evaluation.
- Evaluate pressure and flow to determine that the correct nozzles are being used and that the heads are performing according to the manufacturer's specifications.

- Check pressure and flow rates at each head to determine the average application rate in an area.
- Run catch-can tests to determine the uniformity of coverage and to accurately determine irrigation run times.
- Conduct catch-can testing on the entire golf course to ensure that the system is operating at its highest efficiency.
- Conduct an irrigation audit annually to facilitate a high-quality maintenance and scheduling program for the irrigation system.
- Inspect for interference with water distribution.
- Inspect for broken and misaligned heads.
- Check that the rain sensor is present and functioning.
- Inspect the backflow device to determine that it is in place and in good repair.
- Examine turf quality and plant health for indications of irrigation malfunction or needs for scheduling adjustments.
- Schedule documentation; make adjustments and repairs on items diagnosed during the visual inspection before conducting pressure and flow procedures.

### ***Preventive Maintenance***

- Inspect irrigation pipe in older systems and look for fitting breaks caused by surges in the system.
- Install thrust blocks to support conveyances.
- Inspect the system daily for proper operation by checking computer logs and visually inspecting the pump station, remote controllers, and irrigation heads. A visual inspection should be carried out for leaks, misaligned or inoperable heads, and chronic wet or dry spots so that adjustments can be made.
- Maintain air-relief and vacuum-breaker valves.
- Observe systems in operation at least weekly to detect controller or communication failures, stuck or misaligned heads, and clogged or broken nozzles.
- Check filter operations frequently; keeping filters operating properly prolongs the life of an existing system and reduces pumping costs.
- Keep records of filter changes, as this could be an early sign of system corrosion, well problems, or declining irrigation water quality.
- Check application/distribution efficiencies annually.
- Conduct a periodic professional irrigation audit at least once every five years.
- Document equipment run-time hours. Ensure that all lubrication, overhauls, and other preventive maintenance are completed according to the manufacturer's schedule.
- Monitor the power consumption of pump stations for problems with the pump motors, control valves, or distribution system.
- Perform quarterly checks of amperage to accurately identify increased power usage that indicates potential problems. This should be done by qualified pump personnel.

- Monitor and record the amount of water being applied, including system usage and rainfall. By tracking this information, areas where minor adjustments can improve performance can be identified.
- Document and periodically review the condition of infrastructure (such as pipes, wires, and fittings). If the system requires frequent repairs, it is necessary to determine why these failures are occurring.
- Increase frequency of routine inspection/calibration of soil moisture sensors that may be operating in high-salinity soils.
- Winterize irrigation system to prevent damage.

### ***Corrective Maintenance***

- Replace or repair all broken or worn components before the next scheduled irrigation. Replacement parts should have the same characteristics as the original components.
- Document all corrective actions; record keeping is an essential practice.

### ***System Renovation***

- Use appropriate golf course renovations to improve system efficiencies, conserve water, improve playability, and lower operating costs.
- Correctly identify problems and their cost to determine which renovations are appropriate.
- Determine the age of the system to establish a starting point for renovation.
- Identify ways to improve system performance by maximizing the efficient use of the current system.
- Document system performance to maximize the effectiveness of the renovation routinely.
- Evaluate cost of renovation and its return on benefits, both financial and management.

## ***Winterization and Spring***

### **Principle**

Winterization of the irrigation system is important to protect the system and reduce equipment failures resulting from freezing.

### **Best Management Practices**

- Conduct a visual inspection of the irrigation system: inspect for mainline breaks, low pressure at the pump, and head-to-head spacing.
- Conduct a catch-can test to audit the system.
- Flush and drain above-ground irrigation system components that could hold water.



- Remove water at the lowest point on the system, from all conveyances and supply and distribution devices that may freeze, with compressed air or open drain plugs.
- Clean filters, screens, and housing; remove drain plug and empty water out of the system.
- Secure systems and close and lock covers/compartments doors to protect the system from potential acts of vandalism and from animals seeking refuge.
- Remove drain plug and drain above-ground pump casings.
- Record metering data before closing the system.
- Secure or lock irrigation components and electrical boxes.
- Perform pump and engine servicing/repair during winter, if possible.
- Recharge irrigation in the spring with water and inspect for corrective maintenance issues.
- Ensure proper irrigation system drainage design.

## ***Sensor Technology***

### **Principles**

- To prevent excess water use, irrigation scheduling should take into account plant water requirements, recent rainfall, recent temperature extremes, and soil characteristics.
- Irrigation management and control devices need to be installed correctly for proper irrigation management.
- Soil moisture sensors and other irrigation management tools should be installed in representative locations and maintained to provide the information necessary for making good irrigation management decisions.
- Rain gauges are necessary measurement tools to track how much rain has fallen at a specific site on the golf course. On some courses, more than one station may be necessary to get a complete measure of rainfall or evaporation loss. The use of soil moisture probes and inspections for visual symptoms such as wilting turf, computer models, and tensiometers may supplement these measurements. Computerized displays are available to help visualize the system.
- Predictive models based on weather station data and soil types are also available. These are relatively accurate and applicable, especially as long-term predictors of annual turf water requirements.
- Weather data such as rainfall, air and soil temperature, relative humidity, and wind speed are incorporated into certain model formulas, and soil moisture content is estimated. Models, however, are only as effective as the amount of data collected and the number of assumptions made.
- It is best to have an on-site weather station to daily access weather information and ET to determine site specific water needs.

### **Best Management Practices**

- Reset irrigation controllers/timers as often as practically possible to account for plant growth requirements and local climatic conditions.
- Calibrate flow meters, soil moisture sensors, rain shut-off devices, and/or other automated methods to manage irrigation.
- Ensure irrigation rates do not exceed the maximum ability of the soil to absorb and hold the water applied in any one application.
- Base irrigation on ET rates and soil moisture replacement. It should not occur on a calendar-based schedule.
- Install computerized control systems on all new course irrigation systems to help ensure efficient irrigation application. These allow for timing adjustments at every head.
- Place rain shut-off devices and rain gauges in open areas to prevent erroneous readings.
- Use multiple soil moisture sensors/meters for accuracy and to reflect soil moisture levels.

## ***Maintained Turf Areas***

### **Principle**

Courses should use well-designed irrigation systems with precision scheduling based on evapotranspiration (ET), soil infiltration rates, soil water-holding capacity, plant water-use requirements, the depth of the root zone, and the desired level of turfgrass appearance and performance in order to maximize efficient watering.

### **Best Management Practices**

- Design and install the irrigation system so that the putting surface, slopes, and surrounding areas can be watered independently.
- Account for nutrients in effluent water supply when making fertilizer calculations.
- Install part-circle heads that conserve water and reduce unnecessary stress to greens and surrounds.
- Avoid use of a global setting; make adjustments to watering times per head.
- Base water times on actual site conditions for each head and zone.
- Adjust irrigation run times based on current local meteorological data.
- Use computed daily ET rate to adjust run times to meet the turf's moisture needs.
- Adjust automated ET data manually to reflect wet and dry areas on the course.
- Install rain switches to shut down the irrigation system if enough rain falls in a zone.
- Use soil moisture sensors to bypass preset or to create on-demand irrigation schedules.
- Space permanent irrigation sprinklers and other distribution devices according to the manufacturer's recommendations.
- Base spacing on average wind conditions during irrigation.
- Evaluate triangular spacing. It is more uniform than square spacing.

- Perform catch-can uniformity tests periodically.
- Reduce dry spots and soil compaction to improve water infiltration, which in turn reduces water use and runoff in other areas.
- Use irrigation in the early morning hours before air temperatures rise and relative humidity drops.
- Base plant water needs on evapotranspiration rates, recent rainfall, recent temperature extremes and soil moisture.
- Use mowing, verticutting, aeration, wetting agents, nutrition, and other cultural practices to control water loss and to encourage conservation and efficiency.
- Use solid-tine aeration equipment in place of verticutting, depending on physical soil characteristics and turf type.
- Use slicing and spiking to help relieve surface compaction and promote better water penetration and aeration.
- Monitor for localized dry conditions or hot spots visually to identify poor irrigation efficiency or a failed system device.
- Use predictive models to estimate soil moisture and the best time to irrigate.
- Install in-ground (wireless) soil moisture sensors or use hand-held moisture meters in the root zone for each irrigation zone to enhance scheduled timer-based run times.
- Ensure an irrigation system has high- and low-pressure sensors that shut down the system in case of breaks and malfunctions.
- Place soil moisture sensors in a representative location of the irrigation zone.
- Install soil moisture sensors in the driest irrigation zone of the irrigation system.
- Install wireless soil moisture systems to prevent damage from aeration.



## ***Non-Play and Landscape Areas***

### **Principles**

- Map any environmentally sensitive areas such as sinkholes, wetlands, or flood-prone areas, and identify species classified as endangered or threatened by federal and state governments, and state species of special concern.
- Natural vegetation should be retained and enhanced for non-play areas to conserve water.
- The most efficient and effective watering method for non-turf landscape is micro-irrigation.

- Older golf courses may have more irrigated and maintained acres than are necessary. With the help of a golf course architect, golf professional, golf course superintendent, and other key personnel, the amount of functional turfgrass can be evaluated and transitioned into non-play areas.

#### **Best Management Practices**

- Designate 50% to 70% of the non-play area to remain in natural cover according to “right-plant, right-place,” a principle of plant selection that favors limited supplemental irrigation and on-site cultural practices.
- Incorporate natural vegetation in non-play areas.
- Use micro-irrigation and low-pressure emitters in non-play areas to supplement irrigation.
- Inspect non-play irrigation systems routinely for problems related to emitter clogging, filter defects, and overall system functionality.

# Surface Water Management

## *Stormwater Capture*



Although golf courses are typically large properties ranging in size from 40 to 200 acres, they are just one link in a stormwater management chain. Generally, a quantity of stormwater enters the golf course area, supplemented by what falls on the golf course proper, and then the stormwater leaves the golf course. Therefore, golf courses are realistically capable of having only a small impact on major stormwater flow. That impact should be to add only small increments of water over a given period of time. Engineers call this function “detention.”

When golf courses are designed and built, their drainage capability concept is guided by an average rainfall event of a given frequency. For example, typically, a golf course drainage system is designed to detain a two- or five-year rain event. In other words, when that rain event happens, the golf course will be able to be reasonably drained in a matter of hours, as excess water not absorbed by the soil flows through the drainage system, is temporarily held, and finally leaves the property. In some instances, golf courses and other recreational facilities are mandated to be designed to handle a 20-, 50- or 100-year rain event, which means the golf course must detain more water for perhaps a longer period of time. This ability to detain large amounts of water requires accurate engineering and extensive construction to prevent physical or financial damage to the facility.

Best Management Practices are intended to prolong the detention process as long as practical, harvest as much of the stormwater in surface or underground storage as reasonable, and to improve the quality of water leaving the property when possible.

### **Principles**

- When the golf course is properly designed, rain and runoff captured in water hazards and stormwater ponds may provide most or all of the supplemental water necessary under normal conditions, though backup sources may be needed during drought conditions.
- Capture systems should be considered part of the overall treatment.

- Stormwater capture is desirable where the lowest quality of water is needed to conserve potable water, maintain hydrologic balance, and improve water treatment.
- This practice uses natural systems to cleanse and improve water treatment.
- Natural storage of early season runoff and other stormwater runoff events is an important element in drought mitigation and maintaining/restoring water quality.
- It is important to ensure that captured water returns to streams/other surfaces in good condition by ensuring BMP's are in place to protect captured water.

### **Best Management Practices**

- Install berms and swales to capture pollutants and sediments from runoff before it enters the irrigation storage pond.
- Monitor pond water level for water loss (seepage) to underground systems. If seepage is occurring, it may be necessary to line or seal the pond or install pumps to relocate water.
- Install water-intake systems that use horizontal wells placed in the subsoil below the storage basin; use a post pump to filter particulate matter.
- Incorporate a backup source of water into the management plan.
- Inspect irrigation pumps, filtration systems, conveyances and control devices to prevent/correct system issues.

## ***Regulatory Considerations***

### **Principle**

Course owners and superintendents should investigate regulatory requirements that apply to the golf facility to protect surface and groundwater quality.

### **Best Management Practices**

- Regulate aquatic management of plants under construction permitting and regulatory licensing requirements. Consult with federal, state, and local water management agencies before managing golf course lakes and wetland areas.
- Consult with federal, state, and local water management agencies, and/or consult an approved management plan before performing cultural practices: fertilization, installation of plants, hand removal of plants, or mechanical harvesting.
- Approve the introduction of aquatic triploid grass carp, biological controls, aeration, and chemical controls (herbicide/algaecide), and monitor according to permit and licensing protocols and compliance.
- Understand the disposal of sediments from surface water ponds (stormwater detention) may be subject to regulation.
- Observe Total Maximum Daily Load (TMDL), mitigation, and watershed basin management action plans (BMAP) for golf course management.

- Consult with federal and state agencies before altering natural aquatic areas; wetlands are protected areas.
- Ensure constructed wetlands have an impervious bottom to prevent groundwater contamination.
- Check studies of water supplies needed for irrigation systems, including studies of waterbodies or flows on, near, and under the property to properly design a course's stormwater system and water features to protect water resources.

## ***Water Quality Protection***

### **Principle**

- An aquatic plant management strategy should address the intended uses of the waterbody to maintain water quality. Proper documentation of the site's physical attributes and location should include the presence of invasive or weedy species, aesthetics, watershed and groundwater assessments, and other environmental considerations.
- One of the key elements of any suite of practices to protect and maintain water quality is having a good riparian buffer that generally consists of woody vegetation or wetland plant communities. These help filter pollutants, provide shade and stabilize banks.
- Another key element is providing stream access to its floodplain along with good shape/pattern/profile of the channel. With access to its floodplain, a stream will generally maintain a stable shape/pattern/profile. A good sized buffer allows some channel movement without affecting course infrastructure.
- Only licensed individuals or contractors should be allowed to select and apply aquatic pesticides.

### **Best Management Practices**

- Accommodate natural lake processes in the construction of lakes and ponds; include herbaceous and woody vegetation and emergent and submergent shoreline plants to reduce operational costs.
- Use integrated pest management (IPM) strategies and native or naturalized vegetation, wherever practical.
- Apply appropriate herbicides to minimize damage to non-target littoral plantings.
- Maintain a narrow band of open water at the pond edge to control the expansion of plants into more desirable littoral plantings.
- Use appropriate aquatic herbicides to prevent turfgrass injury and to protect water quality and wildlife habitat.
- Ensure irrigation does not directly strike or run off to waterbodies, and maintain no-fertilization buffers along water edges.
- Outline goals and priorities to guide the development of the BMP necessary to support the lake/aquatic management plan.
- Monitor, by superintendents, all waterbodies in their area for the persistence of toxic herbicides and algaecides in the environment.

- Monitor and record secondary environmental effects on surface water and groundwater from the chemical control of vegetation.
- Apply fertilizer and reclaim (reuse) irrigation/fertigation appropriately to avoid surface water and groundwater contamination.
- Apply copper products per label instructions to reduce the risk of impairing water quality and causing negative biological impacts, with special consideration to fish, aquatic life and grazing wildlife present in the area, which are sensitive to bio-accumulation of copper in plant communities.
- Identify position of property in relation to its watershed.
- Identify 50 and 100 year flood zones and properly locate structures or improvements, working with local and federal agencies.
- Identify overall goals and validate concerns of the local watershed.
- Identify surface water and flow patterns to be able to monitor any changes.
- Indicate stormwater flow, as well as existing and potential holding capacity to document any potential changes.
- Indicate impervious surfaces, such as buildings, parking lots, or pathways.
- Indicate major drainages and catch basins that connect to local surface water bodies as an area to record water quality measurements.
- Identify and understand depth to water tables and soil types to help manage any activities that may impact them.
- Locate and protect wellheads.





Bridger Creek Golf Course - Bozeman, MT

## ***Dissolved Oxygen***

### **Principles**

- Every golf course should have a plan to monitor the state of the environment and the effects the golf course may be having on the environment.
- Monitoring is used to determine whether outside events are changing the water quality entering the golf course, or whether the golf course is having a positive, neutral, or negative effect on water quality. It also provides a body of evidence on the golf course's environmental impact.
- A water-quality monitoring plan should be prepared to ensure the ongoing protection of groundwater and surface-water quality after construction has been completed. The same sites should be monitored during the preconstruction phase, although the monitoring plan can be modified based on site-specific conditions.
- Sampling parameters should be determined based on golf course operation and basin-specific parameters of concern (these may be identified by DEQ Water Quality Programs). Typically, samples should be analyzed for nutrients, pH and

alkalinity, sediments, and suspended solids, dissolved oxygen (DO), heavy metals, and any pesticides expected to be used on the golf course.

- Ongoing, routine water sampling provides meaningful trends over time. A single sample is rarely meaningful in isolation.
- Post-construction sampling of surface-water quality should begin with the installation and maintenance of golf course turf and landscaping. If water quality monitoring cannot be conducted monthly, target strategic times that are relevant to the water quality parameter being measured, for example times of peak temperatures, runoff, pesticide applications, etc.
- If there is no discharge on the scheduled sample date, samples should be taken during the next discharge event.
- Post-construction surface-water quality sampling should continue through the first three years of operation and during the wet and dry seasons every third year thereafter, provided that all required water-quality monitoring has been completed and the development continues to implement all current management plans. It may also be wise to sample if a significant change has been made in course operation or design that could affect nearby water quality.
- The purpose of quality assurance/quality control (QA/QC) is to ensure that chemical, physical, biological, microbiological, and toxicological data are appropriate and reliable. Data should be collected and analyzed using scientifically sound procedures.
- Golf course management must have good data to make good decisions. If a golf course should ever want to produce data for an agency or go to court to defend the facility from unwarranted charges, those data must meet QA/QC standards to be defensible as evidence.
- However, even if the data are only for proprietary use and are not reported to any regulatory agency, it is strongly recommended that a certified laboratory be used and all QA/QC procedures followed.

### **Best Management Practices**

- Establish DO thresholds to prevent fish kills (occur at levels of 2 ppm), for example, use artificial aeration (diffusers).
- Reduce stress on fish; keep DO levels above 3 ppm.
- Select algacides containing natural biological enzymes or hydrogen peroxide instead of copper or endothall to treat high populations of phytoplankton.
- Use IPM principles to limit excess use of pesticides.
- Spot-treat filamentous algae or frequently remove algae by hand to prevent lowering oxygen concentrations in water.
- Use dyes and aeration to maintain appropriate light and DO levels.
- Apply algacides to small areas to prevent fish mortality; do not treat the entire pond at once.
- Coordinate construction/renovation activities to minimize the amount of disturbed area and possible risk of contamination via runoff.
- Plan construction/renovation activities in phases to limit soil disruption and movement.

- Sod, or reseed, bare or thinning turf areas.
- Mulch areas under tree canopies to cover bare soil.
- Avoid allowing grass clippings and other biological waste products to be deposited in open water.
- Mow lake and pond collars at a higher height to slow and filter overland flow to waterbodies.
- Remove excess sediments to reduce irrigation system failures.
- Treat dredged materials as a toxic substance. Avoid contact with turf.
- Locate littoral shelves at the pond's inlets and outlets to reduce problems with the playability and maintainability of a water hazard.
- Seek professional assistance from an environmental specialist to design an appropriate water sample collection strategy.
- Determine which sites will be analyzed, and use reputable equipment and qualified technicians.
- Demonstrate responsible land and water use practices based on water data.
- Define water quality data values appropriately, based on the associated BMP used to protect water quality.
- Record observations of fish, wildlife, and general pond conditions.

## ***Aquatic Plants***

### **Principles**

- Phytoplankton, which give water its green appearance, provide the base for the food chain in ponds. Tiny animals called zooplankton use phytoplankton as a food source.
- Large aquatic plants (aquatic macrophytes) can grow rooted to the bottom and supported by the water (submersed plants), rooted to the bottom or shoreline and extended above the water surface (emersed plants), rooted to the bottom with their leaves floating on the water surface (floating-leaved plants), or free-floating on the water surface (floating plants). Different types of aquatic macrophytes have different functions in ponds.
- Plant life growing on littoral shelves may help to protect receiving waters from the pollutants present in surface water runoff, and a littoral shelf is often required in permitted surface water-retention ponds. Floating plants suppress phytoplankton because they absorb nutrients from the pond water and create shade.
- The use of aquatic plants to improve the appearance of a pond (aquascaping) can be included as part of the overall landscape design.
- Ponds may be constructed on golf courses strictly as water hazards or for landscape purposes, but they often have the primary purpose of drainage and stormwater management, and are also often a source of irrigation water.

### **Best Management Practices**

- Design ponds properly with a narrow fringe of vegetation along the edge. These are more resistant to problems than those with highly maintained turf.
- Control problem plants in ponds with littoral plantings selectively, without damaging littoral shelves.
- Encourage clumps of native emergent vegetation at the shoreline.
- Include in a comprehensive lake management plan, strategies to control the growth of nuisance vegetation that can negatively affect a pond's water quality and treatment capacity.
- Remove filamentous algae by hand frequently, and/or frequently apply algaecide to small areas of algae (spot treatment).
- Use natural algaecides whenever possible, including enzymes which consume excess nutrients in pond water, to limit algae growth.
- Identify undesirable or noxious aquatic weeds and create an IPM for their control.

## ***Human Health Concerns***

### **Principles**

- The use of pesticides should be part of an overall pest management strategy that includes biological controls, cultural methods, pest monitoring, and other applicable practices, referred to altogether as IPM.
- Address areas where standing water may provide habitat for nuisance organisms.

### **Best Management Practices**

- Use IPM principles to address insects that may pose a hazard to human health.
- Drain areas of standing water during wet seasons to reduce insect populations.
- Use *Bacillus thuringiensis* (*Bt*) products according to label directions to manage waterborne insect larvae.

## ***Floodplain Restoration***

### **Principles**

- Reestablishment of natural stream/river systems helps mitigate flooding and control stormwater.
- Address high sediment and nutrient loads and vertical and lateral stream migration causing unstable banks, flooding, and reductions in groundwater recharge.
- Land use decisions and engineering standards must be based on the latest research science available.

### **Best Management Practices**

- Install stream buffers to restore natural water flows and flooding controls.
- Install buffers in play areas to stabilize and restore natural areas that will attract wildlife species.
- Install detention basins to store water and reduce flooding at peak flows.

## ***Stormwater, Ponds, and Lakes***

Stormwater is the conveying force behind what is called nonpoint source pollution. Nonpoint pollution, which is both natural and caused by humans, comes not from a pipe from a factory or sewage treatment plant, but from daily activity. Pollutants commonly found in stormwater include the microscopic wear products of brake linings and tires; oil; shingle particles washed off roofs; soap, dirt, and worn paint particles from car washing; leaves and grass clippings; pet and wildlife wastes; lawn, commercial, and agricultural fertilizers; and pesticides.

### **Principles**

- The control of stormwater on a golf course is more than just preventing the flooding of the clubhouse, maintenance, and play areas. In addition to controlling the amount and rate of water leaving the course, it involves storing irrigation water, controlling erosion and sediment, enhancing wildlife habitat, removing waterborne pollutants, and addressing aesthetic and playability concerns.
- Most golf courses plan their lakes and water hazards to be a part of the stormwater control and treatment system. However, natural waters of the state cannot be considered treatment systems and must be protected.
- Lakes and ponds may also be used as a source of irrigation water.
- It is important to consider these functions when designing and constructing the ponds. Peninsular projections and long, narrow fingers may prevent mixing. Ponds that are too shallow may reach high temperatures, leading to low oxygen levels and promoting algal growth and excess sedimentation.
- Stormwater treatment is best accomplished by a treatment train approach, in which water is conveyed from one treatment to another by conveyances that themselves contribute to the treatment.
- Source controls are the first car on the BMP treatment train. They help to prevent the generation of stormwater or introduction of pollutants into stormwater. The most effective method of stormwater treatment is not to generate stormwater in the first place, or to remove it as it is generated.

### **Best Management Practices**

- Install swales and slight berms where appropriate around the water's edge, along with buffer strips, to reduce nutrients and contamination. Stormwater should run through at least 30' of vegetation before entering any body of water.
- Design stormwater treatment trains to direct stormwater across vegetated filter strips (such as turfgrass), through a swale into a wet detention pond, and then out through another swale to a constructed wetland system.

- Ensure that no discharges from pipes go directly to water. Construct drainage pipes to discharge into a sump containing filter media before it can overflow into a body of water.
- Eliminate or minimize directly connected impervious areas.
- Use vegetated swales to slow and infiltrate water and trap pollutants in the soil, where they can be naturally destroyed by soil organisms.
- Use depressed landscape islands in parking lots to catch, filter, and infiltrate water, instead of letting it run off. When hard rains occur, an elevated stormwater drain inlet allows the island to hold the treatment volume and settle out sediments, while allowing the overflow to drain away.
- Maximize the use of pervious pavements, such as brick or concrete pavers separated by sand and planted with grass. Special high-permeability concrete is available for cart paths or parking lots.
- Disconnect runoff from gutters and roof drains from impervious areas, so that it flows onto permeable areas that allow the water to infiltrate near the point of generation.
- Include in golf course stormwater management “natural systems engineering” or “soft engineering” approaches that maximize the use of natural systems to treat water.
- Institute buffers and special management zones.



Cabinet View Golf Club - Libby, MT

# Water Quality Monitoring and Management

## *Regulatory Considerations*



### Principles

- Golf course owners and superintendents should know and understand the state regulations that govern them regarding water quality.
- Owners and superintendents should know what activities require permitting to perform.
- Owners and superintendents should make every attempt to stay in contact with those administering regulatory considerations and stay in the loop of possible future regulatory considerations.
- Owners and superintendents should have a general baseline knowledge of local water rights, and should consider other water rights holders who could be effected by future decisions.

### Best Management Practices

- Dispose of sediments from surface-water ponds (stormwater detention), subject to regulation.
- Consult with federal and state agencies before altering natural aquatic areas, as wetlands are protected areas.
- Maintain an impervious bottom in constructed wetlands to prevent groundwater contamination.
- Perform studies of water supplies needed for irrigation systems, including studies of waterbodies or flows on, near, and under the property. These studies are needed to properly design a course's stormwater system and water features to protect water resources.

## ***Local Involvement***

### Principles

- Citizen science refers to the practice of engaging the general public in scientific projects that can produce reliable data and information.

- Incorporation of citizen perspectives can be a conduit to other scientific research programs, as citizens involved in the research development process provide important cross-connections, perspectives and relationships with other community and government programs.
- Golf course owners can obtain a broader public support since community members who participate in the development and decision making process are partially responsible for the program.
- Citizens are more likely to take a more active role in implementation if their opinions are considered in the development of goals and decisions.
- The DEQ Nonpoint Source Program works with local groups to implement BMPs and is a good option to engage citizens.

## ***Site Analysis***

### **Principle**

Identify the site's physical attributes and location, the invasive or weedy species present, aesthetics, watershed and groundwater assessments, and other environmental considerations.

### **Best Management Practices**

- Use Integrated Pest Management (IPM) and native or naturalized vegetation wherever practical.
- Apply appropriate herbicides to minimize damage to non-target littoral plantings.
- Use appropriate aquatic herbicides to avoid turfgrass injury.
- Maintain no-fertilization buffers along edges.
- Monitor, by superintendents, the designated waters on their property.
- Monitor and record environmental effects on surface water and groundwater from the chemical control of vegetation.
- Apply fertilizer and reclaim (reuse) irrigation/fertigation appropriately to avoid surface and groundwater contamination.
- Identify position of property in relation to its watershed.
- Identify overall goals and qualify concerns of the local watershed.
- Indicate surface water and flow patterns.
- Indicate stormwater flow as well as existing and potential holding capacity.
- Indicate impervious surfaces, such as buildings, parking lots, or pathways.
- Indicate major drainages and catch basins that connect to local surface water bodies.
- Identify and understand depth to water tables and soil types.
- Locate and protect wellheads, active and inactive.

## ***Water Quality Sampling Program***

### **Principles**



- Monitoring is the method used to determine whether outside events are impacting the water quality entering the golf course, or whether the golf course is having a positive, neutral, or negative effect on water quality. It also provides a body of evidence on the golf course's environmental impact.
- Sampling parameters are determined based on golf course operation and basin-specific parameters of concern from local regulators and watershed interest groups. Typically, samples should be analyzed for nutrients, pH and alkalinity, sediments, suspended solids, dissolved oxygen (DO), heavy metals, and any pesticides expected to be used on the golf course.
- Ongoing, routine water sampling provides meaningful trends over time. A single sample is rarely meaningful in isolation.
- Should there be no discharge on the scheduled sample date, samples should be taken during the next discharge event.
- Post-construction surface-water quality sampling should continue through the first three years of operation and during the wet and dry seasons every third year thereafter, provided that all required water quality monitoring has been completed and the development continues to implement all current management plans. It may also be wise to sample if a significant change has been made in course operation or design that could affect nearby water quality.
- Golf courses should also sample for macroinvertebrates as determined useful by water quality specialists.

### **Best Management Practices**

- Reduce stress on fish; when feasible provide aeration as needed for oxygenation.
- Select algaecides containing hydrogen peroxide instead of one containing copper or endothall to treat high populations of phytoplankton.
- Use IPM principles to limit excess use of pesticides.
- Spot-treat filamentous algae or frequently remove algae by hand to prevent lowering oxygen concentrations in water.
- Use dyes and aeration to maintain appropriate light and DO levels.
- Apply algaecides to small areas to prevent fish mortality; do not treat the entire pond at once.
- Coordinate construction/renovation activities to minimize the amount of disturbed area and possible risk of contamination via runoff.
- Provide turf or mulch to reduce sediments.

### ***Sampling Parameters, Collection, and Analysis***

#### **Principles**

- A water quality monitoring program must include monitoring of surface water, groundwater, and pond sediments.

- Sampling of all watershed ingress and egress points is important to know what is coming into the property to identify potential impacts and baseline of water quality data.
- The purpose of quality assurance/quality control (QA/QC) is to ensure that chemical, physical, biological, microbiological, and toxicological data are appropriate and reliable, and are collected and analyzed using scientifically sound procedures.
- It is strongly recommended that a certified laboratory be used even if the data are only for proprietary use and are not reported to any regulatory agency.
- QA/QC procedures should be followed. Golf course management must have good data to make good decisions, and if a golf course should ever want to produce data for an agency or in court to defend the facility from unwarranted charges, those data must meet QA/QC standards to be defensible as evidence.

### **Best Management Practices**

- Seek cooperation with local watershed interest groups.
- Seek professional assistance from an environmental specialist to design an appropriate water sample collection strategy.
- Determine what sites will be analyzed and use reputable equipment and qualified technicians.
- Demonstrate responsible land and water use practices based on water data.
- Define data values appropriately based on the associated BMP used to protect water quality.
- Record observations of fish, wildlife, and general pond conditions.

### ***Buffer Zones***

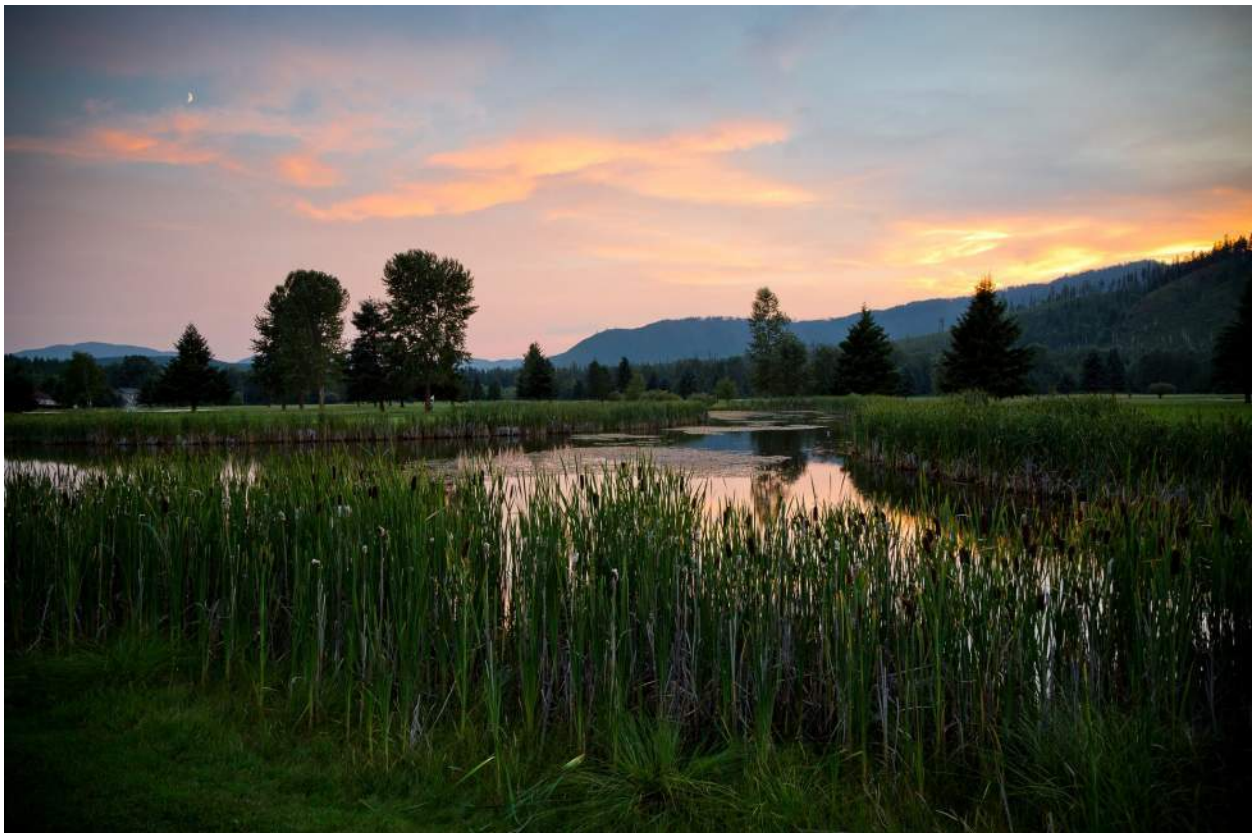
#### **Principles**

- Buffers around the shore of a waterbody or other sensitive areas filter and purify runoff as it passes across the buffer. Ideally, plant buffers with native species provide a triple play of water quality benefits, pleasing aesthetics, and habitat/food sources for wildlife.
- Effective BMP in these areas include filter and trap sediment, site-specific natural/organic fertilization, and limits on pesticide use, primarily focusing on the control of invasive species.

#### **Best Management Practices**

- Ensure riparian buffer areas are above the high-water mark and should be unfertilized and left in a natural state.
- Institute buffers and special management zones.
- Use turf and native plantings to enhance buffer areas. Increase height of cut in the riparian zone to filter and buffer nutrient movement to the water.

- Apply fertilizer and pesticides based on the effective swath; keep application on target and away from buffers or channel swales.
- Use a swale and berm system to allow for resident time (ponding) for water to infiltrate through the root zone to reduce lateral water movement to the surface water body.
- Use plant buffers with native species to provide pleasing aesthetics, habitat, and food sources for wildlife when possible.
- Establish special management zones around pond edges.
- Plant all or most of the out-of-play water bodies with shoreline buffers planted with native or well-adapted noninvasive vegetation to provide food and shelter for wildlife.
- Practice good fertilizer management to prevent the nutrient runoff into ponds.
- Dredge or remove sediment when needed, and with proper permitting, to protect beneficial organisms that contribute to the lake's food web and overall lake health.
- If maintaining turf grass to edge of artificial ponds, reduce the frequency of mowing.



Glacier View Golf Course - West Glacier, MT

## ***Wetland Protection***

### **Principles**

- When present, wetlands are critical components of a landscape and are closely regulated.
- Wetlands are protected as waters of the state by rule of law. Wetlands act both as filters for pollutant removal and as nurseries for many species. Many people do not realize the vital role they play in purifying surface waters.
- The biological activity of plants, fish, animals, insects, and especially bacteria and fungi in a healthy, diverse wetland is the recycling factory of our ecosystem. While wetlands do pose a special concern, their mere presence is not incompatible with the game of golf. With care, many golf holes have been threaded through sensitive areas, and, with proper design and management, golf can be an acceptable neighbor.
- Constructed or disturbed wetlands may be permitted to be an integral part of the stormwater management system.

### **Best Management Practices**

- Maintain appropriate silt fencing and BMP on projects upstream to prevent erosion and sedimentation.
- Protect natural waters, which cannot be considered treatment systems and must be protected. Natural waters do not include treatment wetlands.
- Consult appropriate regulatory agencies when planning management or construction activity that may impact wetlands.

## ***Stormwater Management***

### **Principle**

Controlling stormwater on a golf course is more than just preventing the flooding of the clubhouse, maintenance, and play areas. In addition to controlling the amount and rate of water leaving the course, stormwater involves storing irrigation water, controlling erosion and sedimentation, enhancing wildlife habitat, removing waterborne pollutants, and addressing aesthetic and playability concerns. Keep in mind that not all stormwater on a golf course originates there; some may be from adjoining lands, including residential or commercial developments.

### **Best Management Practices**

- Use vegetated swales to slow and infiltrate water and trap pollutants in the soil, where they can be naturally destroyed by soil organisms.
- Maximize the use of pervious pavements, such as brick or concrete pavers separated by sand and planted with grass.
- Use special high-permeability concrete available for cart paths or parking lots.

- Design stormwater control structures to hold stormwater for appropriate residence times, in order to remove total suspended solids.
- Eliminate or minimize directly connected impervious areas as much as possible.
- Use depressed landscape islands in parking lots to catch, filter, and infiltrate water, instead of letting it run off.

## ***Sediment***

### **Principle**

- Sediment is the leading cause of impairment to stream beneficial uses. The source is often from excessive streambank erosion caused by alterations to riparian vegetation and the stream channel's shape/pattern/profile. Courses should ideally be designed to leave a large buffer along a stream corridor in order to allow some channel movement.
- During construction and/or renovation, temporary barriers and traps must be used to prevent sediments from being washed off-site into water bodies. Wherever possible, keep a vegetative cover on the site until it is actually ready for construction, and then plant, sod, or otherwise cover it as soon as possible to prevent erosion.
- If any activity will disturb more than one acre, a National Pollutant Discharge Elimination System (NPDES) permit may be required.
- All construction activities should include a Storm Water Pollution Prevention Plan (SWPPP) which will consider all sources & remedies of storm water pollution that should be monitored.

### **Best Management Practices**

- Use turfgrass or vegetation to prevent bank erosion and sediment movement into water bodies.
- Use dry detention basins/catchments to buffer flooding and excessive runoff that may contain sediment.
- Pay close attention to engineering details such as subsoil preparation, the placement of gravel, slopes, and backfilling when constructing drainage systems.
- Ensure that internal golf course drains not drain directly into an open water body, but discharge through pretreatment zones and/or vegetative buffers to help remove nutrients and sediments.

## ***Sodic/Saline Conditions***

### **Principles**

- All natural waters contain soluble salts; however, the amount and type of salts they contain vary greatly.

- Irrigation water can degrade when wells are pumped at high rates or for prolonged periods. Sometimes “up-coning” can occur from pumping, whereby saline water, rather than freshwater, is drawn into the well.
- Saline water typically is unsuitable for irrigation because of its high content of TDS.

### **Best Management Practices**

- Monitor water quality routinely to ensure that salt concentrations are at the acceptable levels.
- Consider fertilizer that uses soluble nitrogen forms with a relatively low concentration of salts in frequent applications.
- Consider a controlled-release fertilizer to reduce salt injury.
- Base management plan on routine soil tests to determine sodium adsorption ration (SAR), exchangeable sodium percentage (ESP), electrical conductivity saturated paste method/unit (EC), and free calcium carbonate content.
- Select alternative turfgrass and landscape plants that are more salt-tolerant if problems exist.
- Reduce salt accumulations in the soil by flushing soils as needed.
- Amend soil and water to remove salt ions from affected areas.



Hilands Golf Club - Billings, MT

# Nutrient and Soils Management

## *Introduction*



Proper nutrient and soils management play a key role in the reduction of environmental risk while also potentially helping to reduce inputs and overall expenditures. Maintaining appropriate nutrient levels along with managing soil physical and biological health ultimately produce the most efficient turf system possible. This will allow turfgrass to not only survive under stress conditions but be as healthy as possible during the variety of seasonal changes that occur in our climate.

Nutrients may move beyond the turfgrass via leaching or runoff, which may directly impact our environment. The goal of a proper nutrient management plan should be to apply the minimum necessary nutrients with the help of a vibrant microbial population to achieve an acceptable playing surface. A key benefit of healthy biology is the higher efficiency of the system with reduced inputs.

Soils are a dynamic, living entity that encompass what some refer to as a 'three legged stool'. The legs, all of which interact with each other are what support the stool, or in this case, healthy soils. The chemical leg is addressed through soil testing and adjusting nutrient levels per the results shown or applying corrective amendments such as lime or gypsum. The physical leg comprises things like soil amendments and sand topdressing to correct poor physical soil structure. The biological leg addresses the bacterial and fungal populations in the soil that are responsible for many important functions in turf management such as thatch breakdown, nutrient cycling, buffering of salts and bicarbonates and the efficient use of water. This also can be tested doing direct microscopy and mitigated with soil inoculants and food for the biology if tests indicate the need.





## ***Regulatory Considerations***

### **Principles**

- Manage nutrient risks based on the unique conditions that exist in your location and unique ecosystem.
- Depending on your location, regulatory agencies may include federal, state, or local policies.
- Understand the importance of nutrient licensing.
- There are currently no regulatory policies regarding nutrient management in Montana.

### **Best Management Practices**

- Identify who must be licensed.
- Describe differing licenses, if applicable.
- Provide the minimum requirement.
- Detail the Continued Education Unit required to maintain the license.
- Understand the value of training programs.
- Contact local and state organizations for regulatory restrictions.

## ***Soil Health***

### **Principles**

- Understand that many of the important processes we undertake on a seasonal basis have an impact on the health of the soil microbiology.
- Understanding the dynamic relationships going on in the soil and how we impact them, can make golf courses a haven for a healthy microbial system.

- Devise ways to maintain a healthy microbial system using as part of your overall management plan, biologically friendly inputs such as humic acids and naturally derived Nitrogen sources (ex: kelp, composts, other organic sources).

### **Best Management Practices**

- Minimize potentially harmful inputs to the microbial population when possible but if they are necessary, work to rebuild those populations through inoculants and testing.
- There are many regenerative land companies that can assist in this effort and are easy to locate.

## ***Soil Testing***

### **Principles**

- Soil testing may or may not provide the appropriate answers to your nutrient management questions. Consult with your local land-grant university to get the most current information and to better understand which soil test values are relevant in your location.
  - Montana State University Extension - <https://www.msueextension.org/>
- Through proper sampling, laboratory analysis, interpretation of results, recommendations, and record keeping, soil testing can be used to manage nutrients more efficiently.

### **Best Management Practices**

- Sample accurately and consistently as an essential part to providing useful soil test information over time.
- Divide the course into logical components such as greens, fairways, tees, roughs, etc., for each hole.
- Take ten to 15 soil samples randomly from each section and blend together to provide a representative, uniform soil sample.
- Take each soil sample from the same depth.
- Use an extractant appropriate for your soils.
  - Most Montana soils have a pH of 7 or higher. For high pH soils, the Olsen method of phosphorus extraction is preferred. Acidic soils are extracted with the Bray method (MSU Extension Document 4449-4).
- Use the same extractant for each test in order to compare soil test results over time.
- Use a soil test to provide the grower with a prediction of a plant's response to an applied nutrient.
- Observe if the location has correlation data between a given nutrient applied to soil and a response to that nutrient by turfgrass, then recommendations may provide expected results.

- Note that if your location does not have correlation data, then soil test recommendations may be of little value.
- Keep soil tests from prior years. This will allow you to observe changes over time. This practice can provide good evidence of the impact of your nutrient management plan.
- Extensive information on soil testing in Montana can be found in Montana State University Extension's Nutrient Management Model 1 - <http://landresources.montana.edu/nm/>

## ***Plant Tissue Analysis***

### **Principles**

- Because of the mobility and conversion of elements within the soil; soil sampling can be less predictable than tissue testing. Tissue testing provides a precise measurement of nutrients within the plant. Tissue test sufficiency ranges are only as good as the correlation data of a given element to an acceptable quality level of a given turfgrass. Typically, tissue correlation data are more prevalent than soil test correlation data and, therefore, programs designed around tissue testing may provide more reliable results.
- Through proper sampling, consistent intervals, and record keeping, tissue sampling may be used to measure existing turf health.

### **Best Management Practices**

- Collect tissue samples during regular mowing.
- Avoid collecting tissue after any event that may alter the nutrient analysis. Events may include fertilization, topdressing, pesticide applications, etc.
- Place tissue in paper bags, not plastic.
- Allow tissue samples, if possible, to air-dry at your facility before mailing them.
- Sample poor-quality turfgrass that is of concern separately from higher-quality turfgrass.
- Collect a sample immediately when turfgrass begins to show signs of nutrient stress.
- Sample tissue more frequently to allow a more accurate assessment of your turfgrass nutrient status changes over time.
- Choose the quantity of tissue analysis depending on you and your needs. However, two to four tests per year are common on greens and one to two tests per year are common on tees and fairways.
- Keep tissue tests from prior years, allowing you to observe changes over time.
- Use tissue testing to provide good evidence of the impact of your nutrient management plan.

## ***Fertilizers Used in Golf Course Management***

### **Principles**

Understanding the components of fertilizers, the fertilizer label, and the function of each element within the plant are all essential in the development of an efficient nutrient management program.

### Terminology

- Grade or analysis is the percent by weight of Nitrogen (N), Phosphorous fertilizer ( $P_2O_5$ ) and Potassium fertilizer ( $K_2O$ ) that is guaranteed to be in the fertilizer.
- A complete fertilizer contains N,  $P_2O_5$ , and  $K_2O$ .
- The laws governing the labeling of fertilizer vary greatly among states.

### Label

- The label is intended to inform the user about the contents of the fertilizer which, if understood and followed, will result in little to no environmental risk.
- The fertilizer label may contain:
  - Brand
  - Grade
  - Manufacturer's name and address
  - Guaranteed analysis
  - "Derived from" statement
  - Net weight

### Macronutrients

Macronutrients are required in the greatest quantities and include nitrogen (N), phosphorus (P), and potassium (K).

Understanding the role of each macronutrient within the plant should provide a greater understanding of why these nutrients play such a key role in proper turfgrass management.

### The role of nitrogen (N)

Nitrogen is required by the plant in greater quantities than any other element except carbon (C), hydrogen (H), and oxygen (O). Nitrogen plays a role in numerous plant functions, including being an essential component of amino acids, proteins and nucleic acids.

- *Fate and transformation of N*
- The goal of all applied nutrients is to maximize plant uptake while minimizing nutrient losses. Understanding each process will increase the ability to make sound management decisions and ultimately lead to an increase in course profitability and a reduction in environmental risk.
- *Nitrogen processes*

- *Mineralization*: the microbial mediated conversion of organic N into plant-available  $\text{NH}_4$
  - *Nitrification*: the microbial-mediated conversion of  $\text{NH}_4$  to  $\text{NO}_3$
  - *Denitrification*: the microbial mediated conversion of  $\text{NO}_3$  to N gas; this primarily occurs in low-oxygen environments and is enhanced by high soil pH
  - *Volatilization*: the conversion of  $\text{NH}_4$  to  $\text{NH}_3$  gas
  - *Leaching*: the downward movement of an element below the rootzone
  - *Runoff*: the lateral movement of an element beyond the intended turfgrass location
- The release mechanism and factors influencing N release from available N sources

Understanding how certain N sources should be blended and applied is an essential component in an efficient nutrient management plan. In many cases, N sources are applied without regard to their release characteristics. This is an improper practice and increases the risk of negative environmental impact. Each N source (particularly slow-release forms) is unique and therefore should be managed accordingly. Applying a polymer-coated urea in the same manner one would apply a sulfur-coated urea greatly reduces the value of the polymer-coated urea. Similarly, applying 2 pounds of N from ammonium sulfate may cause burning, while applying 2 pounds of N from certain polymer-coated ureas may not provide the desired turfgrass response. Rate, application date, location, and turfgrass species all should be included in your nutrient application decision.

- *Soluble nitrogen sources*
  - Urea (46-0-0)
  - Ammonium nitrate (34-0-0)
  - Ammonium sulfate (21-0-0)
  - Diammonium phosphate (18-46-0)
  - Monoammonium phosphate (11-52-0)
  - Calcium nitrate (15.5-0-0)
  - Potassium nitrate (13-0-44)
- *Slow-release nitrogen sources*

A slow-release N source is any N-containing fertilizer where the release of N into the soil is delayed either by requiring microbial degradation of the N source, by coating the N substrate, which delays the dissolution of N, or by reducing the water solubility of the N source.

These include:

- Sulfur-coated urea
- Polymer/resin-coated

- Isobutylidene diurea
- Urea-formaldehyde/ureaformaldehyde reaction products
- Natural organic
  
- *Urease and nitrification inhibitors*
  - Urease inhibitors reduce the activity of the urease enzyme, resulting in a reduction of volatilization and an increase in plant-available N.
  - Nitrification inhibitors reduce the activity of *Nitrosomonas* bacteria, which are responsible for the conversion of NH<sub>4</sub> to NO<sub>2</sub>. This reduced activity results in a reduction of N lost via denitrification and an increase in plant-available N.

### **The role of phosphorous (P)**

Phosphorus can be a growth-limiting factor for many unintended organisms and is a major contributor to eutrophication of water bodies. Thus, proper timing and rates should be implemented to reduce the risk of off-site movement of phosphorus.

Phosphorus forms high-energy compounds that are used to transfer energy within the plant. Phosphorus may remain in an inorganic form or may become incorporated into organic compounds. Phosphorous application rates should be based upon soil test results derived from documented correlations, demonstrating a turf response to soil test phosphorous levels.

- *P deficiency symptoms*
  - Initially, reduced shoot growth and dark green color may be observed
  - Later, lower leaves may turn reddish at the tips and then the color may progress down the blade
  
- *P sufficiency ranges*
  
- Consult your land-grant university for sufficiency ranges in your location.
  
- *P fertilizer sources*
  - Diammonium phosphate
  - Concentrated superphosphate
  - Monoammonium phosphate
  - Struvite
  - Natural organics

### **The role of potassium (K)**

Potassium is of no environmental concern, but can be an economic concern, particularly when potassium is over-utilized, which can be quite common. Generally, potassium concentrations in turfgrass tissue are about 1/3 to 1/2 that of nitrogen.

Potassium is not a component of any organic compound and moves readily within the plant. Potassium is a key component of osmoregulation which has been documented to increase stress resistance.

- *K deficiency symptoms*

Except under severe, documented deficiencies, K may not have an observable influence on turfgrass quality. Yellowing of older leaves followed by tip dieback and scorching of leaf margins have been reported.

- *K sufficiency ranges*

Consult your land-grant university for sufficiency ranges in your location.

- *K fertilizer sources*
  - Potassium sulfate
  - Potassium chloride
  - Potassium nitrate

## **Secondary Macronutrients**

Secondary macronutrients are essential to plant function and are required in quantities less than N, P, and K, but more than micronutrients. These include calcium (Ca), magnesium (Mg), and sulfur (S)

### **The role of calcium (Ca)**

- Primarily a component of cell walls and structure
- Consult your land-grant university for sufficiency ranges in your location
- Found in gypsum, limestone, and calcium chloride

### **The role of magnesium (Mg)**

- Central ion in the chlorophyll molecule and chlorophyll synthesis
- Consult your land-grant university for sufficiency ranges in your location
- Found in S-Po-Mg, dolomitic limestone, and magnesium sulfate

### **The role of sulfur (S)**

- Metabolized into the amino acid, cysteine, which is used in various proteins and enzymes
- Consult your land-grant university for sufficiency ranges in your location
- Found in ammonium sulfate, elemental sulfur, gypsum, potassium sulfate

## **Micronutrients**

Understanding the role of each micronutrient within the plant should provide you with a greater understanding of why these nutrients play such a key role in proper turfgrass management.

Micronutrients are just as essential for proper turfgrass health as macronutrients, but they are required in very small quantities compared to macronutrients. Micronutrients include iron (Fe), manganese (Mn), boron (B), copper (Cu), zinc (Zn), molybdenum (Mo), and Chlorine (Cl).

Consult your land-grant university for micronutrient sufficiency ranges in your location.

### **The role of iron (Fe)**

- Is part of the catalytic enzymes and is required for chlorophyll synthesis
- Affects photosynthesis, nitrogen fixation, and respiration

### **The role of manganese (Mn)**

- Involved in photosynthesis
- Required as a cofactor for ~35 enzymes
- Lignin biosynthesis depends on Mn

### **The role of boron (B)**

- Found in the cell wall; probably required for the structural integrity of the cell wall

### **The role of copper (Cu)**

- Cu-protein plastocyanin is involved in photosynthesis
- Cofactor for a variety of oxidative enzymes

### **The role of zinc (Zn)**

- Structural component of enzymes
- Protein synthesis requires Zn
- Carbohydrate metabolism affected by Zn

### **The role of molybdenum (Mo)**

- Primarily related to nitrogen metabolism
- Structural and catalytical functions of enzymes

### **The role of chlorine (Cl)**

- Required for the oxygen-evolving reactions of photosynthesis



- Also appears to be required for cell division in both leaves and shoots

## ***Soil pH***

### **Principle**

Identifying pH levels may be the most important soil test result for turfgrass managers. In most cases, a pH of 6.3 is ideal because it provides the greatest probability of micronutrient availability. Soil pH adjustments may occur slowly and are temporary.

### **Best Management Practices**

- Apply a liming material (calcium carbonate, calcium oxide, dolomitic limestone) that contains  $\text{Ca}^{2+}$  and neutralizes acidity to increase soil pH.
- Apply products containing elemental sulfur in order to lower soil pH.
- Utilize injection pumps into irrigation water to address pH. This can be beneficial in some cases.

## ***Nutrient Management***

### **Principles**

- Within Montana, environmental conditions vary greatly, including differences among soils, topography, rainfall, and temperature. These differences require that a nutrient management plan be flexible enough to allow turfgrass managers to address their unique needs.
- Understanding the importance of application timing for effective use of applied nutrients is critical to nutrient management.
- The objective of all nutrient applications is plant uptake and the corresponding desirable response.
- The reduced height of cut and excessive traffic damage on putting greens results in an increased need for growth leading to an increase in nutrition.
- Tees and landing areas often have higher fertility requirements than fairways and roughs because they suffer constant divot damage.
- Fairways and roughs often require less nutrient inputs than other locations because of their increased height of cut, less damage, and clipping return.

### **Best Management Practices**

- Apply nutrients when turfgrass is actively growing.
- Apply slow-release N fertilizers at the appropriate time of year to maximize the products' release characteristics. Many fertilizer and manufacturers and distributors have software available to help predict N release from their various products.
- Follow N application rate recommendations from your local land-grant university.

- Consider N application rates from slow-release materials, taking into consideration the release rate of the chosen material. If insufficient material is applied, the desired response may not be observed.
- Exercise caution when applying nutrient applications during turfgrass establishment as these applications are particularly susceptible to loss via leaching and runoff.
- Provide appropriate rates and products to minimize N loss without reducing turfgrass establishment.
  - Increased water applications
  - Increased nutrients to hasten establishment
  - Reduced root mass
- Understand the different types of spreaders and the advantages and disadvantages of each.
- Use the correct spreader with fertilizers. For example, if sulfur-coated urea was spread through a drop spreader, the sulfur coating could be damaged, essentially leading to an application of soluble urea.
- Choose the appropriate spreader for a given fertilizer material.
  - Walk-behind rotary
  - Drop spreader
  - Bulk rotary
  - Spray
- Use calibration to reduce environmental risk and increases profitability.
- Use proper fertilizer storage, loading, and clean-up to reduce environmental risk.
- Avoid applying fertilizer to soils that are at, or near, field capacity or following rain events that leave the soils wet. Avoid applying fertilizer to frozen soils.
- Understand fertilizer should NOT be applied when the National Weather Service has issued a flood or severe storm warning, or if heavy rains are likely.



The Reserve at Moonlight Basin - Big Sky, MT

# Cultural Practices

## *Mowing*



Cultivation practices are an important part of golf course turf management. Certain cultural practices such as mowing, verticutting, and rolling are necessary to provide a high-quality playing surface, while others such as aerification are required to enhance plant health.

Heavily used areas such as putting greens often deteriorate because of compacted soil, thatch accumulation, and excessive use. Soil problems from active use are usually limited to the top 3 inches of the soil profile and should be actively managed to enhance turf health and improve nutrient and water uptake.

Unlike annual crops, which offer the opportunity for periodic tilling of the soil profile to correct problems like soil compaction that might develop over time, turfgrass does not offer opportunities for significant physical disturbance of the soil without destroying the playing surface.

### **Principles**

- Mowing is the most basic yet most important cultural practice to consider when developing a management plan.
- The mowing practices implemented on a facility will have an impact on turf density, texture, color, root development, and wear tolerance.
- Mowing practices affect turfgrass growth. Frequent mowing will increase shoot density and tillering. It will also decrease root and rhizome growth as a result of plant stress associated with removal of leaf tissue.
- Infrequent mowing results in alternating cycles of vegetative growth followed by scalping, which further depletes food reserves of the plants.
- Proper mowing height is a function of the species/cultivar being managed and the intended use of the site. Other factors influencing mowing height include mowing frequency, shade, mowing equipment, time of year, root growth, and abiotic and biotic stresses.
- Maintaining an optimal root-to-shoot ratio is critical. Turfgrass plants that are mowed too low will require a substantial amount of time to provide the food needed to produce shoot tissue for future photosynthesis. If turf is mowed too low

in one event, an imbalance occurs between the remaining vegetative tissue and the root system, resulting in more roots being present than the plant needs physiologically. As a result, the plants will slough off the unneeded roots. Root growth is least affected when no more than 30% to 40% of leaf area is removed in a single mowing.

- Failure to mow properly will result in weakened turf with poor density and quality.

### **Best Management Practices**

- Increase mowing frequency during periods of rapid growth and decrease during dry, stressful periods.
- Avoid mowing down tall turf to the desired height all at once. Such severe scalping reduces turf density and can result in a dramatic reduction in root growth. Tall grass should be mowed frequently and height gradually decreased until desired height of cut is achieved.
- Know that shade affects turfgrass growth by filtering out photosynthetically active radiation. As a result, turfgrass plants respond by growing upright in an effort to capture more light to meet their photosynthetic needs. Because of this, increase mowing height by at least 30% to improve the health of turf grown in a shaded environment.
- Use the plant growth regulator trinexapac-ethyl, which has been shown to improve overall turf health when used as a regular management tool for grasses growing in shaded environments.
- Understand that environmental stresses such as prolonged cloudy weather or drought can have a significant impact on turf health. Increase mowing heights as much as use will allow in order to increase photosynthetic capacity and rooting depth of plants.
- Use proper mowing equipment.
- Use reel mowers that are ideally suited for maintaining turfgrass stands that require a height of cut below 1.5 inches. They produce the best quality when compared to other types of mowers. Dull or improperly adjusted reels will result in shredding of leaf tissue, increasing water loss and the potential for disease development.
- Use rotary mowers, that when sharp and properly adjusted, deliver acceptable cutting quality for turf that is to be cut above 1 inch in height. Dull blades will result in shredding of leaf tissue, increasing water loss and the potential for disease development.
- Use flail mowers to maintain utility turf areas that are mowed infrequently and do not have a high aesthetic requirement.
- Understand mowing patterns influence both the aesthetic and functional characteristics of a turf surface.
- Be aware that turfgrass clippings are a source of nutrients, containing 2% to 4% nitrogen on a dry-weight basis, as well as significant amounts of phosphorus and potassium.
- Handle nutrients contained in clippings properly as they can be sources of pollution.

- Return clippings to the site during the mowing process unless the presence of grass clippings will have a detrimental impact on play. Cases when clippings should be removed include times when the amount of clippings is so large that it could smother the underlying grass or on golf greens where clippings might affect ball roll.
- Dispose of collected clippings properly to prevent undesirable odors near play areas and to prevent fire hazards that can occur when clippings accumulate. Consider composting clippings or dispersing them evenly in maintained rough areas where mowers can aid the natural decomposition without accumulating in piles.
- Consider reducing or eliminating mowing on turf areas close to waterbodies to provide a filter strip that will reduce runoff.

## ***Cultivation***

### **Principles**

- Cultivation involves disturbing the soil or thatch through the use of various implements to achieve important agronomic goals that include relief of soil compaction, thatch/organic matter reduction, and improved water and air exchange.
- Cultivation techniques will result in disturbance of the playing surface that can require significant time for recovery.
- Frequency of cultivation should be based on traffic intensity and level of soil compaction.
- Core aerification is effective at managing soil compaction and aiding in improvement of soil drainage.
- Accumulation of excessive thatch and organic matter will reduce root growth, encourage disease, and create undesirable playing conditions.
- Light and frequent applications of sand will smooth the playing surface, control thatch, and potentially change the physical characteristics of the underlying soil when done in conjunction with core aerification.

### **Best Management Practices**

- Design core aerification by removal of small cores or plugs from the soil profile. Cores are usually 0.25 to 0.75 inch in diameter. Annual core aerification programs should be designed to remove 15%-20% of the surface area. High-traffic areas may require a minimum of two to four core aerifications annually.
- Conduct core aerification only when grasses are actively growing to aid in quick recovery of surface density.
- Vary depth of aerification events by incorporating varying length tines to prevent development of compacted layers in the soil profile as a result of cultivation.
- Use solid tines, which cause less disturbance to the turf surface, to temporarily reduce compaction and soften surface hardness during months when the growth

rate of grasses has been reduced. Benefits of solid-tine aerification are temporary because no soil is removed from the profile.

- Create deep aerification holes in the soil profile. If removing soil, it can be brought to the surface and distributed into the canopy or removed. Holes can be backfilled with new root-zone materials if a drill-and-fill machine is used. These machines allow replacement of heavier soils with sand or other materials in an effort to improve water infiltration into the soil profile.
- Reduce surface compaction and promote water infiltration with minimal surface damage by using slicing and spiking.
- Observe that slicing is faster than core aerification but is less effective. Slicing is best accomplished on moist soils.
- Use a spiker to break up crusts on the soil surface, disrupt algae layers, and improve water infiltration.
- Incorporate vertical mowing (verticutting) into a cultural management program to achieve a number of different goals. The grain of a putting green can be reduced by setting a verticutter to a depth that just nicks the surface of the turf. Deeper penetration of knives will stimulate new growth by cutting through stolons and rhizomes while removing accumulated thatch.
- Ensure verticutting depth for thatch removal reaches the bottom of the thatch layer and extends into the surface of the soil beneath the thatch.
- Complete shallow vertical mowing at least monthly on putting greens, during active growing periods when turf is not under heat or drought stress, to prevent excessive thatch accumulation.
- Use groomers, or miniature vertical mowers attached to the front of reels, which are effective at improving management of grain and improving plant density through cutting of stolons.
- Topdress the playing surface with sand following core aerification and heavy vertical mowing to aid in recovery of turf. Rates will vary from 0.08 to 0.5 inch in depth and will depend on the capacity of the turf canopy to absorb the material without burying the plants.
- Aid in the management of thatch accumulation by making light, frequent applications of topdressing sand on putting greens to smooth out minor surface irregularities.
- Use only weed-free topdressing materials with a particle size similar to that of the underlying root zone.
- Understand the use of finer materials can result in layering and can have a negative impact on water infiltration.
- Increase putting speeds by roughly 10%, allowing for improved ball roll without lowering height of cut, by daily rolling of putting surfaces following mowing.
- Use light weight rollers to minimize potential for compaction caused by rolling.

## ***Shade and Tree Management***

### **Principles**

- In general, most turfgrasses perform best in full sun.
- Excessive shade reduces photosynthesis and air circulation, thus increasing the susceptibility of the turf to pest and disease problems.

### **Best Management Practices**

- Prune tree limbs and roots as needed to reduce competition for sunlight, water, and nutrients.
- Remove, when possible, trees located near closely mowed areas such as tees and greens, or thin their canopy to promote good turf growth.
- Understand the variability in sun angles at different times of the year and how this affects turf health.
- Conduct a shade audit to identify problem areas.
- Conduct a tree survey that identifies each tree's location, species, health, life expectancy, safety concerns, value and special maintenance requirements.
- Understand thoroughly the growth characteristics, and water and space requirements of each tree species before planting, to help eliminate future problems and competition with desired turf and other beneficial trees.



Iron Horse Golf Club - Whitefish, MT



# Integrated Pest Management

## *Introduction*



The philosophy of integrated pest management (IPM) was developed in the 1950s because of concerns over increased pesticide use, environmental contamination, and the development of pesticide resistance. The objectives of IPM include reducing pest management expenses, conserving energy, and reducing the risk of pesticide exposure to people, animals, and the environment. Its main goal, however, is to reduce pesticide use by using a combination of tactics to control pests, including cultural, biological, genetic, and chemical controls.

Pest management on golf courses results in significant inputs of time, labor, and financial resources. To grow healthy turfgrass, it is important for golf course superintendents to know what IPM is and how to implement it for each pest group (arthropods, nematodes, diseases, and weeds). They must be well-versed in pest identification, understand pest life cycles and/or conditions that favor pests, and know about all possible methods of controlling pests.

## ***Regulatory Considerations***

### **Principles**

- Some federal or state regulations cover practically anyone who manufactures, formulates, markets, and uses pesticides.
- Record keeping of pesticide use is required by law. IPM principles suggest that you keep records of all pest control activity so that you may refer to information on past infestations or other problems to select the best course of action in the future.

### **Best Management Practices**

- Keep proper records of all pesticide applications according to local, state, or federal requirements.
- Keep at least one trained and licensed applicator on staff.
- Use records to establish proof of use and follow-up investigation of standard protocols regarding:

- Date and time of application
- Name of applicator
- Person directing or authorizing the application
- Weather conditions at the time of application
- Target pest
- Pesticide used (trade name, active ingredient, amount of formulation, amount of water)
- Adjuvant/surfactant and amount applied, if used
- Area treated (acres or square feet) and location
- Total amount of pesticide used
- Application equipment
- Additional remarks, such as the severity of the infestation or life stage of the pest
- Follow-up to check the effectiveness of the application

### **Noxious Weeds**

**Definition** - Any weed designated by an agricultural authority or lawmaking body that has or may have the potential to cause harmful effects on agricultural crops, horticultural crops, natural habits, ecosystems, humans, or livestock.

With each state designating a variety of plant species as noxious, it is important for golf courses to consider noxious weed management as part of the regulatory considerations for weed management.

### **Terrestrial Noxious Weeds**

- Blueweed, Canada Thistle, Common Tansy, Dalmatian Toadflax, Diffuse Knapweed, Dyer's Woad, Field Bindweed, Hoary Alyssum, Houndstongue, Knotweed Complex, Leafy Spurge, Meadow Hawkweed Complex, Orange Hawkweed, Oxeye Daisy, Perennial Pepperweed, Purple Loosetrife, Rush Skeletonweed, Russian Knapweed, Saltcedar, Scotch Broom, Spotted Knapweed, St. Johnswort, Sulfur Cinquefoil, Tall Buttercup, Tansy Ragwort, Whitetop, Yellow Starthistle, Yellow Toadflax, Yellowflag Iris

### **Aquatic Noxious Weeds**

- Curly-Leaf Pondweed, Eurasian Water Milfoil, Flowering Rush

**Regulated Plants** (Not Montana listed noxious weeds, but regulated because of the potential to have significant negative impacts)

- Cheatgrass, Hydrilla, Russian Olive

## ***IPM Overview***

### **Principles**

- The fundamental basis of an environmentally sound pest control program is a process called IPM.
- IPM focuses on the basics of identifying the pests, choosing pest-resistant varieties of grasses and other plants, enhancing the habitat for natural pest predators, scouting to determine pest populations and determining acceptable thresholds, and applying biological and other less toxic alternatives to chemical pesticides whenever possible.
- Chemical controls should have minimal effect on beneficial organisms and the environment and minimize the development of pesticide resistance.

### **Best Management Practices**

- Choose chemical pesticide applications carefully for effective and site-specific pest control with minimal environmental impact.
- Identify key pests on key plants.
- Determine the pest's life cycle, and know which life stage to target (for an insect pest, whether it is an egg, larva/nymph, pupa, or adult).
- Use cultural, mechanical, or physical methods to prevent problems from occurring (for example, prepare the site, select resistant cultivars), reduce pest habitat (for example, practice good sanitation, carry out pruning and dethatching), or to help promote biological control (for example, provide nectar or honeydew sources).
- Decide which pest management practice is appropriate and carry out corrective actions. Direct control where the pest lives or feeds.
- Use preventive chemical applications only when your professional judgment indicates that properly timed preventive applications are likely to control the target pest effectively while minimizing the economic and environmental costs.
- Determine whether the corrective actions actually reduced or prevented pest populations, were economical, and minimized risks. Record and use this information when making similar decisions in the future.

### ***Written Plan***

#### **Principles**

- IPM is an overall pest management strategy that includes biological controls, cultural methods, pest monitoring and other applicable preventative practices.
- A pest-control strategy should be used only when the pest is causing or is expected to cause more damage than what can be reasonably and economically tolerated. A control strategy should be implemented that reduces the pest numbers to an acceptable level while minimizing harm to non-targeted organisms.
- When a pesticide application is deemed necessary, its selection should be based on effectiveness, toxicity to non-target species, cost, and site characteristics, as well as its solubility and persistence.

## **Best Management Practices**

- Decide which pest management practice(s) are appropriate and carry out corrective actions. Direct control where the pest lives or feeds. Use properly timed preventive chemical applications only when your professional judgment indicates they are likely to control the target pest effectively, while minimizing the economic and environmental costs.
- Determine whether the corrective actions actually reduced or prevented pest populations, were economical, and minimized risks. Record and use this information when making similar decisions in the future.
- Observe and document turf conditions regularly (daily, weekly, or monthly, depending on the pest), noting which pests are present, so intelligent decisions can be made regarding how damaging the pests are and what control strategies are necessary.

## ***Pest Thresholds***

### **Principles**

- IPM is commonly used in agricultural crop production, where the economic thresholds for key pests have been determined. Pest levels exceeding the site's threshold warrant treatment.
- Using IPM is more challenging on golf courses than in an agricultural setting. The golf industry is sensitive to aesthetic damage, and golfers are often intolerant of anything that could affect the appearance of turfgrass and ornamental plants. Increased education of golfers and maintenance personnel could raise their tolerance of minor aesthetic damage without compromising plant health, play, and aesthetics.

## **Best Management Practices**

- Use available pest thresholds to guide pesticide application decisions (see IPM Guide).
- Use preventive chemical applications only when professional judgment indicates that properly timed preventive applications are likely to control the target pest effectively while minimizing the economic and environmental costs.
- Record and use this information when making similar decisions in the future.

## ***Monitoring***

### **Principles**

- Monitoring, or scouting, is the most important element of a successful IPM program. Monitoring documents the presence and development of pests, or the conditions that are conducive for pest outbreak throughout the year.

- It is essential to record the results of scouting in order to develop historical information, document patterns of pest activity, and document successes and failures.

### **Best Management Practices**

- Train personnel to observe and document turf conditions regularly (daily, weekly, or monthly, depending on the pest), noting which pests are present, so intelligent decisions can be made regarding how damaging they are and what control strategies are necessary.
- Train personnel to determine the pest's life cycle, and know which life stage to target (for an insect pest, whether it is an egg, larva/nymph, pupa, or adult).
- Train personnel to determine whether the corrective actions actually reduced or prevented pest populations, were economical, and minimized risks. Record and use this information when making similar decisions in the future.
- Train personnel to document, identify, and record key pest activities on key plants.
- Identify signs of the pest. These may include mushrooms, animal damage, insect frass, or webbing.
- Identify the symptoms of the pest. Look for symptoms such as chlorosis, dieback, growth reduction, defoliation, mounds, or tunnels.
- Determine the damage. Problem areas might include the edges of fairways, shady areas, or poorly drained areas.
- Document when the damage occurred. Note the time of day, year, and flowering stages of nearby plants.
- Map pest outbreak locations to identify patterns and susceptible areas for future target applications and ultimate pesticide reductions.

## ***Record Keeping***

### **Principles**

- It is essential to record the results of scouting in order to develop historical information, document patterns of pest activity, and document successes and failures.
- Record keeping is required to comply with the federal Superfund Amendments and Reauthorization Act (SARA, Title III), which contains emergency planning and community right-to-know legislation.
- Certain pesticides are classified as restricted-use pesticides (RUPs). Very few pesticides in this category are routinely used in turf maintenance, but if you happen to use one of them, certain record-keeping requirements apply.

### **Best Management Practices**

- Document, identify, and record key pest activities on key plants and locations.

- Determine the pest's life cycle, and know which life stage to target (for an insect pest, whether it is an egg, larva/nymph, pupa, or adult).
- Determine whether the corrective actions actually reduced or prevented pest populations, were economical, and minimized risks. Record and use this information when making similar decisions in the future.
- Observe and document turf conditions regularly (daily, weekly, or monthly, depending on the pest), noting which pests are present, so intelligent decisions can be made regarding how damaging they are and what control strategies are necessary.

## ***Turfgrass Selection***

### **Principles**

- Selecting pest-resistant cultivars or plant species is a very important part of IPM, and it leads to reduced pesticide usage. Species grown outside of their zone of adaptation are more prone to pest problems.
- Species and cultivars should be managed under conditions similar to their intended use (for example, not exceeding mowing height limitations that a grass was bred for or selected for).
- Educate builders, developers, golf course and landscape architects, sod producers, golfers and others on which plants are best suited to their areas.
- Turfgrasses must be scientifically selected for the eco-region of the golf course, resulting in minimized irrigation requirements, fertilization needs, and pesticide use.

### **Best Management Practices**

- Select the most suitable turfgrass for existing conditions and one that adheres to design specifications.
- Avoid use of turfgrass in heavy shade.
- Select shade-adapted grasses for areas receiving partial sun or shaded areas.
- Reduce pest and disease pressures by correcting dead spots and air-circulation issues by pruning understory and adjusting irrigation scheduling.
- Reduce fertilizer applications in shaded areas.
- Reduce traffic in shaded areas to protect turfgrasses and trees from injury and soil compaction, if practical.



Sidney Country Club - Sidney, MT

## ***Biological Controls***

### **Principles**

- The biological component of IPM involves the release and/or conservation of natural predators, such as parasites and pathogens, and other beneficial organisms (pollinators).
- Natural enemies (beneficial insects including ladybird beetles, green lacewings, and mantids) may be purchased and released near pest infestations.
- Areas on the golf course can also be modified to better support natural predators and beneficial organisms.

### **Best Management Practices**

- Identify areas on the golf course that can be modified to attract natural predators, provide habitat for them, and protect them from pesticide applications.
- Install flowering plants that can provide parasitoids with nectar, or sucking insects (aphids, mealybugs, or soft scales) with a honeydew source.
- Provide a refuge for beneficial organisms by not applying pesticides to roughs, driving ranges, or other low-use areas.
- Release insect-parasitic nematodes to naturally suppress mole crickets and white grubs.

## ***Pollinators***

### **Principles**

- It is important to minimize the impacts on bees and beneficial arthropods. Pesticide applicators must use appropriate tools to help manage pests while safeguarding pollinators, the environment, and humans.
- Pollinator-protection language is a label requirement found on pesticide labels.

- Be mindful of pollinators; when applying pesticides, focus on minimizing exposure to non-target pollinators in play and non-play course areas.
- Pollinators may be negatively impacted when pesticide applications are made based on insufficient information and/or made without regard to the safety of pollinators.

### **Best Management Practices**

- Minimize injury and damage by following label directions when using pesticides.
- Follow label information concerning the application of pesticides when plants may be in bloom. Avoid applying pesticides during bloom season.
- Stay on target by using coarse-droplet nozzles and monitor wind to reduce drift.
- Prohibit applying pesticides when pollinators are active.
- Scout/inspect area for both harmful and beneficial insect populations before applying a pesticide, and apply only when the indicated threshold of damage has been reached.
- Mow flowering plants (weeds) before insecticide application.
- Control flowering weeds, if prevalent, before applying insecticides.
- Use insecticides that have a lower impact on pollinators.
- Use the latest spray technologies, such as drift-reduction nozzles to prevent off-site (target) translocation of pesticide.
- Avoid applications during unusually low temperatures or when dew is forecasted.
- Use granular formulations of pesticides that are known to be less hazardous to bees.
- Consider lures, baits, and pheromones as alternatives to insecticides for pest management.

## ***Conventional Pesticides***

### **Principles**

- IPM does not preclude the use of pesticides. However, pesticides should be viewed as one of the many tools used to minimize pest problems.
- IPM involves both prevention — keeping the pest from becoming a problem — and suppression — reducing the pest numbers or damage to an acceptable level.
- A pest-control strategy using pesticides should be used only when the pest is causing or is expected to cause more damage than what can be reasonably and economically tolerated.
- Pesticides are designed to control or alter the behavior of pests. When, where, and how they can be used safely and effectively is a matter of considerable public interest.
- Pesticides should be evaluated on effectiveness against the pest, mode of action, life stage of the pest, personnel hazards, non-target effects, potential off-site movement, and cost.



- A control strategy should be implemented that reduces the pest numbers to an acceptable level while minimizing harm to non-targeted organisms.
- Always follow the directions on the label. These directions have been developed after extensive research and field studies on the chemistry, biological effects, and environmental fate of the pesticide. The label is the single most important document in the use of a pesticide. State and federal pesticide laws require following label directions!

### **Best Management Practices**

- Train employees in proper pest identification and pesticide selection techniques.
- Choose the product most appropriate for the problem or pest.
- Mix only the quantity of pesticide needed in order to avoid disposal problems, protect non-target organisms, and save money.
- Spot-treat pests whenever appropriate.
- Note any environmental hazards and groundwater advisories included on the label.
- Rotate pesticide modes-of-action to reduce the likelihood of resistance.
- Follow guidelines and advice provided by the Fungicide Resistance Action Committee (FRAC), Herbicide Resistance Action Committee (HRAC), and Insecticide Resistance Action Committee (IRAC).

## ***Disease***

### **Principles**

- In the presence of a susceptible host and a conducive environment, plant pathogens can disrupt play by damaging and destroying intensely managed turf.
- No measure can completely eliminate the threat of turfgrass disease on a golf course. However, turfgrass managers have multiple tactics and tools that can reduce the likelihood of disease.
- Cultural factors that can influence turfgrass stress and the likelihood of disease problems include organic layer management, fertility programs, water management, and mowing height selection. Healthy, well-managed turfgrass is less likely to develop disease problems.
- Disease outbreaks that do occur are less likely to be severe on turf that is healthy because it has better recuperative potential than stressed, unhealthy turf.

### **Best Management Practices**

- Identify the disease pathogen correctly. This often involves sending samples to diagnostic clinics.
- Ensure that proper cultural practices that reduce turfgrass stress are used.
- Correct conditions that produce stressful environments for the turf (for example, improve airflow and drainage, reduce or eliminate shade.)
- Integrate fungicide use into an overall management strategy for a golf course.

- Apply the appropriate (most effective) preventive fungicide to susceptible turfgrasses when unacceptable levels of disease are likely to occur.
- Apply appropriate preventative fungicides where diseases are likely to occur and when conditions favor disease outbreaks.
- Record and map disease outbreaks and identify trends that can help guide future treatments and focus on changing conditions in susceptible areas to reduce disease outbreaks.

## **Weeds**

### **Principles**

- Weeds compete with desired plants for space, water, light, and nutrients and can harbor insect pests and diseases.
- Weed management is an integrated process where good cultural practices are employed to encourage desirable turfgrass ground cover, and where herbicides are intelligently selected and judiciously used. A successful weed management program consists of:
  - preventing weeds from being introduced into an area
  - using proper turfgrass management and cultural practices to promote vigorous, competitive turf
  - properly identifying weeds
  - properly selecting and using the appropriate herbicide, if necessary
- Weeds are hosts for other pests such as plant pathogens, nematodes, and insects, and certain weeds can cause allergic reactions in humans.
- Weeds reproduce from seed, root pieces, and special vegetative reproductive organs such as tubers, corms, rhizomes, stolons, or bulbs. People, animals, birds, wind, and water can distribute seeds.
- Weeds complete their life cycles in either one growing season (annuals), two growing seasons (biennials), or three or more years (perennials). Annuals that complete their life cycles from spring to fall are referred to as summer annuals. Those that complete their life cycles from fall to spring are winter annuals.

### **Best Management Practices**

- Use proper weed identification - essential for effective management and control.
- Select appropriate turf species or cultivars that are adapted to the prevalent environmental conditions to reduce weed encroachment that may lead to bare soils.
- Adopt or maintain cultural practices that prevent weed encroachment and protect turfgrass from environmental stresses such as shade, drought, and extreme temperatures.
- Address improper turf management practices to reduce weed infestation, such as the misuse of fertilizers and chemicals, improper mowing height or mowing frequency, and improper soil aeration, and physical damage and compaction from excessive traffic.

- Use proper fertilization, which is essential for turfgrasses to sustain desirable color, growth density, and vigor and to better resist diseases, weeds, and insects.
- Avoid scalping; it reduces turf density, increasing weed establishment.
- Use weed-free materials for topdressing.
- Address damage from turfgrass pests such as diseases, insects, nematodes, and animals to prevent density/canopy loss to broadleaf weeds.
- Record and map weed infestations to help identify site specific issues for preventative actions.

## ***Nematodes***

### **Principles**

- Plant-parasitic nematodes adversely affect turfgrass health.
- Plant-parasitic nematodes are microscopic roundworms (unsegmented), usually between 0.0156 and 0.125 inch (0.25 and 3 mm) in length, and are difficult to control.
- Nematodes debilitate the root system of susceptible turfgrasses; plant-parasitic nematodes cause turf to be less efficient at water and nutrient uptake from the soil and make it much more susceptible to environmental stresses. Additionally, weakened turf favors pest infestation, especially troublesome weeds that necessitate herbicide applications.
- Over time, turf in the affected areas thins out and, with severe infestations, may die. The roots of turfgrasses under nematode attack may be very short, with few, if any, root hairs, or they may appear dark and rotten.
- Turfgrasses usually begin showing signs of nematode injury as they experience additional stresses, including drought, high temperatures, low temperatures, and wear.

### **Best Management Practices**

- Assess an assay of soil and turfgrass roots when nematode activity is suspected, to determine the extent of the problem.
- Base the application of a nematicide on golf course turf on assay results.
- Divert traffic away from areas that are stressed by insects, nematodes, diseases, or weeds.
- Increase mowing height to reduce plant stress associated with nematodes, root-feeding insects, disease outbreaks, or peak weed-seed germination.
- Reduce/eliminate other biotic/abiotic stresses when nematodes are compromising the root system and plant health.



# Pesticide Management

## *Introduction*



Pesticide use should be part of an overall pest management strategy that includes biological controls, cultural methods, pest monitoring, and other applicable practices, referred altogether as IPM. When a pesticide application is deemed necessary, its selection should be based on effectiveness, toxicity to non-target species, cost, site characteristics, and its solubility and persistence in the environment.

## ***Regulatory Considerations***

### **Principle**

Pesticides contain active ingredients (the component that targets the pest) and inert ingredients such as solvents, surfactants, and carriers. Both active and inert ingredients may be controlled or regulated by federal, state, and local laws because of environmental and health concerns.

### **Best Management Practices**

- Apply only pesticides that are legally registered at all levels of jurisdiction.
- Apply only pesticides that are legally registered for use on the facility (for example, do not apply pesticides labeled for agricultural uses even though they may have the same active ingredient).
- Apply according to manufacturer recommendations as seen on label.

## ***Human Health Risks***

### **Principle**

Pesticides belong to numerous chemical classes that vary greatly in their toxicity. The human health risk associated with pesticide use is related to both pesticide toxicity and the level of exposure. The risk of a very highly toxic pesticide may be very low if the exposure is sufficiently small.

### **Best Management Practices**

- Select the least toxic pesticide with the lowest exposure potential within the economic abilities of the facilities.
- Know the emergency response procedure in case excessive exposure occurs.

## ***Environmental Fate and Transport***

### **Principle**

Environmental characteristics of a pesticide can often be determined by the environmental hazards statement found on pesticide product labels. The environmental hazards statement (referred to as “Environmental Hazards” on the label and found under the general heading “Precautionary Statements”) provides the precautionary language advising the user of the potential hazards to the environment from the use of the product. The environmental hazards generally fall into three categories: (1) general environmental hazards, (2) non-target toxicity, and (3) endangered species protection.

### **Best Management Practices**

- Select pesticides that have a low runoff and leaching potential.
- Evaluate the impact of site-specific characteristics before applying a pesticide (for example, proximity to surface water, water table, and well-heads; soil type; prevailing wind; etc.) and pesticide-specific characteristics (for example, half-lives and partition coefficients).
- Select pesticides with reduced impact on pollinators.
- Select pesticides that, when applied according to the label, have no known effect on endangered species known to be present on the facility.

## ***Pesticide Transportation, Storage, and Handling***

### **Principle**

Storage and handling of pesticides in their concentrated form poses the highest potential risk to ground or surface waters. For this reason, it is essential that facilities for storing and handling these products be properly sited, designed, constructed, and operated.

### **Best Management Practices**

- Store, mix, and load pesticides away from sites that directly link to surface water or groundwater.
- Store pesticides in a lockable concrete or metal building that is separate from other buildings.
- Locate pesticide storage facilities away from other types of structures to allow fire department access.

- Seal storage facility floors, which should be impervious, with a chemical-resistant paint.
- Construct floors with a continuous sill to retain spilled materials and no drains, although a sump may be included.
- Provide sloped ramps at the entrance to allow the use of wheeled handcarts for moving material in and out of the storage area safely.
- Construct shelving made of sturdy plastic or reinforced metal.
- Paint metal shelving to avoid corrosion. Wood shelving should never be used, because it may absorb spilled pesticides.
- Provide automatic exhaust fans and an emergency wash area. Explosion-proof lighting may be required. Light and fan switches should be located outside the building, so that both can be turned on before staff enter the building and turned off after they leave the building.
- Avoid temperature extremes inside the pesticide storage facility.
- Make personal protective equipment (PPE) easily accessible and store immediately outside the pesticide storage area.
- Avoid transporting pesticides in the passenger section of a vehicle.
- Prevent pesticides from being left unattended during transport.
- Place a spill containment kit in the storage area, in the mix/load area, and on the spray rig.

## ***Emergency Preparedness and Spill Response***

### **Principle**

Accidents happen. Advance preparation on what to do when an accident occurs is essential to mitigate the human health effects and the impact on the environment.

### **Best Management Practices**

- Develop a golf course facility emergency response plan which includes procedures to control, contain, collect, and store spilled materials.
- Post in a prominent location “Important Telephone Numbers”, including CHEMTREC, for emergency information on hazards or actions to take in the event of a spill.
- Ensure an adequately sized spill containment kit is readily available.
- Designate a spokesperson who will speak on behalf of the facility should an emergency occur.
- Host a tour for local emergency response teams (for example, fire fighters, etc.) to show them the facilities and to discuss the emergency response plan. Seek advice on ways to improve the plan.

## ***Pesticide Record Keeping***

### **Principle**

Maintaining accurate records of pesticide-related activities (for example, purchasing, storage, inventory, applications, etc.) is essential.

### **Best Management Practices**

- Keep and maintain records of all pesticides used to meet legal (federal, state, and local) reporting requirements.
- Use records to monitor pest control efforts and to plan future management actions.
- Use electronic or hard-copy forms and software tools to properly track pesticide inventory and use.
- Develop and implement a pesticide drift management plan.
- Keep a backup set of records in a safe, but separate storage area.

## ***Sprayer Calibration***

### **Principle**

Properly calibrated application equipment is paramount to mitigating environmental and human health concerns.

### **Best Management Practices**

- Ensure personally that your spray technician is experienced, licensed, and properly trained.
- Minimize off-target movement by using properly configured application equipment.
- Properly calibrate all application equipment at the beginning of each season (at a minimum) or after equipment modifications.
- Check equipment daily when in use.
- Use recommended spray volumes for the targeted pest to maximize efficacy.
- Conduct the calibration of walk-behind applicators for each person making the application, to take into consideration their walking speed, etc.

## ***Types of Sprayers***

### **Principle**

Various types and sizes of application equipment are readily available. The size of the equipment (tank size, boom width, etc.) should be matched to the scale of the facility.

### **Best Management Practices**

- Use an appropriately sized applicator for the size of area being treated.
- Avoid using equipment too large in size that requires greater volumes to prime the system. This can result in significant waste that must be properly handled.



## ***Inventory***

### **Principle**

Do not store large quantities of pesticides for long periods. Adopt the “first in–first out” principle, using the oldest products first to ensure that the product shelf life does not expire.

### **Best Management Practices**

Keep an inventory of the pesticides in the storage building. The Safety Data Sheets (SDS) for the chemicals used in the operation should be accessible on the premises, but not kept in the pesticide storage room itself.

## ***Shelf Life***

### **Principle**

- Pesticides degrade over time. Do not store large quantities of pesticides for long periods.
- Utilize computer software systems to record inventory and use.

### **Best Management Practices**

- Avoid purchasing large quantities of pesticides that require storage for greater than six months.
- Adopt the “first in–first out” principle, using the oldest products first to ensure that the product shelf life does not expire.
- Use available Department of Agriculture recycling programs in order to eliminate potential public health and environmental hazards from cancelled, suspended, and unusable pesticides that are being stored.
- Ensure labels are on every package and container.
- Consult inventory when planning and before making purchases.
- Ensure that labels remain properly affixed to their containers.

## ***Leaching Potentials***

### **Principle**

Weakly sorbed pesticides (compounds with small K<sub>oc</sub> values) are more likely to leach through the soil and reach groundwater. Conversely, strongly sorbed pesticides (compounds with large K<sub>oc</sub> values) are likely to remain near the soil surface, reducing the likelihood of leaching, but increasing the chances of being carried to surface water via runoff or soil erosion.

### **Best Management Practices**

- Understand pesticide sorption principles so that appropriate decisions can be made.
- Understand site characteristics that are prone to leaching losses (for example, sand-based putting greens, coarse-textured soils, shallow water tables).
- Identify label restrictions that may pertain to your facility.
- Avoid using highly water-soluble pesticides.
- Exercise caution when using spray adjuvants that may facilitate off-target movement.

## ***Mixing/Washing Station***

### **Principle**

Pesticide leaks or spills, if contained, will not percolate down through the soil into groundwater or run off the surface to contaminate streams, ditches, ponds, and other waterbodies. One of the best containment methods is the use of a properly designed and constructed chemical mixing center (CMC).

### **Best Management Practices**

- Load pesticides and mix them with water or oil diluents over an impermeable surface (such as lined or sealed concrete), so that spills can be collected and managed.
- Ensure mixing station surface provides for easy cleaning and the recovery of spilled materials.
- Pump the sump dry and clean it at the end of each day. Liquids and sediments should also be removed from the sump and the pad whenever pesticide materials are changed to an incompatible product (that is, one that cannot be legally applied to the same site).
- Apply liquids and sediments as you would a pesticide, strictly following label instructions.
- Use absorbents such as cat litter or sand to clean up small spills and then apply as a topdressing in accordance with the label rates, or dispose of as a waste.
- Sweep up solid materials and use as intended.

## ***Disposal***

### **Principle**

Wash water from pesticide application equipment must be managed properly, since it contains pesticide residues.

### **Best Management Practices**

- Collect wash water (from both inside and outside the application equipment) and use it as a pesticide in accordance with the label instructions.

- Apply the rinsate as a pesticide (preferred) or store for use as makeup water for the next compatible application.

## ***Personal Protective Equipment***

### **Principle**

Exposure to pesticides can be mitigated by practicing good work habits and adopting modern pesticide mix/load equipment (for example, closed-loading) that reduce potential exposure. Personal Protective Equipment (PPE) statements on pesticide labels provide the applicator with important information on protecting himself/herself.

### **Best Management Practices**

- Provide adequate PPE for all employees who work with pesticides (including equipment technicians who service pesticide application equipment).
- Ensure that PPE is sized appropriately for each person.
- Confirm that PPE is appropriate for the chemicals used.
- Ensure that PPE meets rigorous testing standards and is not just the least expensive.
- Store PPE where it is easily accessible, but not in the pesticide storage area.
- Forbid employees who apply pesticides from wearing facility uniforms home where they may come into contact with children.
- Provide laundering facilities or uniform service for employee uniforms.
- Follow the federal Occupational Safety and Health Administration (OSHA) requirement for employers to fit test workers who must wear tight-fitting respirators.
- Meet requirements for OSHA 1910.134 Respiratory Protection Program.

## ***Pesticide Container Management***

### **Principle**

The containers of some commonly used pesticides are classified as hazardous wastes if not properly rinsed, and, as such, are subject to the many rules and regulations governing hazardous waste. The improper disposal of a hazardous waste can result in very high fines and/or criminal penalties. However, pesticide containers that have been properly rinsed can be handled and disposed of as nonhazardous solid waste. Federal law (FIFRA) and some state laws require pesticide applicators to rinse all empty pesticide containers before taking other container disposal steps. Under federal law (the Resource Conservation and Recovery Act, or RCRA), A PESTICIDE CONTAINER IS NOT EMPTY UNTIL IT HAS BEEN PROPERLY RINSED.

### **Best Management Practices**

- Rinse pesticide containers immediately in order to remove the most residue.

- Rinse containers during the mixing and loading process and add rinsate water to the finished spray mix.
- Rinse emptied pesticide containers by either triple rinsing or pressure rinsing.
- Puncture empty and rinsed pesticide containers and dispose of according to the label.



Old Works Golf Club - Anaconda, MT

# Pollinator Protection

## *Introduction*



Most flowering plants need pollination to reproduce and grow fruit. While some plants are pollinated by wind, many require assistance from insects and other animals. In the absence of pollinators, many plant species, including the fruits and vegetables we eat, would fail to survive.

The western honey bee (*Apis mellifera*) is one of the most important pollinators in the United States. Hundreds of other bee species, including the bumble bee (*Bombus* spp.), also serve as important pollinator species. Protecting bees and other pollinators is important to the sustainability of agriculture.

Pesticides are products designed to control pests (for example, insects, diseases, weeds, nematodes, etc.). Pesticides and other plant growth products, including plant growth regulators, surfactants, biostimulants, etc., are used in golf course management. The non-target effect of products used in golf course management is of increasing concern; therefore, pesticide applicators, including those on golf courses, need to be mindful of the impact that pesticides have on pollinator species and their habitat.

## ***Regulatory Considerations***

### **Principles**

- Pollinator-protection language is a label requirement found on pesticide labels; follow the label, it is the law.
- Pesticide applicators must be aware of honey bee toxicity groups and able to understand precautionary statements.
- Recordkeeping may be required by law in order to use some products. IPM principles suggest that you keep records of all pest control activity so that you may refer to information on past infestations or other problems to select the best course of action in the future.

### **Best Management Practices**

- Keep proper records of all pesticide applications according to local, state, or federal requirements.
- Use records to establish proof of use and follow-up investigation of standard protocols regarding:
  - Date and time of application
  - Name of applicator
  - Person directing or authorizing the application
  - Weather conditions at the time of application
  - Target pest
  - Pesticide used (trade name, active ingredient, amount of formulation, amount of water)
  - Adjuvant/surfactant and amount applied, if used
  - Area treated (acres or square feet) and location
  - Total amount of pesticide used
  - Application equipment
  - Additional remarks, such as the severity of the infestation or life stage of the pest
  - Follow-up to check the effectiveness of the application
- Understand that pollinator protection label statements should be used by those who make decisions regarding their applications and those applying the pesticides.
- Know honey bee biology when applying pesticides.
- Understand the various routes of exposure (outside the hive and inside the hive) when applying pesticides.
- Understand the effects of pesticides on bees when applying pesticides.

## ***Pollinator Habitat Protection***

### **Principles**

- It is important to minimize the impacts of pesticides on bees and beneficial arthropods. Pesticide applicators must use appropriate tools to help manage pests while safeguarding pollinators, the environment, and humans.
- Be mindful of pollinators; when applying pesticides, focus on minimizing exposure to non-target pollinators in play and non-play course areas.
- Pollinators require a diversity of flowering species to complete their life cycle. Pollinator habitat contains a diversity of wildflower species of different colors and heights, with blossoms throughout the entire growing season

### **Best Management Practices**

- Follow label information directing the application of pesticide when the plant may be in bloom. Avoid applying pesticides during bloom season.
- Stay on target by using coarse-droplet nozzles, and monitoring wind to reduce drift.
- Prohibit applying pesticides when pollinators are active.

- Scout/inspect the area for both harmful and beneficial insect populations, and use pesticides only when a threshold of damage has been indicated.
- Mow flowering plants (weeds) before insecticide application.
- Control flowering weeds, if prevalent, before applying insecticides.
- Use insecticides that have a lower impact on pollinators.
- Use the latest spray technologies, such as drift-reduction nozzles to prevent off-site (target) translocation of pesticide.
- Avoid applications during unusually low temperatures or when dew is forecast.
- Use granular formulations of pesticides that are known to be less hazardous to bees.
- Consider lures, baits, and pheromones as alternatives to insecticides for pest management.
- Develop new pollinator habitat and/or enhance existing habitat.



# Maintenance Operations

## *Introduction*



Equipment maintenance, fueling, and chemical storage can have an impact on water quality, both on-site and off-site, during construction and during the maintenance of existing golf courses.

## ***Regulatory Considerations***

Local and state regulations may be in place in your location. Early engagement among developers, designers, local community groups and permitting agencies is essential to designing and constructing a golf maintenance and storage facility that minimizes environmental impact and meets the needs for the approval process.

## ***Storage and Handling of Chemicals***

### **Principles**

- Proper handling and storage of pesticides and petroleum-based products is important to reduce risk of serious injury or death of an operator or bystander. Fires or environmental contamination may result in large fines, cleanup costs, and civil lawsuits if these chemicals are not managed properly.
- Check federal, state, and local regulations for specific requirements related to storage of pesticides.

### **Best Management Practices**

- Post appropriate warning signs and placards at storage buildings.
- Follow all personal protective equipment (PPE) statements on pesticide labels.
- Store PPE away from pesticide storage areas in an area that is easily accessible.
- Develop an emergency response plan and educate all golf course personnel regarding emergency procedures on a regular basis.
- Train individuals conducting emergency chemical cleanups properly, under requirements of Federal Occupational Safety and Health Administration (OSHA).
- Store pesticides in a lockable concrete or metal building.



- Locate pesticide storage away from other buildings, especially fertilizer storage facilities.
- Seal floors of chemical storage buildings with chemical-resistant paint. These floors should be impervious.
- Equip floors of chemical storage buildings with a continuous sill to contain spills. There should be no drain. A sump is acceptable.
- Construct shelving fabricated from plastic or reinforced metal. Metal shelving should be painted to avoid corrosion. Wood shelving should never be used because of its ability to absorb spilled pesticides.
- Provide automatic exhaust fans and an emergency wash area.
- Use explosion-proof lighting if required. Locate fan and light switches outside the entrance to the building to facilitate ventilation of building before entrance of staff.
- Maintain detailed records of current pesticide inventory in the storage facility. Safety Data Sheets (SDS) for the chemicals stored on-site should be stored separately from the storage room, but readily accessible on-site.
- Abstain from storing large quantities of pesticides or chemicals for long periods of time. Follow a “first in, first out” principle to rotate products into use to ensure products do not expire.
- Store chemicals in original containers. Never store them in containers that might be mistaken as packaging for food or drink.
- Arrange containers so the labels are clearly visible. Securely fasten loose labels to ensure containers and associated labels are kept together.
- Replace damaged labels immediately.
- Store flammable pesticides separate from those that are nonflammable.
- Store liquid materials below dry materials to prevent leaks from contaminating dry products.
- Ensure that oil containers and small fuel containers (service containers) are properly labeled and stored within the facility.

## ***Waste Handling***

### **Principles**

- Proper disposal of waste materials is critical for protection of water and natural resources. State or local laws and regulations related to disposal of hazardous waste products may vary. Be sure to familiarize yourself with all state and local laws related to disposal/recycling of these waste materials.
- Identify and implement waste-reduction practices.
- Look for ways to increase recycling efforts and programs.
- Purchase environmentally preferred products in bulk packaging when possible.

### **Best Management Practices**

- Dispose as waste pesticides that have been mixed for application. These may be classified as hazardous waste depending on the materials involved. Contact local authorities for guidance regarding proper disposal.
- Collect used oil, oil filters, and antifreeze in separate marked containers and recycle them as directed by local and state authorities.
- Handle antifreeze, which may be considered hazardous waste by state or local laws, appropriately. Commercial services are available to collect and recycle antifreeze.
- Classify lead-acid batteries as hazardous waste unless they are properly recycled.
- Store old batteries on impervious surfaces where they are protected from rainfall and recycle as soon as possible.
- Recycle used tires.
- Recycle or dispose of fluorescent tubes and other lights according to state requirements.

## ***Equipment Storage and Maintenance***

### **Principle**

Storing and maintaining equipment properly will extend useful life and reduce repairs.

### **Best Management Practices**

- Store and maintain equipment in a covered area complete with a sealed impervious surface to limit risk of fluid leaks contaminating the environment and to facilitate the early detection of small leaks that may require repair before causing significant damage to the turf or the environment.
- Seal floor drains unless they are connected to a holding tank or sanitary sewer with permission from the local wastewater treatment plant.
- Store pesticide and fertilizer application equipment in areas protected from rainfall. Rain can wash pesticide and fertilizer residues from the exterior of the equipment and possibly contaminate soil or water.
- Store solvents and degreasers in lockable metal cabinets away from ignition sources in a well-ventilated area. These products are generally toxic and highly flammable. Never store them with fertilizers or in areas where smoking is permitted.
- Keep an inventory of solvents and SDS for those materials on-site but in a different location where they will be easily accessible in case of an emergency.
- Keep basins of solvent baths covered to reduce emissions of volatile organic compounds (VOC).
- Replace solvent baths with recirculating aqueous washing unit when possible. Soap and water or other aqueous cleaners are often as effective as solvent-based products and present a lower risk to the environment.
- Use appropriate PPE when working with solvents.

- Prohibit solvents or degreasers from draining onto pavement or soil, or discharging into waterbodies, wetlands, storm drains, sewers, or septic systems.
- Collect used solvents and degreasers in containers clearly marked with contents and date; schedule collection by a commercial service.
- Blow off all equipment with compressed air to reduce damage to hydraulic seals.

## ***Equipment Washing***

### **Principle**

Wash water generated from equipment-washing facilities can be a source of both surface-water and groundwater pollution. Steps should be taken to prevent pollution.

### **Best Management Practices**

- Brush or blow off grass-covered equipment with compressed air before being washed.
- Use spring-operated shut-off nozzles.
- Prevent wastewater, including water from equipment washing areas, from flowing directly into surface waters or storm drains.

## ***Fueling Facilities***

### **Principle**

Safe storage of fuel, including use of above-ground tanks and containment facilities, is critical to the protection of the environment. State or local laws and regulations related to storage of fuel may vary.

### **Best Management Practices**

- Equip fueling stations with spill-containment and recovery facilities.
- Use above ground fuel tanks, if possible.

## ***Pollution Prevention***

### **Principles**

- Plan appropriately to minimize the possibility of an illicit discharge and need for disposal. Monitor the water to be discharged for contamination; never discharge to the environment any contaminated water. If the water is not contaminated, it can be reused or discharged to a permitted stormwater treatment system.
- Pesticide leaks or spills, if contained, will not percolate down through the soil into groundwater or run off the surface to contaminate streams, ditches, ponds, and other water bodies.

- Wash water from pesticide application equipment must be managed properly, since it contains pesticide residues. This applies to wash water from both the inside and the outside of the application equipment. Material should be collected and used as a pesticide in accordance with the label instructions for that pesticide.
- An equipment-washing facility can be a source of both surface water and groundwater pollution, if the wash water generated is not properly handled. All equipment used in the maintenance of golf courses and associated developments should be designed, used, maintained, and stored in a way that eliminates or minimizes the potential for pollution.
- One of the key principles of pollution prevention is to reduce the unnecessary use of potential pollutants. Over time, the routine discharge of even small amounts of solvents can result in serious environmental and liability consequences, because of the accumulation of contaminants in soil or groundwater.
- The proper handling and storage of pesticides is important. Failure to do so correctly may lead to the serious injury or death of an operator or bystander, fires, environmental contamination that may result in large fines and cleanup costs, civil lawsuits, the destruction of the turf you are trying to protect, and wasted pesticide product.
- Generating as little as 25 gallons per month of used solvents for disposal can qualify you as a “small-quantity generator” of hazardous waste, triggering EPA and state reporting requirements.
- Pesticides that have been mixed so they cannot be legally applied to a site in accordance with the label must be disposed of as a waste. Depending on the materials involved, they may be classified as hazardous waste.
- Provide adequate protection from the weather. Rain can wash pesticide and fertilizer residues from the exterior of the equipment, and these residues can contaminate soil or water.
- Never allow solvents to drain onto pavement or soil, or discharge into water bodies, wetlands, storm drains, sewers, or septic systems, even in small amounts.
- Office paper, recyclable plastics, glass, and aluminum should be recycled. Place containers for recycling aluminum cans and glass or plastic soft drink bottles at convenient locations on the golf course.

### **Best Management Practices**

- Store pesticides in a lockable concrete or metal building.
- Seal pesticide storage and mixing facility floors with a chemical-resistant paint. These floors should be impervious and have a continuous sill to retain spilled materials. Prohibit drains, although a sump may be included.
- Reference the Midwest Plan Service book Designing Facilities for Pesticide and Fertilizer Containment (revised 1995); the Tennessee Valley Authority (TVA) publication, Coating Concrete Secondary Containment Structures Exposed to

Agrichemicals (Broder and Nguyen, 1995); and USDA–NRCS Code 703 for valuable information about constructing chemical mixing facilities.

- Use a chemical mixing center (CMC) as a place for performing all operations where pesticides are likely to be spilled in concentrated form—or where even dilute formulations may be repeatedly spilled in the same area—over an impermeable surface. (A CMC is a concrete pad treated with a sealant and sloped to a liquid-tight sump where all of the spilled liquids can be recovered.)
- Flush wash pad with clean water after the equipment is washed. Captured wash water can be used as a dilute pesticide per labeled site, or it may be pumped into a rinsate storage tank for use in the next application.
- Allow the applicator to apply a pesticide at less than the labeled rate per FIFRA, Section 2(ee).
- Clean the sump of any sediment before another type of pesticide is handled.
- Discharge to a treatment system that is permitted under industrial wastewater rules.
- Avoid discharging to a sanitary sewer system without written permission from the utility.
- Avoid discharging to a septic tank.
- Use non-containment wash water for field irrigation.
- Avoid discharging non-contaminated wastewater during or immediately after a rainstorm, since the added flow may cause the permitted storage volume of the stormwater system to be exceeded.
- Replace, whenever practical, solvent baths with recirculating aqueous washing units (which resemble heavy-duty dishwashers).
- Use soap and water or other aqueous cleaners; these products are often as effective as solvent-based ones.
- Clean up spills as soon as possible.
- Keep spill cleanup equipment available when handling pesticides or their containers.
- Report if a spill occurs of a pesticide covered by certain state and federal laws. You may need to report any accidental release if the spill quantity exceeds the “reportable quantity” of active ingredient specified in the law.
- Remediate large spills or uncontained spills involving hazardous materials, using hazardous material cleanup professionals.
- Call CHEMTREC, at (800)424-9300 for emergency (only) information on hazards or actions to take in the event of a spill. CHEMTREC is a service of the Chemical Manufacturers Association. For information on whether a spilled chemical requires reporting, call the CERCLA/RCRA help line at (800) 424–9346.
- Avoid washing equipment in the vicinity of wells or surface water bodies.
- Wash equipment over a concrete or asphalt pad that allows the water to be collected. After the residue dries on the pad, collect, compost, or spread in the field.
- If applicable, allow runoff onto a grassed area to soak into the ground, but never into a surface water body or canal.

- Use compressed air to blow off equipment. This is less harmful to the equipment's hydraulic seals, eliminates wastewater, and produces dry material that is easier to handle.
- Handle clippings and dust separately. After the residue dries on the pad, it can be collected and composted or spread in the field.
- Minimize the use of detergents. Use only biodegradable non-phosphate detergents.
- Minimize the amount of water used to clean equipment. This can be done by using spray nozzles that generate high-pressure streams of water at low volumes.
- Avoid discharging wash water to surface water or groundwater, either directly or indirectly, through ditches, storm drains, or canals.
- Avoid conducting equipment wash operations on a pesticide mixing and loading pad. (This keeps grass clippings and other debris from becoming contaminated with pesticide).
- Use solvents and degreasers over a collection basin or pad that collects all used material.
- Manage oil/water separators properly to avoid problems. Do not wash equipment used to apply pesticides on pads with oil/water separators.
- Collect used solvents and degreasers, place them into containers marked with the contents and the date, and then have them picked up by a service that properly recycles or disposes of them. Never mix used oil or other liquid material with the used solvents.
- Collect used oil, oil filters, and antifreeze in separate marked containers and recycle them. Arrange pickup of used oil, or deliver to a hazardous waste collection site.
- Avoid mixing used oil with used antifreeze or sludge from used solvents. Antifreeze may be considered hazardous waste by state or local laws and should be handled accordingly. Commercial services are available to collect and recycle antifreeze.
- Store batteries on an impervious surface and preferably under cover. Remember, spent lead-acid batteries must be recycled if they are to be exempt from strict hazardous waste regulations.
- Classify lead-acid storage batteries as hazardous wastes unless they are recycled. All lead-acid battery retailers in Florida are required by law to accept returned batteries for recycling.
- Recycle spent lead-acid batteries if they are to be exempt from strict hazardous waste regulations.
- Store equipment used to apply pesticides and fertilizers in areas protected from rainfall.
- Store pesticide application equipment in the chemical mixing center (CMC), but fertilizer application equipment should be stored separately.
- Blow or wash loose debris off equipment to prevent dirt from getting on the CMC pad, where it could become contaminated with pesticides.

- Ensure that all containers are sealed, secured, and properly labeled. Use only regulatory agency-approved, licensed contractors for disposal.
- Rinse pesticide containers as soon as they are empty. Pressure rinse or triple-rinse containers, and add the rinse water to the sprayer.
- Shake or tap non-rinseable containers, such as bags or boxes, so that all dust and material fall into the application equipment.
- Puncture the pesticide containers, after cleaning them, to prevent reuse (except glass and refillable mini-bulk containers).
- Keep the rinsed containers in a clean area, out of the weather, for disposal or recycling.
- Store the containers in large plastic bags/tubs to protect the containers from collecting rainwater.
- Recycle rinsed containers in counties where an applicable program is available, or take them to a landfill for disposal. Check with your local landfill before taking containers for disposal, as not all landfills will accept them.



The Reserve at Moonlight Basin - Big Sky, MT

# Landscape

## *Species Selection and Size Considerations*



Landscape (non-play) areas are an essential part of the overall course design, providing enhanced course aesthetics, wildlife habitat, external sound/noise abatement, and natural cooling and freeze protection.

An environmental landscape design approach addresses environmentally safe and energy-saving practices; therefore, environmentally sound landscape management is also economically important. Non-play areas require a mix of sun and shade, optimal soil conditions and adequate canopy air movement to sustain growth and function.

### Principles

- The fundamental principle for the environmentally sound management of landscapes is “right plant, right place.” The ideal plant from an environmental standpoint is the one that nature and evolution placed there. It has adapted specifically to the soil, microclimate, rainfall, and light patterns, insects, and other pests, and endemic nutrient levels over thousands of years.
- Know the ultimate sizes and growth rates of trees, shrubs, and ground covers. This reduces the need for pruning and debris removal and lowers maintenance costs.
- The addition of proper soil amendments can improve soil’s physical and chemical properties, increase its water-holding capacity, and reduce the leaching of fertilizers. Amendments may be organic or inorganic; however, soil microorganisms rapidly decompose organic amendments such as peat or compost.
- The goal of species-selection BMP is to maintain as close to a natural ecosystem as practical, while meeting the needs of a golf course.
- Landscape areas should be fundamentally designed to facilitate rapid plant establishment to conserve water and lower nutritional input requirements once mature. Plants within areas that are not in play or are not critical to the design of the course may be removed and replanted with native plant material that requires little to no maintenance after establishment. Additionally, 50% to 70% of the non-play areas should remain in natural cover. As much natural vegetation as possible should be retained and enhanced through the supplemental planting of



native trees, shrubs, and herbaceous vegetation to provide wildlife habitat in non-play areas, along water sources, to support fish and other water-dependent species. By leaving dead trees (snags) where they do not pose a hazard, a well-developed understory (brush and young trees), and native grasses, the amount of work needed to prepare a course is reduced while habitat for wildlife survival is maintained.

### **Best Management Practices**

- Ensure base plant selection is as close to a natural ecosystem as practical, while meeting the needs of the golf course. The natural ecosystem has adapted specifically to the soil, microclimate, rainfall, light patterns, insects and other pests, and endemic nutrient levels over many years.
- Select trees, plants, and grass species to attract birds seeking wild fruits, herbs, seeds, and insects.
- Know the ultimate sizes and growth rates of trees, shrubs, and ground covers.
- Use plants that are adapted for the site based on the United States Department of Agriculture (USDA) cold-hardiness map.
- Select stress-tolerant species or cultivars to manage periodic dry/wet conditions.
- Choose the most stress-tolerant species or cultivar for a particular area.

## ***Design and Function***

### **Principles**

- Aesthetic gardens, window boxes, and container gardens should include a variety of plants of different heights that provide nectar for hummingbirds and butterflies. Again, “right plant, right place” is the key to success.
- When integrating turf areas into the landscape around the clubhouse, entries, and other areas, design them for ease of maintenance and keep in mind that turfgrasses grow best in sunny areas. Consider the effect that tree canopy and other design features may have on the health and function of the turf.
- Garden plants, shrubbery, ground covers, or native plants may provide a pleasing view and also provide useful food, cover, or other environmental benefits to wildlife; they may also require reduced maintenance.
- Trees and shrubs along streams provide temperature moderation through shade, which lowers water temperature in summer and increases it in winter.

### **Best Management Practices**

- Ensure well-designed forested buffers contain a mixture of fast- and slow-growing native trees, shrubs, and grasses to provide a diverse habitat for wildlife.
- Use forested buffers to trap and remove upland sources of sediments, nutrients, and chemicals.
- Use forested buffers to protect fish and wildlife by supplying food, cover, and shade.

- Use forested buffers to maintain a healthy riparian ecosystem and stable stream channel.
- Leave dead tree snags whenever possible for nesting and food source to wildlife. However, make sure that these snags are a safe distance away from playing surfaces should they get blown over.
- Use turf as a landscape element where needed.

## ***Planting Methods***

### **Principles**

- The ideal plant from an environmental standpoint is the one that nature and evolution placed there. It has adapted specifically to the soil, microclimate, rainfall, light patterns, insects, and other pests, and endemic nutrient levels over hundreds or thousands of generations. Where these factors have changed, the challenge is finding other suitable plants. A BMP goal is to maintain as close to a natural ecosystem as practical, while meeting the needs of the golf course.
- The use of organic mulches in gardens and aesthetic areas increases the moisture-holding capacity of plantings and prevents weed growth when applied in sufficient depth. Organic amendments are decomposed by soil microorganisms and add to soil tilth.
- Keep mulch 2 to 3 inches away from plants, to prevent fungal growth from excess dampness.
- Excess mulch or compacted mulch may be detrimental, causing water to shed away from the root zone and encourage overwatering. Compaction or excessive mulch buildup should be avoided, especially when annual re-mulching is performed.

### **Best Management Practices**

- Ensure the plant palette and irrigation system are appropriate for site conditions, taking into account that, in some cases, soil improvement can enhance water-use efficiency.
- Group plants together based on irrigation demand.
- Minimize the percentage of landscaped area in irrigated high-water-use hydrozones. Local government ordinances should address the percentage of irrigated landscaped area that may be included in high-water-use hydrozones. These high water-use limits should not apply to landscaped areas requiring large amounts of turf for their primary functions (for example, ball fields and playgrounds).
- Understand that in most instances, established, drought-tolerant landscape plants have a root system substantial enough to keep them alive with little or no supplemental irrigation.
- Ensure pruning and fertilizing will benefit landscape plants while they are becoming established.

- Add proper soil amendments in garden areas to improve the soil's physical and chemical properties, increase its water-holding capacity, and reduce the leaching of fertilizers.



Rock Creek Cattle Company - Deer Lodge, MT

# Energy

## *Energy Conservation*



According to the GCSAA Golf Course Environmental Profile, Vol. IV (GCSAA 2012), six major energy sources were identified for golf course use: electricity, gasoline, diesel, natural gas, propane and heating oil. In addition, operational uses were segmented to meet irrigation, turf maintenance, buildings, clubhouse operations, swimming pools and various amenity needs.

The overall conclusion of the study suggests that golf facility managers must take steps toward identifying options for conservation, efficiency, and cost savings.

To address current needs and future energy reduction opportunities, managers should evaluate current energy conservation performance practices based on the following categories:

- General energy conservation position statements on policy and planning
- Buildings and amenities statements –buildings, infrastructure and facility amenities such as the clubhouse, swimming pool, restaurant, parking lot, kitchen, offices, maintenance building(s), tennis courts, etc.
- Golf course statements – the golf course and surrounding landscapes, pump station, irrigation system and related agronomic operations (playing surfaces, equipment, turfgrass maintenance etc.)

### **Principles**

- Determine goals and establish an energy policy that is part of the facility's overall environmental plan.
- Establish an energy management plan for the facility based on current energy use baselines to optimize efficiency.
- Communicate policy to all staff regarding use patterns and management practices to effect change.
- Relate the policy to the entire facility, including the services the facility provides to its customers and community.
- Incorporate quality management elements for continual improvement (plan, do, check, and act) to reduce environmental and economic impacts.

- Understand that the irrigation pump is the largest user of energy associated with the golf course itself. A well-engineered pump station is critical to reducing energy consumption.

### **Best Management Practices**

- Conduct an energy audit.
- Conduct a lighting audit.
- Conduct a carbon footprint analysis.
- Add insulation where needed.
- Use non-demand electrical hour rates: charge golf carts, use pumps to acquire water, charge maintenance equipment, and other items later in the day or early in the morning.
- Limit high-consumption activities during periods when demand is high.
- Explore potential use of alternative energy from natural sources, such as solar, geothermal and wind energy generation.
- Upgrade or install National Electrical Manufacturers Association's (NEMA) premium efficiency-rated pump motors.
- Seek output reduction by watering less area, apply target golf goals.
- Install LED lighting and/or retrofit devices.
- Install motion sensors for lights where appropriate.
- Install a programmable thermostat.

## ***Evaluation***

### **Principles**

- Continually track and measure energy use at the facility based on energy assessment units, for example, kilowatt hour.
- Benchmark practices to evaluate existing facility consumption with other local golf facilities of similar size.

### **Best Management Practices**

- Monitor energy use: track data, evaluate billing meters.
- Install adequate meters, gauges, etc.
- Develop an equipment inventory, incorporating individual equipment's energy use, use / traffic patterns, etc. (maintenance records, operation hours, etc.).
- Establish a baseline for performance parameters to optimize irrigation pumps.
- Consider benchmarking performance against similar-sized facilities.

## ***Efficiency***

### **Principles**

- Evaluate energy efficiency performance.
- Evaluate electric equipment/operations and ensure proper selection, operation, charging, and maintenance.

### **Best Management Practices**

- Evaluate all energy providers (electricity, natural gas and liquid petroleum fuels) for costs, efficiency/assistance programs, and incentives.
- Identify and categorize operations for energy efficiency opportunity and conservation analysis.
- Perform assessments of all the facility's infrastructure and operations.
- Perform appropriate audits throughout the facility, depending on operation, infrastructure, and planning stage.
- Identify efficiency and conservation elements of infrastructure/hard items and behavioral/process-oriented items.
- Consider alternative equipment, products, and practices.



Canyon River Golf Club - Missoula, MT

## ***Design and Renovation***

### **Principles**

- Incorporate an analysis of the assessments, audits, and data.
- Incorporate first cost consideration (initial investment and long-term gain).
- Redesign – evaluate future projects with a priority for energy conservation.
- According to system and compliance standards, communicate with utility provider, insurance company, and any state or local regulatory officials.

### **Best Management Practices**

- Identify buildings, amenities, and operations including existing, new construction, or renovation activities where energy efficiency enhancements are needed.
- Identify the golf course, course infrastructure, and related agronomic operations, including existing and future developments or renovations, that would benefit from energy efficiency improvements.

## ***Implementation Plan***

### **Principles**

- Set goals for buildings/amenities and the golf course operation; develop an implementation plan.
- Set energy-use goals according to efficiency/conservation of the building, infrastructure and equipment efficiency.

### **Best Management Practices**

- Evaluate effectiveness of upgrades according to efficiency/conservation goals for energy use.
- Identify future energy needs and maintain good record keeping.
- Prioritize energy consumption as part of purchase/decision-making process for HVAC, food service, laundry, swimming pools, etc.
- Consider other devices as part of the plan; do research on building, pumps, and power generation.

## ***Infrastructure***

### **Principles**

- Ensure efficient building/facility/amenities and related infrastructure.
- Consider the materials: which type insulation and color selection.
- Ensure efficient lighting in both interior and exterior areas.

### **Best Management Practices**

- Maximize use of space.
- Inspect and repair leaks/maintenance.
- Monitor temperature/environmental settings (heat loss, etc.).
- Evaluate building automation systems, monitoring systems, etc.
- Incorporate technology and up-to-date equipment (lights, controls, switches, etc.).
- Implement schedules/controlled use.
- Evaluate off-grid pole lighting and similar technology.

## ***Alternative products, operations, and practices***

### **Principles**

- Educate and motivate employees, guests, etc.
- Educate, train, and motivate employees on energy efficiency practices pertaining to golf course operations.
- Identify incentives and programs from energy providers.
- Identify state/local programs and certification.
- Consider U.S. Green Building Council's LEED program.
- Consider EPA's EnergyStar, Portfolio Manager, etc.
- Consider energy management software, services, etc.
- Consider national and local programs and programs like the EPA's WaterSense program as it relates to buildings (see Water Conservation BMP).

### **Best Management Practices**

- Evaluate alternative transportation.
- Evaluate cleaning practices (dry vs. wet).
- Consider local vs. distant purchases, product selection, etc.
- Evaluate energy acquisition and energy coming into the facility.
- Evaluate golf cart equipment/operations and ensure proper selection, operation, charging, and maintenance.
- Incorporate training for employees.
- Incorporate the use of incentives.

## ***Course Management Plan***

### **Principles**

- Set energy-use goals for efficiency/conservation, including infrastructure, equipment, behavior and agronomic practices.
- Ensure proper selection (type, size, etc.), operation, and equipment maintenance.
- Ensure efficient design, selection, operation, and maintenance of irrigation pumps, irrigation controls and other irrigation components.



- Implement energy source selection, management, and efficiency/conservation practices.

### **Best Management Practices**

- Work with energy providers and evaluate existing programs, resources, etc.
- Consider long-term costs in addition to acquisitions.
- Schedule reviews to evaluate future technology and fuel types.
- Evaluate upgrades.
- Evaluate use of alternative energy/fuels.
- Identify future energy needs.
- Prioritize energy consumption as part of selection.
- Optimize equipment use data, including hours operated, use patterns, etc.
- Incorporate new technology and upgrades when feasible.
- Consider alternative equipment, products, and practices.

## ***Irrigation***

### **Principles**

- Ensure efficient design, selection, operation, and maintenance of irrigation pumps, irrigation controls, and other irrigation components.
- Assess irrigation pump efficiency; consider alternative equipment, products, and practices; use energy efficiently to maximize the output of the pump station.

### **Best Management Practices**

- Audit irrigation system (see Water Conservation BMP).
- Schedule and operate pumps and irrigation in an efficient manner.
- Identify and implement infrastructure and behavioral changes in irrigation.
- Evaluate technology and upgrades; implement when feasible.



## References



## Selected References

(Note: URLs are as of September 2016)

---

Aerts, M.O., N. Nesheim, and F. M. Fishel. April 1998; revised September 2015. *Pesticide recordkeeping*. PI-20. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/PI012>.

Aquatic Ecosystem Restoration Foundation. 2014. *Biology and Control of Aquatic Plants: A Best Management Practices Handbook*: 3rd Ed. Gettys, L.A., W. T. Haller, and D. G. Petty, editors. <http://www.aquatics.org/bmp%203rd%20edition.pdf>

ASCE, January 2005. *The ASCE standardized reference evapotranspiration equation*. Final report of the Task Committee on Standardization of Reference Evapotranspiration, Environmental and Water Resources Institute of the American Society of Civil Engineers. 1801 Alexander Bell Drive, Reston, VA 20191 Available: <http://www.kimberly.uidaho.edu/water/asceewri/ascestzdetmain2005.pdf>

Bohmont, B. 1981. *The new pesticide users guide*. Fort Collins, Colorado: B & K Enterprises.

Brecke, B.J., and J.B. Unruh. May 1991; revised February 25, 2003. *Spray additives and pesticide formulations*. Fact Sheet ENH-82. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/LH061>.

Broder, M.F., and D.T. Nguyen. 1995. *Coating concrete secondary containment structures exposed to agrichemicals*. Circular Z-361. Muscle Shoals, Alabama: Tennessee Valley Authority, Environmental Research Center. Tel. (205) 386-2714.

Broder, M.F., and T. Samples. 2002. *Tennessee handbook for golf course environmental management*. Tennessee Department of Agriculture.

Buss, E.A. January 2002; revised July 2003. *Insect pest management on golf courses*. ENY-351. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/IN410>.

Butler, T., W. Martinkovic, and O.N. Nesheim. June 1993; revised April 1998. *Factors influencing pesticide movement to groundwater*. PI2. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/PI002>.

California Fertilizer Association. 1985. *Western fertilizer handbook*, 7th ed. Sacramento, California.

Carrow, R.N., R. Duncan, and C. Waltz. 2007. Best Management Practices (BMPs) Water-Use Efficiency/Conservation Plan for Golf Courses. Available: [https://www.gcsaa.org/uploadedfiles/Environment/Get-Started/BMPs/Water-use-efficiency-and-conservation-best-management-practices-\(Georgia\).pdf](https://www.gcsaa.org/uploadedfiles/Environment/Get-Started/BMPs/Water-use-efficiency-and-conservation-best-management-practices-(Georgia).pdf)

Carrow, R.N., R.R. Duncan, and D. Wienecke. 2005. BMPs: Critical for the golf industry. *Golf Course Management*. 73(6):81-84.

Center for Resource Management. 1996. *Environmental principles for golf courses in the United States*. 1104 East Ashton Avenue, Suite 210, Salt Lake City, Utah 84106. Tel: (801) 466-3600, Fax: (801) 466-3600.

Clark, G.A. July 1994. *Microirrigation in the landscape*. Fact Sheet AE254. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/AE076>.

Clark, Mark and Acomb, Glenn; Florida Field Guide to Low Impact Development: Stormwater Reuse. Univ. Florida 2008. [http://buildgreen.ufl.edu/Fact\\_sheet\\_Stormwater\\_Reuse.pdf](http://buildgreen.ufl.edu/Fact_sheet_Stormwater_Reuse.pdf)

Colorado Nonpoint Source Task Force. 1996. Guidelines for Water Quality Enhancement at Golf Courses Through the Use of Best Management Practices. Available: <http://www.wrightwater.com/assets/7-golf-course-bmps.pdf>

Connecticut Department of Environmental Protection. 2006. Best Management Practices for Golf Course Water Use. Available: [http://www.ct.gov/deep/lib/deep/water\\_inland/diversions/golfcoursewaterusebmp.pdf](http://www.ct.gov/deep/lib/deep/water_inland/diversions/golfcoursewaterusebmp.pdf)

Cromwell, R.P. June 1993; reviewed December 2005. *Agricultural chemical drift and its control*. CIR1105. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/AE043>.

Crow, W.T. February 2001; revised November 2005. *Nematode management for golf courses in Florida*. ENY-008 (IN124). Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/IN124>.

Daum, D.R., and T.F. Reed. n.d. *Sprayer nozzles*. Ithaca, New York: Cornell Cooperative Extension. Available <http://psep.cce.cornell.edu/facts-slides-self/facts/gen-peapp-spray-nozz.aspx>.

Dean, T.W. February 2003. *Pesticide applicator update: Choosing suitable personal protective equipment*. PI-28. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/PI061>.

———. April 2004; revised November 2004. *Secure pesticide storage: Facility size and location*. Fact Sheet PI-29. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/PI064>.

———. April 2004; revised November 2004. *Secure pesticide storage: Essential structural features of a storage building*. Fact Sheet PI-30. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/PI065>.

Dean, T.W., O.N. Nesheim, and F. Fishel. Revised May 2005. *Pesticide container rinsing*. PI-3. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/PI003>.

Delaware Nutrient Management Commission. 2006. *Water Quality Best Management Practices: Nutrients, Irrigation and Pesticides for Golf Course, Athletic Turf, Lawn Care and Landscape Industries*. Available: <http://dda.delaware.gov/nutrients/forms/BMPnonagforprinter.pdf>

Dodson, R.G. 2000. *Managing wildlife habitat on golf courses*. Sleeping Bear Press. Chelsea, MI.

Elliott, M.L., and G.W. Simone. July 1991; revised April 2001. *Turfgrass disease management*. SS-PLP-14. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/LH040>.

Fishel, F.M. March 2005. *Interpreting pesticide label wording*. Gainesville, Florida: Institute of Food and Agricultural Sciences. Available: <http://edis.ifas.ufl.edu/PI071>.

Fishel, F.M., and Nesheim, O.N. November 2006. *Pesticide safety*. FS11. Gainesville, Florida: Institute of Food and Agricultural Sciences. Available: <http://edis.ifas.ufl.edu/pdf/CV/CV10800.pdf>.

Florida Department of Agriculture and Consumer Services. n.d. *Pesticide recordkeeping—benefits and requirements*. Available: <http://www.flaes.org/pdf/Pesticide%20Recordkeeping%20Pamphlet%205-05.pdf>.

Florida Department of Agriculture and Consumer Services. Division of Agricultural Environmental Services. *Suggested pesticide recordkeeping form*. Available: <https://www.freshfromflorida.com/content/download/2990/18861/Suggested%20Pesticide%20Recordkeeping%20Form.pdf>

———. Division of Agricultural Environmental Services. *Suggested pesticide recordkeeping form for organo-auxin herbicides*. Available: <http://forms.freshfromflorida.com/13328.pdf>.

Florida Department of Agriculture and Consumer Services and Florida Department of Environmental Protection. 1998. *Best management practices for agrichemical handling and farm equipment maintenance*. Available:

<http://www.dep.state.fl.us/water/nonpoint/docs/nonpoint/agbmp3p.pdf>

Florida Department of Environmental Protection. 2008. *Florida stormwater, erosion, and sedimentation control inspector's manual*. Tallahassee, Florida: Nonpoint Source Management Section, MS 3570, 3900 Commonwealth Blvd., Tallahassee, Florida 32399-3000. Available: <http://www.dep.state.fl.us/water/nonpoint/docs/erosion/erosion-inspectors-manual.pdf>.

———. December 27, 2002. *Environmental risks from use of organic arsenical herbicides at south Florida golf courses*. FDEP white paper. Available:

<http://fddep.ifas.ufl.edu/msma.htm>.

———. April 2002. *Florida water conservation initiative*. Available:

[http://www.dep.state.fl.us/water/waterpolicy/docs/WCI\\_2002\\_Final\\_Report.pdf](http://www.dep.state.fl.us/water/waterpolicy/docs/WCI_2002_Final_Report.pdf).

———. 2015. "Florida-friendly Best Management Practices for Protection of Water Resources by the Green Industries", Florida Department of Environmental Protection. Revised December 2008, 3rd printing 2015. <https://fyn.ifas.ufl.edu/pdf/grn-ind-bmp-en-12-2008.pdf>

———. 2012. *Best Management Practices for The Enhancement of Environmental Quality on Florida Golf Courses*. Florida Department of Environmental Protection. 3rd printing, September 2012.

<http://www.dep.state.fl.us/water/nonpoint/docs/nonpoint/glfbmp07.pdf>

———. Revised August 2009. *A guide on hazardous waste management for Florida's auto repair shops*. Available:

[http://www.dep.state.fl.us/waste/quick\\_topics/publications/shw/hazardous/business/Paint\\_and\\_Body8\\_09.pdf](http://www.dep.state.fl.us/waste/quick_topics/publications/shw/hazardous/business/Paint_and_Body8_09.pdf).

———. October 2005. *Checklist guide for 100% closed loop recycle systems at vehicle and other equipment wash facilities*. Available:

<http://www.dep.state.fl.us/water/wastewater/docs/ChecklistGuideClosed-LoopRecycleSystems.pdf>.

———. October 2005. *Guide to best management practices for 100% closed-loop recycle systems at vehicle and other equipment wash facilities*. Pollution Prevention Program and Industrial Wastewater Section. Available:

<http://www.dep.state.fl.us/water/wastewater/docs/GuideBMPClosed-LoopRecycleSystems.pdf>.

———. 2006. *State of Florida erosion and sediment control designer and reviewer manual*. Nonpoint Source Management Section. Available: <http://www.dep.state.fl.us/water/nonpoint/erosion.htm>.

———. 2016. Operation Cleansweep for Pesticides Web site. Available: <http://www.dep.state.fl.us/waste/categories/cleansweep-pesticides>.

———. December 1, 2005. *Standards and specifications for turf and landscape irrigation systems*, 5th Ed. Available: <http://ufdc.ufl.edu/UF00076845/00001>.

———. December 2006. *Landscape Irrigation & Florida-Friendly Design Standards*. Florida Department of Environmental Protection, Office of Water Policy, 3900 Commonwealth Blvd., MS 46, Tallahassee, FL 32399-3000. Available: <http://www.dep.state.fl.us/water/waterpolicy/docs/LandscapeIrrigationFloridaFriendlyDesign.pdf>

Gilman, E. 2006. *Pruning shade trees in landscapes*. Available: <http://hort.ufl.edu/woody/pruning/index.htm>.

Golf Course Superintendents Association of America. 2012. *Golf Course Environmental Profile; Volume IV; Energy Use and Energy Conservation Practices on U.S. Golf Courses*. Available: <https://www.gcsaa.org/Uploadedfiles/Environment/Environmental-Profile/Energy/Golf-Course-Environmental-Profile--Energy-Use-and-Conservation-Report.pdf>

Golf Course Water Resources Handbook of Best Management Practices (Pennsylvania). 2009. Available: <http://pecpa.org/wp-content/uploads/Golf-Course-Water-Resources-Handbook-of-Best-Management-Practices.pdf>

Havlin, J.L., et al. 2004. *Soil fertility and fertilizers*, 7th Ed. Prentice Hall.

Haydu, J.J., and A.W. Hodges. 2002. *Economic impacts of the Florida golf course industry*. UF–IFAS Report EIR 02-4. Available: <http://economicimpact.ifas.ufl.edu/publications/EIR02-4r.pdf>.

Helfrich, L.A., et al. June 1996. *Pesticides and aquatic animals: A guide to reducing impacts on aquatic systems*. Virginia Cooperative Extension Service. Publication Number 420-013. Available: <http://www.ext.vt.edu/pubs/waterquality/420-013/420-013.html>.

Hornsby, A.G., T.M. Buttler, L.B. McCarty, D.E. Short, R.A. Dunn, G.W. Simone. Revised September 1995. *Managing pesticides for sod production and water quality protection*. Circular 1012. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/SS053>.

Insecticide Resistance Action Committee Web site. Available: <http://www.irac-online.org/>.

King, K.W., and J.C. Balogh. 2001. Water quality impacts associated with converting farmland and forests to turfgrass. In: *Transactions of the ASAE, Vol. 44(3): 569-576*.

Lehtola, C.J., C.M. Brown, and W.J. Becker. November 2001. *Personal protective equipment. OSHA Standards 1910.132-137. AE271*. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/OA034>.

McCarty, L.B., and D.L. Colvin. 1990. *Weeds of southern turfgrasses*. Gainesville, Florida: University of Florida.

Midwest Plan Service. Revised 1995. *Designing facilities for pesticide and fertilizer containment*. MWPS-37. Midwest Plan Service, 122 Davidson Hall, Iowa State University, Ames, IA 50011-3080. Tel.: (515) 294-4337. Available: <http://infohouse.p2ric.org/ref/50/49471.pdf>.

Mitra, S. 2006. *Effects of recycled water on turfgrass quality maintained under golf course fairway conditions*. WateReuse Foundation, 1199 North Fairfax Street, Suite 410, Alexandria, VA 22314. Available: <http://www.watereuse.org/Foundation/documents/wrf-04-002.pdf>.

National Pesticide Telecommunications Network. December 1999. *Signal words*. Fact Sheet. Available: <http://npic.orst.edu/factsheets/signalwords.pdf>.

Nesheim, O.N., and F.M. Fishel September 2007, reviewed August 2013. *Interpreting PPE statements on pesticide labels*. P116. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <https://edis.ifas.ufl.edu/pdffiles/CV/CV28500.pdf>.

Nesheim, O.N., and F.M. Fishel. March 1989; revised November 2005. *Proper disposal of pesticide waste*. PI-18. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/PI010>.

Nesheim, O.N., F.M. Fishel, and M. Mossler. July 1993. *Toxicity of pesticides*. PI-13. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/pdffiles/PI/PI00800.pdf>.

O'Brien, P. July/August 1996. Optimizing the turfgrass canopy environment with fans. *USGA Green Section Record, Vol. 34(4), 9-12* Available: <http://gsrpdf.lib.msu.edu/ticpdf.py?file=/1990s/1996/960709.pdf>.



O'Brien, P., and C. Hartwiger. March/April 2003. Aerification and sand topdressing for the 21st century. *USGA Green Section Record*, Vol. 41(2), 1-7. Available: <http://turf.lib.msu.edu/2000s/2003/030301.pdf>.

Olexa, M.T., A. Leviten, and K. Samek. December 2008, revised December 2013. *Florida solid and hazardous waste regulation handbook: Table of contents*. FE758. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/fe758>.

Otterbine Barebo, Inc. 2003. *Pond and lake management*. 3840 Main Road East, Emmaus, PA 18049. Available: <http://www.otterbine.com/assets/base/resources/PondAndLakeManual.pdf>.

Peterson, A. 2000. *Protocols for an IPM system on golf courses*. University of Massachusetts Extension Turf Program.

Pennsylvania Department of Environmental Protection, LandStudies, Inc., The Pennsylvania Environmental Council. *Golf Course Water Resources Handbook of Best Management Practices*. June 2009. <http://pecpa.org/wp-content/uploads/Golf-Course-Water-Resources-Handbook-of-Best-Management-Practices.pdf>

Pettinger, N.A. 1935. Useful chart for teaching the relation of soil reaction to availability of plant nutrients to crops. *Virginia Agri. Ext. Bul.* 136, 1-19.

Portness, R.E., J.A. Grant, B. Jordan, A.M. Petrovic, and F.S. Rossi. 2014. *Best Management Practices for New York State Golf Courses*. Cornell Univ. Available: [http://nysgolfbmp.cals.cornell.edu/ny\\_bmp\\_feb2014.pdf](http://nysgolfbmp.cals.cornell.edu/ny_bmp_feb2014.pdf)

Rao, P.S.C., and A.G. Hornsby. May 1993; revised December 2001. *Behavior of pesticides in soils and water*. Fact Sheet SL40. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/SS111>.

Rao, P.S.C., R.S. Mansell, L.B. Baldwin, and M.F. Laurent. n.d. *Pesticides and their behavior in soil and water*. Ithaca, New York: Cornell Cooperative Extension. Available: <http://psep.cce.cornell.edu/facts-slides-self/facts/gen-pubre-soil-water.aspx>.

Rodgers, J. n.d. *Plants for lakefront revegetation*. Invasive Plant Management, Florida Department of Environmental Protection, 3900 Commonwealth Blvd., MS 705, Tallahassee, FL 32399. Available: <http://myfwc.com/media/2518526/LakefrontRevegetation.pdf> .

Sartain, J.B. 2000. *General recommendations for fertilization of turfgrasses on Florida soils*. Fact Sheet SL-21. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/LH014>.

———. 2001. *Soil testing and interpretation for Florida turfgrasses*. SL-181. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/SS317>.

———. 2002. revised October 2006. *Recommendations for N, P, K, and Mg for golf course and athletic field fertilization based on Mehlich-I extractant*. SL-191. Available: <http://edis.ifas.ufl.edu/SS404>. Gainesville, Florida.

Sartain, J.B., and W.R. Cox. 1998. *The Florida fertilizer label*. SL-3. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/SS170>.

Sartain, J.B., G.L. Miller, G.H. Snyder, and J.L. Cisar. 1999a. Plant nutrition and turf fertilizers. In: J.B. Unruh and M. Elliott (Eds.). *Best management practices for Florida golf courses*. SP-141 2nd ed. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida.

———. 1999b. Liquid fertilization and foliar feeding. In: J.B. Unruh and M. Elliott (Eds.), *Best management practices for Florida golf courses*. SP-141 2nd ed. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida.

Sartain, J.B., G.L. Miller, G.H. Snyder, J.L. Cisar, and J.B. Unruh. 1999. Fertilization programs. In: J.B. Unruh and M. Elliott (Eds.). *Best management practices for Florida golf courses*. SP-141 2nd ed. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida.

Schueler, T.R. 2000. Minimizing the impact of golf courses on streams. Article 134 in: *The practice of watershed protection*. T. R. Schueler and H. K. Holland (Eds.). Ellicott City, Maryland: Center for Watershed Protection. Available: <http://www.stormwatercenter.net/>.

Schumann, G.L., et al. January 1998. *IPM handbook for golf courses*. Indianapolis, Indiana: Wiley Publishing, Inc.

Seelig, B. July 1996. *Improved pesticide application BMP for groundwater protection from pesticides*. AE-1113. Fargo, North Dakota: North Dakota State University Extension Service. Available: <http://www.ext.nodak.edu/extpubs/h2oqual/watgrnd/ae1113w.htm>.

Smajstrla, A.G., and B.J. Boman. April 2000. *Flushing procedures for microirrigation systems*. Bulletin 333. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/WI013>.

Staples, A.J. 2. Golf Course Energy Use Part 2: Pump Stations. Golf Course Management, July 2009.

<https://www.gcsaa.org/Uploadedfiles/Environment/Resources/Energy-Conservation/Golf-course-energy-use-Part-2-Pump-stations.pdf>

Tennessee Department of Agriculture. Tennessee Handbook for Golf Course Environmental Management. Available: <http://tennesseeturf.utk.edu/pdf/golcourseenvironmgmt.pdf>

Thostenson, A., C. Ogg, K. Schaefer, M. Wiesbrook, J. Stone, and D. Herzfeld. 2016. Laundering pesticide-contaminated work clothes. PS 1778. Fargo, ND. North Dakota State Univ. Cooperative Extension. <https://www.ag.ndsu.edu/pubs/plantsci/pests/ps1778.pdf>

Trautmann, N.M., K.S. Porter, and R.J. Wagenet. n.d. *Pesticides and groundwater: A guide for the pesticide user*. Fact Sheet. Ithaca, New York: Cornell Cooperative Extension. Available: <http://psep.cce.cornell.edu/facts-slides-self/facts/pest-gr-gud-grw89.aspx>

University of Florida—Institute of Food and Agricultural Sciences. Center for Aquatic and Invasive Plants Web site. Available: <http://plants.ifas.ufl.edu/>.

———. Insect Identification Service Web site. Available: <http://edis.ifas.ufl.edu/SR010>.

———. Nematode Assay Laboratory Web site. Available: <http://edis.ifas.ufl.edu/SR011>.

———. Pesticide Information Office Web site. Available: <http://pested.ifas.ufl.edu/>

———. Plant Disease Clinic Web site. Available: <http://plantpath.ifas.ufl.edu/extension/plant-diagnostic-center/>

———. Rapid Turfgrass Diagnostic Service Web site. Available: <http://turfpath.ifas.ufl.edu/rapiddiag.shtml>.

Unruh, J.B. November 1993. *Pesticide calibration formulas and information*. Fact Sheet ENH-90. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://edis.ifas.ufl.edu/WG067>.

Unruh, J.B. 2006. *2006 University of Florida's pest control guide for turfgrass managers*. Gainesville, Florida: Institute of Food and Agricultural Sciences, University of Florida. Available: <http://turf.ufl.edu>.

Unruh, J.B., and B.J. Brecke. Revised January 1998. *Response of turfgrass and turfgrass weeds to herbicides*. ENH-100. Gainesville, Florida: Department of Environmental Horticulture, University of Florida. Available: <http://edis.ifas.ufl.edu/WG071>.

Unruh, J.B., and M. Elliot. 1999. *Best management practices for Florida golf courses*, 2nd ed. UF–IFAS Publication SP-141. Gainesville, Florida.

Unruh, J.B., J.L. Cisar, and G.L. Miller. 1999. Mowing. In: J.B. Unruh and M.L. Elliot (Eds.). *Best management practices for Florida golf courses*, 2nd ed. Gainesville, Florida: University of Florida Institute of Food and Agricultural Sciences.

Unruh, J.B., A.E. Dudeck, J.L. Cisar, and G.L. Miller. 1999. Turfgrass cultivation practices. In: J.B. Unruh and M.L. Elliot (Eds.). *Best management practices for Florida golf courses*, 2nd ed. Gainesville, Florida: University of Florida Institute of Food and Agricultural Sciences.

U.S. Environmental Protection Agency. 2005. *GreenScapes: Environmentally beneficial landscaping*; Washington, D.C. Office of Solid Waste and Emergency Response. Available: <https://archive.epa.gov/greenbuilding/web/pdf/brochure.pdf>

United States Golf Association. 2004. *Recommendations for a method of putting green construction*. Available: <http://www.usga.org/content/dam/usga/images/course-care/2004%20USGA%20Recommendations%20For%20a%20Method%20of%20Putting%20Green%20Cons.pdf>.

van Es., H.M. October 1990. *Pesticide management for water quality: Principles and practices*. October 1990. Ithaca, New York: Cornell Cooperative Extension. Available: <http://psep.cce.cornell.edu/facts-slides-self/facts/pestmgt-water-qual-90.aspx>.

Virginia Golf Course Superintendents Association. 2012. Environmental Best Management Practices for Virginia's Golf Courses. [https://pubs.ext.vt.edu/ANR/ANR-48/ANR-48\\_pdf.pdf](https://pubs.ext.vt.edu/ANR/ANR-48/ANR-48_pdf.pdf)

White, C.B. 2000. Turfgrass manager's handbook for golf course construction, renovation, and grow-in. Sleeping Bear Press. Chelsea, MI.

Witt, J.M. n.d. *Agricultural spray adjuvants*. Ithaca, New York: Cornell Cooperative Extension. Available: <http://pmep.cce.cornell.edu/facts-slides-self/facts/gen-peapp-adjuvants.html>.

Yergert, M.B. Austin, and R. Waskom. June 1993. *Best management practices for turfgrass production*. Turf BMP Fact Sheet. Colorado Department of Agriculture. Agricultural Chemicals and Groundwater Protection Program. Available: [http://hermes.cde.state.co.us/drupal/islandora/object/co%3A3063/datastream/OBJ/download/Best\\_management\\_practices\\_for\\_turfgrass\\_production.pdf](http://hermes.cde.state.co.us/drupal/islandora/object/co%3A3063/datastream/OBJ/download/Best_management_practices_for_turfgrass_production.pdf).



## Chapter 8 GARBAGE AND REFUSE

### Sections:

#### 8.8.010 Definitions.

Pursuant to this Chapter, the following definitions of terms shall apply:

- A. "City-owned container" means any container supplied to residential or commercial refuse generators by the City.
- B. "Compost" means the product resulting from the decomposition of leaves, straw, grasses, and other such organic matter mixed or unmixed with well-rotted manure, and mixed or unmixed with materials ordinarily forming a part of the soil used as fertilizer and soil conditioner.
- C. "Contract collection" means engagement by the City of a private company or companies under formal agreement and definite specifications to collect and haul municipal refuse for which the contractors are paid from general public revenues or service fees collected by the City.
- D. "Disposal area" means any site, location, tract of land, area, building, structure, or premises used or intended to be used for refuse disposal.
- E. "Garbage" or "Refuse" means every accumulation of matter that attends the preparation, consumption, decay, dealing in, or storage of meats, fish, fowl, birds, fruit, or vegetables, including the cans, containers, or wrappers. These terms also include solid materials including but not limited to the following:
  - 1. Garbage cleanings;
  - 2. Industrial solid wastes or domestic solid wastes;
  - 3. Organic wastes or residue of animals sold as meat;
  - 4. Fruit or other vegetables or animal matter from kitchens or dining rooms;
  - 5. Wasted material from food establishments; or
  - 6. Any places dealing in or handling meat, fowl, fruits, grain or vegetables, offal, animal excreta or the carcasses of animals, brick, plaster, or other waste matter resulting from the demolition, alteration or construction of buildings or structures; accumulated waste material, cans, containers, tires, junk, or other such substances which may become a Nuisance.
- F. "Manure" means the accumulation of animal or fowl droppings with or without added decomposable materials such as straw, grasses, or leaves, exclusive of human excrement.
- G. "Municipal collection" means performance of collection operations under direction of a regular municipal department or official.
- H. "Owner/occupant" means the person occupying a dwelling or unit, or the person owning, operating, managing, or keeping any:
  - 1. Hotel;
  - 2. Apartment house;
  - 3. Rental unit;

- 
4. Mobile home;
  5. Boarding house;
  6. Trailer camp;
  7. Auto court;
  8. Food establishment;
  9. Industrial establishment;
  10. Commercial establishment;
  11. Business establishment;
  12. School;
  13. Church; or
  14. Institution or premises wherein or whereon refuse accumulates or is likely to accumulate.
- I. "Private collection" means collection by licensed individuals or companies of refuse materials from private properties, pursuant to arrangements made directly between the owner or occupant of the premises and the collector.
- J. "Rack" means any type of support which will hold refuse containers upright and protect the contents from being scattered by animals or the wind.
- K. "Refuse collector" means the person, firm, agency, public body, or employee or agent thereof who is engaged in the collection and/or transportation of refuse in any part of the City that is either properly licensed pursuant to OCCGF Title 5 or has written permission from the Public Works Director or designee to engage in such collection or transportation.
- L. "Refuse container" means any container supplied to refuse generators by an authorized collector which are approved by the City Public Works Director.
- M. "Refuse disposal" means the complete process required for the disposal of any refuse and includes all tools, equipment, treatment spaces, buildings, structures, appurtenances, and materials required to take refuse from a refuse collector and bury, incinerate, destroy, or otherwise dispose of such refuse.
- N. "Rubbish" means accumulation of any of the following:
1. Wood and leaves;
  2. Trimmings from shrubs;
  3. Dead trees or branches; shavings and sawdust;
  4. Wood shavings;
  5. Woodenware;
  6. Printed matter including paper, paperboard, and pasteboard;
  7. Packing crates and pasteboard boxes;
  8. Grass and roots;
  9. Straw;
  10. Wearing apparel;
  11. Soil, earth, sand, clay, gravel, loam;

- 
12. Stone, bricks, plaster, crockery, glass, and glassware;
  13. Ashes, cinders, shell, and metals; or
  14. All other materials not included under the term "garbage."
- O. "Salvage operation" means any operation carried on by a person, firm, corporation, or other entity for the express purpose of reclaiming for value a portion of a substance, material, or goods prior to or as a part of the refuse disposal process by sorting, segregation, or other manual or mechanical means.
  - P. "Transportation of refuse" means the hauling in bulk or in refuse containers to the designated disposal area or transfer station.
  - Q. "Commercial collection" means collection from businesses and multifamily dwelling units containing two (2) or more separate dwellings.
  - R. "Residential collection" means collection from all single-family dwellings.
  - S. "Yard waste" means grass clippings, leaves, trimmings from shrubs and trees, and vegetable and flower garden plants.
  - T. "Winter months' traveler" means a residential property owner who temporarily leaves his or her primary residence for a period of time during the months of November through April, often referred to as "snowbird".

(Ord. 3181, 2018)

#### **8.8.020 Containers—accumulation or refuse—standards generally.**

The standards and requirements set out in OCCGF sections 8.8.030 through 8.8.120 are established as a minimum for the accumulation and storage of refuse pending collection.

(Ord. 3181, 2018)

#### **8.8.030 Containers—future use of underground cans prohibited.**

Underground containers are prohibited.

(Ord. 3181, 2018)

#### **8.8.040 Containers—refuse—placement for collection.**

- A. Residential refuse and garbage generators equipped with City-owned rollout containers shall place refuse and garbage containers on the scheduled collection days at the curb-line in front of the premises.
- B. Containers shall not be placed for collection before 6:00 p.m. on the day preceding the day of collection, and after the containers are emptied they shall be removed from the curb-line on the day of collection. It shall be the duty of the owner or occupant to provide and maintain accessibility to any and all containers.

(Ord. 3181, 2018)

#### **8.8.050 Containers—refuse—placement for alley collection.**

City-owned containers shall be distributed and positioned as approved by the City Public Works Director or designee. Containers serving more than one property or dwelling unit shall be positioned along the rear or side

---

(Supp. No. 18)

Created: 2023-11-03 13:28:54 [EST]



---

alley in a manner to facilitate efficient collection and accessibility for refuse and garbage generators and City refuse and garbage collection. It shall be the duty of the property owner to provide and maintain accessibility to any and all containers.

(Ord. 3181, 2018)

### **8.8.060 Containers—refuse—garbage wrapping requirements.**

All garbage placed in residential refuse containers shall be wrapped with paper or plastic. It is prohibited to place the following materials in a City-owned container:

- A. Large limbs or trimmings that do not allow the container lid to close;
- B. Hazardous liquids;
- C. Large construction, demolition or remodeling debris;
- D. Concrete, dirt or plaster;
- E. Appliances or other furniture that will not allow the lid to close;
- F. Hot ashes; and
- G. Dead animals or parts thereof.

(Ord. 3181, 2018)

### **8.8.070 Combustible rubbish storage.**

Whenever combustible rubbish is held and stored within any industrial, commercial, or business structure, it must be stored in a manner acceptable to the Fire Marshall.

(Ord. 3181, 2018)

### **8.8.080 Containers—rubbish accumulation.**

- A. Ordinary accumulations of rubbish between collections may be placed at the designated collection place in any container of size and shape so as to be easily lifted, no larger than thirty-two (32) gallons, secured against the wind, and handled without spillage by the collector.
- B. Extraordinary accumulations of rubbish shall be placed for collection in appropriate containers. Tree trimmings may be placed for collection outside of a container, provided such trimmings are secured in bundles that do not exceed seventy-five (75) pounds in weight and do not exceed four (4) feet in length.
- C. Grass clippings shall be placed in substantial containers or bags that can be collected without spillage or in a manner so as to not prevent a City container from closing.
- D. Wetted down ashes shall be placed only in easily lifted metal containers with covers.
- E. Other waste material shall be placed in containers which will not break, fall apart, rip or tear while being handled by the collector, or shall be secured in neat bundles, easily handled by the collector and shall not exceed four (4) feet in length.

(Ord. 3181, 2018)

---

### **8.8.090 Bulk handling—refuse storage.**

Bulk handling or storage of refuse of any character shall be subject to review by the City Public Works Director or designee, and the owner or occupant of any industrial, commercial, or business establishment shall make such provisions as required for the sanitary and safe storage and collection of such refuse as may be produced in bulk.

(Ord. 3181, 2018)

### **8.8.100 Containers—bulk—multifamily dwelling.**

- A. For multifamily dwellings containing four (4) or more separate dwelling units, bulk containers of a minimum one-half-cubic-yard or ninety-six (96) gallon capacity shall be required per dwelling unit.
- B. For commercial or industrial establishments, bulk containers shall generally be required unless the amount of refuse generated warrants special consideration by the City Public Works Director or designee. Bulk containers shall be supplied by the City and shall be in accordance with requirements provided by sections 8.8.040 through 8.8.050.

(Ord. 3181, 2018)

### **8.8.110 Collector—littering prohibited.**

- A. The collector shall not litter any premises or public property while making collections of refuse, nor shall any refuse be allowed to blow or fall from collection vehicles.
- B. If in spite of normal precautions against spillage, litter is made on any premises or public property, the collector shall immediately clear the area of spillage. The collector shall not be responsible to clear up the area of spillage when refuse has been carelessly spilled by the owner or occupant. The City Sanitation Officer shall be notified to enforce correct litter accumulation requirements.
- C. A violation of the Section is a misdemeanor punishable by a fine not to exceed five-hundred dollars (\$500.00), a term not to exceed six (6) months in jail, or both.

(Ord. 3181, 2018)

### **8.8.120 Private persons transporting.**

Private persons who transport any refuse or yard waste shall take action to prevent any spillage. Should any spillage accidentally occur, the transporter will immediately clean the area.

(Ord. 3181, 2018)

### **8.8.130 Premises maintenance—violation.**

- A. It shall be the duty of every property owner to maintain the premises, equipment, containers, and disposal areas owned or used in compliance with all the requirements of this Chapter.
- B. A violation of this section is a misdemeanor punishable by a term not to exceed six (6) months in jail, a fine not to exceed five hundred dollars (\$500.00), or both.
- C. Any premises where a violation of this section is occurring is hereby declared a Nuisance as defined by Chapter 49 of this Title.

---

(Supp. No. 18)

Created: 2023-11-03 13:28:55 [EST]

---

(Ord. 3181, 2018)

**8.8.140 Alley maintenance.**

All persons owning, occupying, or being in control of property fronting on any alley of the City shall keep the portion of the alley between the centerline thereof and the property line of such property and fronting on such property, free from garbage, rubbish, weeds, or any other combustible material.

(Ord. 3181, 2018)

**8.8.150 Premises—container placement—parks and public areas.**

Containers shall be placed by the owner or occupant in a place or manner approved by the City Public Works Sanitation Division. The Sanitation Division may also place containers in parks, recreation areas, places of public assembly, and along public rights-of-way as may be required or desirable.

(Ord. 3181, 2018)

**8.8.160 Premises—collection—authorized.**

- A. Every property owner of the places or occupancies referred to in this Chapter shall be responsible for the regular collection of garbage from the places of occupancy by authorized collectors. No person shall permit the removal of any refuse except in an approved manner or by an authorized collector.
- B. A violation of this section is a misdemeanor punishable by a term not to exceed six (6) months in jail, a fine not to exceed five hundred dollars (\$500.00), or both.
- C. Any premises where a violation of this section is occurring is hereby declared a Nuisance as defined by Chapter 49 of this Title.

(Ord. 3181, 2018)

**8.8.170 Burning.**

- A. The burning of refuse is prohibited.
- B. A violation of this section is a misdemeanor punishable by a term not to exceed six (6) months in jail, a fine not to exceed five hundred dollars (\$500.00), or both.

(Ord. 3181, 2018)

**8.8.180 Construction—waste removal regulations.**

- A. Each person, building contractor, construction contractor, or subcontractor, engaged in the construction, landscaping, repair, or demolition of any building, structure, property, or part thereof shall take measures to prevent waste matter or rubbish from accumulating on any:
  - 1. Street, alley, or gutter;
  - 2. Park;
  - 3. Sidewalk curbing or curb space;

- 
- 4. Any public way; or
  - 5. Any privately-owned premises.
- B. Any refuse, waste matter or rubbish shall be cleaned up, and removed from a work site, and disposed of in a sanitary manner.
  - C. A violation of this section is a misdemeanor punishable by a term not to exceed six (6) months in jail, a fine not to exceed five hundred dollars (\$500.00), or both.
- (Ord. 3181, 2018)

#### **8.8.190 Salvaging prohibited.**

- A. No person may pick over, sort, segregate, or salvage any refuse deposited in an authorized disposal area, refuse container or refuse pile.
  - B. A violation of this section is a misdemeanor punishable by a term not to exceed six (6) months in jail, a fine not to exceed five hundred dollars (\$500.00), or both.
- (Ord. 3181, 2018)

#### **8.8.200 Manure accumulations.**

- A. All manure resulting from keeping of any animal, fowl, livestock, or game in the City shall be accumulated in sanitary flyproof containers and collected and disposed of in an approved manner.
  - B. A violation of this section is a misdemeanor punishable by a term not to exceed six (6) months in jail, a fine not to exceed five hundred dollars (\$500.00), or both.
  - C. Any premises where a violation of this section is occurring is hereby declared a Nuisance as defined by Chapter 49 of this Title.
- (Ord. 3181, 2018)

#### **8.8.210 Billing charges.**

- A. The City may make monthly billings for the costs of sanitation service. The cost of sanitation services including collection, refuse reduction, or shredding and disposal of garbage from the streets, alleys, and private premises of the City, shall be charged to the owner or tenant of the property from which such garbage is removed.
  - B. Payment shall be made to the Finance Department within fifteen calendar days after the billing date. If payment is not made, such costs may be assessed against the property or referred to a debt collection service.
  - C. One-time garbage service, extra pick-ups, dumpster rental fees, appliance fees, and monthly recurring commercial service will be billed through Miscellaneous Billing, not Utility Billing. Payment is due fifteen (15) calendar days after the billing date. If payment is not made, such costs may be assessed against the property or referred to a debt collection service.
- (Ord. 3181, 2018)

---

### **8.8.220 Assessing delinquent charges.**

The City may include sanitation charges as part of the annual resolution assessing delinquent accounts. The resolution shall provide:

- A. The property owner's name;
- B. The property owner's mailing address;
- C. Street address;
- D. Legal description;
- E. Parcel number of the property in question; and
- F. The amount of late payment fees.

(Ord. 3181, 2018)

### **8.8.230 Sanitation rates resolution.**

- A. The City Commission shall, following a public hearing, adopt a resolution establishing sanitation rates as it determines necessary to defray the cost of sanitation services for the fiscal year.
- B. It shall be the duty of the Finance Department, before the passage of the resolution fixing the sanitation rates, to publish in a newspaper of general circulation and on the City website, a notice of public hearing on the rate resolution. The notice shall comply with all state and federal public notice requirements.

(Ord. 3181, 2018)

### **8.8.240 Special services rate.**

A special services rate will be established each year to recover the costs of handling garbage outside of containers. These costs shall be billed as incurred to each property owner or occupant on the basis of additional time spent at the pickup site. Large accumulation of material placed for collection may be charged to the customer if it takes longer than two (2) minutes to collect the material.

(Ord. 3181, 2018)

### **8.8.250 Exemption from service prohibited.**

- A. It is declared that it is in the interest of good health and sanitation that all premises in the City shall receive sanitation service. Unless otherwise provided by this section, no service exemption shall be made.
- B. Owners or occupants receiving private collection under a City license or permit shall be exempt from City collection charges unless such owner or occupant uses a City container, in which case the owner or occupant shall be charged for so long as such use continues.
- C. Charges for refuse disposal shall be made against all lots wherein or whereon refuse accumulates or is likely to accumulate. If the City determines that water service to a property is active, refuse is likely to accumulate, and sanitation service is required, no service exemption shall be provided, unless otherwise provided by this section.
- D. A temporary suspension of sanitation services may be provided to a winter months' traveler at the traveler's primary residence only. This suspension of service is allowed for a minimum of two (2) months and a

---

(Supp. No. 18)

Created: 2023-11-03 13:28:55 [EST]

---

maximum of six (6) months between the months of November and April. Stop and start dates are required to be provided to the City Finance Department. If the City determines that refuse is being generated, service will be re-started immediately to include monthly collection fees.

(Ord. 3181, 2018)

#### **8.8.260 Contractual—license required.**

- A. No person shall engage in the business of collecting or removing refuse from any business establishment or private premises in the City without first complying with all licensing provisions established by OCCGF Title 5.
- B. A violation of this section is a misdemeanor punishable by a term not to exceed six (6) months in jail, a fine not to exceed five hundred dollars (\$500.00), or both.

(Ord. 3181, 2018)

#### **8.8.270 Out of City dumping prohibited.**

- A. It is unlawful for any person, not residing in the incorporated City limits, to transport garbage or refuse into the incorporated City limits for placement in City-owned, or City-provided, containers.
- B. A violation of this section is a misdemeanor punishable by a term not to exceed six (6) months in jail, a fine not to exceed five hundred dollars (\$500.00), or both.

(Ord. 3181, 2018)

## **Chapter 9 GARBAGE AND REFUSE DISPOSAL AREAS**

### **Sections:**

#### **8.9.010 Standards.**

The ultimate means of disposal of all refuse shall be by landfilling. All disposal operations shall conform to current and accepted principles and regulations for the operation as approved or adopted by federal, state, and local regulatory agencies.

(Ord. 3181, 2018)

#### **8.9.020 Scavenging or salvaging—authorization required.**

- A. No person shall remove or take away from any City disposal area any soil, manure, refuse, or material of any nature unless specific authorization in writing to do so is obtained from the City Public Works Department.
- B. A violation of this section is a misdemeanor punishable by a term not to exceed six months in jail, a fine not to exceed five hundred dollars (\$500.00), or both.

(Ord. 3181, 2018)

---

### **8.9.030 Disposing in unauthorized areas prohibited.**

- A. It is unlawful for any person to dispose of any manure, garbage, refuse, or other material on property within the incorporated City limits, other than in disposal areas established to receive that particular substance.
- B. A violation of this section is a misdemeanor punishable by a term not to exceed six months in jail, a fine not to exceed five hundred dollars (\$500.00), or both.
- C. Any property where a violation of this section is occurring is hereby declared a Nuisance as defined by Chapter 49 of this Title.

(Ord. 3181, 2018)

### **8.9.040 Fees.**

Any person, firm, corporation, or other entity shall be entitled to dispose of refuse on any disposal area owned by the City, designated for public use, upon payment of fees to the City established by Commission resolution.

(Ord. 3181, 2018)

	<p><b>CITY OF GREAT FALLS</b></p> <p><b>Public Works Department</b> <i>Sanitation Division</i></p> <p><b>Standard Operating Procedure</b></p>	SOP# SAN-1
		Revision # 002
		Effective Date: 06/19/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Garbage Covering &amp; Transport</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach                  #3 IDDE                  #5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation                  #4 Construction Site Storm Water Management  <b>#6 Pollution Prevention/Good Housekeeping</b></p>
---	---

<p><b>Introduction:</b></p>	<p>Garbage covering and transportation has the potential to add pollutants to the environment.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Secure refuse containers with lids to protect against the wind.</li> <li>2. Handle garbage transportation without spillage.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Cover loads (i.e., tarp) during transport.                      Note: Restrictions on liquids, paint, car batteries, motor oil, Freon units and asbestos.</li> <li>2. Fill out internal documentation to ensure route has been covered (Sanitary Division only).</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (boots, ear protection, safety glasses, hard hat, field gloves).</li> <li>2. Vehicle safety; traffic awareness.</li> <li>3. CDL required.</li> <li>4. Hepatitis B shot recommended.</li> <li>5. DOT random drug screens will be administered.</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Foreman, Teamster</p>



<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><u>Total Suspended Solids (TSS)</u>  <u>Nutrients: Phosphorus, Nitrogen</u>  <u>Metals</u>  <u>Bacteria</u>  Salinity  <u>Oil and Grease</u>  <u>Chlorine</u></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

City of Great Falls - Internal documentation

City of Great Falls - Residential Sanitation:

<https://greatfallsmt.net/publicworks/residential-sanitation>

Official City Codes:

Title 8 Chapter 8-Garbage and Refuse\*

Title 8 Chapter 9-Garbage and Refuse-Disposal Area\*

\*Updated in November'23

Chain-of-command:

1. **Sanitary Foreman:** Mike Linn
  - Office Number: (406) 455-8156
2. **Sanitary Division Manager:** Ross Bartell
  - Office Number: (406) 455-8159

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	12/17/21	Transitioned to Sanitation specific format & changed from SOP #5 to SOP# Sanitation-1 (NB)
002	06/19/23	Included chain-of-command (JW)

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b> <i>Sanitation Division</i></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP# SAN-2
		Revision # 002
		Effective Date: 06/19/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Materials Management &amp; Chemical Storage</b></p>		

**Control Measure:**

- |  |   |
|--|---|
| #1 Public Education and Outreach                 | #2 Public Involvement and Participation                 |
| #3 IDDE  | #4 Construction Site Storm Water Management             |
| #5 Post-Construction Site Storm Water Management | <b>#6 <u>Pollution Prevention/Good Housekeeping</u></b> |

<b>Introduction:</b>	Materials and chemicals have the potential to add pollutants to the environment. It is critical to properly store and manage all chemicals to ensure no materials enter the storm water system.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Store materials/chemicals away from storm water controls (i.e., drain inlets).</li> <li>2. Store chemicals indoors or outside under a covered structure.</li> <li>3. Store upright in original labeled containers.</li> <li>4. Hazardous materials - store in original containers, provide secondary containment, &amp; store off the ground (i.e., on a spill containment pallet).</li> <li>5. Liquid materials &amp; petroleum products - store in original covered containers and provide secondary containment (sized to hold 1.5 times the storage capacity of the container).</li> <li>6. Lists of materials and chemicals used are attached.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Training on proper materials/chemical handling and safety procedures.</li> <li>2. Personnel are directed to call 911 in case of an emergency.</li> <li>3. If an emergency occurs, notify personnel following the chain-of-command.</li> <li>4. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (nitrile gloves, safety glasses, hard hat).</li> </ol>
<b>Responsible Staff:</b>	Teamster, Laborer, Operator, Foreman

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><u>Total Suspended Solids (TSS)</u>  <u>Nutrients: Phosphorus, Nitrogen</u>  <u>Metals</u>  <u>Bacteria</u>  <u>Salinity</u>  <u>Oil and Grease</u>  <u>Chemicals</u></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

PW Street/Sanitary Divisions

SDS located on city computer server at P:\Street Safety Data Sheets\

Chain-of-command:

1. **Sanitary Foreman:** Mike Linn
  - Office Number: (406) 455-8156
2. **Sanitary Division Manager:** Ross Bartell
  - Office Number: (406) 455-8159

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	12/17/21	Transitioned to Sanitation specific format & changed from SOP #6 to SOP# Sanitation-2 (NB)
002	06/19/23	Included chain-of-command (JW)

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p><b>CITY OF GREAT FALLS</b></p> <p><b>Public Works Department</b> <i>Sanitation Division</i></p> <p><b>Standard Operating Procedure</b></p>	SOP# SAN-3
		Revision # 002
		Effective Date: 06/19/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Christmas Tree Pickup</b></p>		

<p><b>Control Measure:</b></p>	
<p>#1 Public Education and Outreach</p> <p>#3 IDDE</p> <p>#5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation</p> <p>#4 Construction Site Storm Water Management</p> <p><b>#6 <u>Pollution Prevention/Good Housekeeping</u></b></p>

<p><b>Introduction:</b></p>	<p>Christmas trees have the potential to add excess nutrients (nitrogen and phosphorus) to storm water.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Establish collection sites in approved locations (map).</li> <li>2. Advertise the locations of the collection sites.</li> <li>3. Collection sites need to be located away from storm water controls (i.e., storm inlets, drainage ditches).</li> <li>4. Transfer Christmas trees to hauling vehicle without spillage.</li> <li>5. Spillage will be cleaned up to ensure material/debris do not enter storm water controls (i.e., storm inlets).</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Cover loads (i.e., tarp) during transport.</li> <li>2. Consider weather when hauling (i.e., calm, not windy).</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (steel toe boots, ear protection, safety glasses, hard hat, field gloves).</li> <li>2. Vehicle safety/awareness. Be aware of any vehicles entering/exiting the area.</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Foreman, Teamster, Laborer</p>

<p>Target pollutants this BMP helps to reduce:</p>	<p><u>Total Suspended Solids (TSS)</u>  <u>Nutrients: Phosphorus, Nitrogen</u>  <u>Metals</u>  <u>Bacteria</u>  Salinity  Oil and Grease</p>
<p>Receiving Waters:</p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek   <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

Chain-of-command:

1. **Sanitary Foreman:** Mike Linn
  - Office Number: (406) 455-8156
2. **Sanitary Division Manager:** Ross Bartell
  - Office Number: (406) 455-8159

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	12/17/21	Transitioned to Sanitation specific format & changed from SOP #30 to SOP# Sanitation-3 (NB)
002	06/19/23	Included Chain-of-command (JW)

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



	<b>CITY OF GREAT FALLS</b> <b>Public Works Department</b> <i>Sanitation Division</i> <b>Standard Operating Procedure</b>	SOP# SAN-4
		Revision # 002
		Effective Date: 06/19/23
		Authored By: PW-SWMT
		Approved By:
<b>Title: Refuse Storage Containers</b>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <b>#6 Pollution Prevention/Good Housekeeping</b></p>
---	---

<b>Introduction:</b>	Empty refuse storage containers have the potential to add debris/trash to storm water.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Secure refuse storage containers with lids to protect against the wind.</li> <li>2. Refuse storage containers need to be located away from storm water controls (i.e., storm inlets, drainage ditches).</li> <li>3. Inspect area regularly for loose debris/trash.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Schedule inspection routine to ensure storage containers are structurally sound (i.e., without cracks, leaks, degradation).</li> <li>2. Mark the storage container with the date it is placed in the yard.</li> <li>3. Storage containers that are no longer usable will be disposed or recycled.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (steel toe boots, ear protection, safety glasses, hard hat, field gloves).</li> <li>2. Vehicle safety/awareness.</li> </ol>
<b>Responsible Staff:</b>	Foreman, Laborer, Teamster
<b>Target pollutants this BMP helps to reduce:</b>	<u><b>Total Suspended Solids (TSS)</b></u> <u><b>Nutrients: Phosphorus, Nitrogen</b></u> <u><b>Metals</b></u> <u><b>Bacteria</b></u> Salinity Oil and Grease

## SOP# SAN-4

Receiving Waters:	Missouri River, Lower Sun River, Sand Coulee Creek <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>
-------------------	---

### References:

### Chain-of-command:

1. **Sanitary Foreman:** Mike Linn
  - Office Number: (406) 455-8156
2. **Sanitary Division Manager:** Ross Bartell
  - Office Number: (406) 455-8159

### Revision History:

Revision Number	Effective Date	Significant Changes
001	12/17/21	Transitioned to Sanitation specific format & changed from SOP #31 to SOP# Sanitation-4 (NB)
002	06/19/23	Included Chain-of-Command (JW)

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b></p> <p align="center"><b>Streets Division</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP # STR-1
		Revision # 002
		Effective Date: 9/25/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Track-Out Management</b></p>		

<p><b>Control Measure:</b></p>	
<p>#1 Public Education and Outreach</p> <p>#3 IDDE</p> <p>#5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation</p> <p>#4 Construction Site Storm Water Management</p> <p><b>#6 Pollution Prevention/Good Housekeeping</b></p>

<p><b>Introduction:</b></p>	<p>Track-out management consists of cleaning the sediment that is tracked onto adjacent roadways; sediments have the potential to impact the storm water system.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Avoid sweeping sediment into storm inlets, or protect inlets with inlet protection device. Using ERTEC GR8 guard or Rock Wattles</li> <li>2. Install track pad if warranted.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Schedule seasonal routine (daily, twice weekly, weekly, and/or post-storm event).</li> <li>2. Establish notification chain-of-command when tracking is observed.</li> <li>3. Arrange for proper sediment disposal per MDEQ requirements (see attached).</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (ear protection, safety glasses, hard hat, field gloves, respirator may be needed for dust).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. Equipment awareness.</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Manager, Superintendent, Foreman, Lead Person, Operator, Teamster, Laborer</p>

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>                  Nutrients: Phosphorus, Nitrogen  <b><u>Metals</u></b>                  Bacteria  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek, Whitmore Ravine   <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**References:**

PW Street

Chain-of-command:

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244
3. Eric Boyd, Manager, (406) 781-1745

Montana DEQ Solid Waste Program Memo

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (New ERTEC GR8m Chain of Command)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #1 to SOP# STR-1

Street Division SOP training and documentation is on file

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  <b><u>Metals</u></b>  <b><u>Bacteria</u></b>  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b>  <b><u>Chemicals</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek, Whitmore Ravine</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

PW Streets/Traffic Division

SDS located on city computer server at P:\Street Safety Data Sheets (attached)

Chain-of-command:

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244
3. Eric Boyd, Manager, (406) 781-1745

Chain-of-command for Fuel Spills:

1. Doug Alm, Public Works Shop Supervisor, (406) 781-8993
2. Cory Gilcher Shop Superintendent

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (Chain of Command)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #6 to SOP# STR-2



**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b></p> <p align="center"><b>Streets Division</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP # STR-3
		Revision # 002
		Effective Date: 9/25/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Snow Removal/Storage</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach</p> <p>#2 Public Involvement and Participation</p> <p>#3 IDDE</p> <p>#4 Construction Site Storm Water Management</p> <p>#5 Post-Construction Site Storm Water Management</p> <p><b>#6 Pollution Prevention/Good Housekeeping</b></p>
---

<b>Introduction:</b>	Snow piles accumulate debris and pollutants which have the potential to impact the environment.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Remove and store snow to minimize the transport of pollutants from snowmelt into surface waters.</li> <li>2. Store snow away from stormwater controls (i.e., storm inlets, drainage ditches) and surface waters.</li> <li>3. Snow storage locations must allow for removal of accumulated debris, sand, road dirt, trash, and salts.</li> <li>4. The Street Division snow storage locations are shown on Figure 1-SOP#9.</li> <li>5. The Utility Division snow storage is within the Public Works Complex.</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Training on proper snow handling, storage and safety procedures.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (ear protection, safety glasses, hard hat, field gloves).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. Equipment awareness.</li> </ol>
<b>Responsible Staff:</b>	Teamster, Laborer, Operator, Leadman, Foreman, Superintendent, Manager

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>          Nutrients: Phosphorus, Nitrogen  <b><u>Metals</u></b>          Bacteria          Salinity  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek, Whitmore Ravine   <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**Chain-of-command:**

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244
3. Eric Boyd, Manager, (406) 781-1745

**References:**

Street Division Figure 1-SOP# STR-3

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (Chain of Command + Figure 1 update)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #9 to SOP# STR-3

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

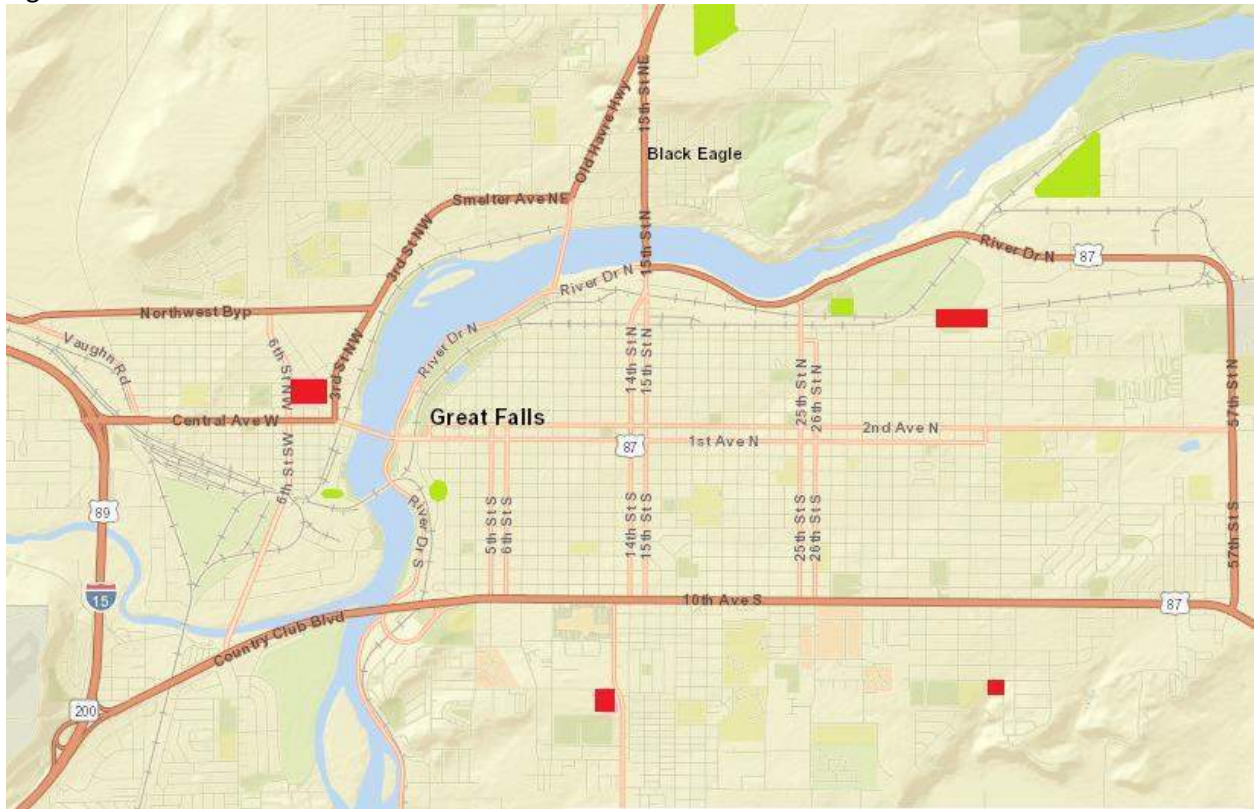
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Figure 1





## SOP# STR-4

<b>Responsible Staff:</b>	Teamster, Laborer, Operator, Leadman, Foreman, Superintendent, Manager
<b>Target pollutants this BMP helps to reduce:</b>	<u><b>Total Suspended Solids (TSS)</b></u> Nutrients: Phosphorus, Nitrogen Metals Bacteria Salinity <u><b>Oil and Grease</b></u>
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek, Whitmore Ravine  <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i>

### References:

PW Street

Chain-of-command:

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244

Eric Boyd, Manager, (406) 781-1745

### Revision History:

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (Chain of Command + ERTEC GR8 Guard inlet info)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #32 to SOP# STR-4

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



	<p align="center"><b>CITY OF GREAT FALLS</b></p> <p align="center"><b>Public Works Department</b></p> <p align="center"><b>Streets Division</b></p> <p align="center"><b>Standard Operating Procedure</b></p>	SOP # STR-5
		Revision # 002
		Effective Date: 9/25/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Paving &amp; Milling/Overlay Procedures</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach</p> <p>#3 IDDE</p> <p>#5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation</p> <p>#4 Construction Site Storm Water Management</p> <p><b>#6 <u>Pollution Prevention/Good Housekeeping</u></b></p>
---	--

<p><b>Introduction:</b></p>	<p>Paving &amp; milling/overlay projects have the potential to add pollutants to storm water.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Install inlet protection devices (i.e., , ERTEC GR8 Guard or Rock Wattles) to ensure sediment and potential hydrocarbons do not enter storm inlets.</li> <li>2. Prior to paving activities, paver must be located in milled area or the area to be paved while “release agent” is applied to the paver. Ensure no “release agent” enters any storm inlets.</li> <li>3. Upon completion of paving activities, place paver on top of scrap/waste piece of geotextile paving fabric while “Citri-Clean” solution is applied and while paver is cleaned.</li> <li>4. Roll up scrap/waste paving fabric, ensure “Citri-Clean” solution and any waste is contained on the fabric, and dispose of properly.</li> <li>5. Sweep streets after project completion if sediment is present.</li> <li>6. Remove inlet protection devices when project is complete.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Establish notification chain-of-command if tracking is observed.</li> <li>2. Foreman will determine staffing and equipment needs.</li> <li>3. Training on proper equipment operation/maintenance/safety procedures.</li> <li>4. Training on proper BMP installation/maintenance procedures.</li> <li>5. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (steel toe boots, ear protection, safety glasses, hard hat, field gloves, high visibility clothing).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. Equipment awareness.</li> </ol>

## SOP# STR-5

<b>Responsible Staff:</b>	Manager, Superintendent, Foreman, Lead Worker, Operator, Teamster and Laborer
<b>Target pollutants this BMP helps to reduce:</b>	<p><b><u>Total Suspended Solids (TSS)</u></b>            Nutrients: Phosphorus, Nitrogen            Metals            Bacteria            Salinity  <b><u>Oil and Grease</u></b></p>
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek, Whitmore Ravine  <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i>

**References:**

PW Street

Chain-of-command

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244
3. Eric Boyd, Manager, (406) 781-1745

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (Chain of Command + ERTEC GR8 Guard inlet info)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #33 to SOP# STR-5

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  <b><u>Metals</u></b>  <b><u>Bacteria</u></b>  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek, Whitmore Ravine</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <b><u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**References:**

PW Street

Chain-of-command:

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244
3. Eric Boyd, Manager, (406) 781-1745

Montana DEQ Solid Waste Program Memo

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (Chain of Command)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #34 to SOP# STR-6

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p>Total Suspended Solids (TSS)                  Nutrients: Phosphorus, Nitrogen                  Metals                  Bacteria  <u>Salinity</u>                  Oil and Grease</p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek, Whitmore Ravine</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

PW Street

Chain-of-command:

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244
3. Eric Boyd, Manager, (406) 781-1745

Montana DEQ Solid Waste Program Memo

Salt Institute, The Salt Storage Handbook

<http://www.nwpa.us/uploads/1/2/9/8/129889926/salt-institute-salt-storage-handbook.pdf>

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (Chain of Command + ERTEC GR8 inlet protection)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #35 to SOP# STR-7



**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><u>Total Suspended Solids (TSS)</u>  <u>Nutrients: Phosphorus, Nitrogen</u>  <u>Metals</u>  <u>Bacteria</u>  <u>Salinity</u>  <u>Oil and Grease</u></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

PW Street

Chain-of-command:

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244
3. Eric Boyd, Manager, (406) 781-1745

Montana DEQ Solid Waste Program Memo

MT DEQ Solid Waste Program – Street Sweeping Reuse Policy (2009)

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (Chain of Command + ERTEC GR8 inlet protection)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #36 to SOP# STR-8

**Supervisor signature/approval:**

**Date:** \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

**Date:** \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>          Nutrients: Phosphorus, Nitrogen  <b><u>Metals</u></b>          Bacteria  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek, Whitmore Ravine   <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

PW Street

Chain-of-command:

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244
3. Eric Boyd, Manager, (406) 781-1745

Montana DEQ Solid Waste Program Memo

Fuel Spill Chain-of-command:

1. Dan Palagi, Street Superintendent, (406) 781-8987
2. Darren Yatsko Quality Control Foreman (406) 781-9244
3. Cory Gilcher Garage Superintendent (406) 781-8977
4. Doug Alm, Central Garage Manager, (406) 781-8993
5. Eric Boyd, Foreman, (406) 781-1745

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (Chain of Command)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #37 to SOP# STR-9

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><u>Total Suspended Solids (TSS)</u>  <u>Nutrients: Phosphorus, Nitrogen</u>  <u>Metals</u>  <u>Bacteria</u>  <u>Salinity</u>  <u>Oil and Grease</u></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek, Whitmore Ravine</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

PW Street

Chain-of-command:

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244
3. Eric Boyd, Manager, (406) 781-1745

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (Chain of Command + ERTEC)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #38 to SOP# STR-10

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Distributor Clean Out Process

### Beginning of Maintenance Season

1. Fill with SS1 Emulsion for Overlay Application
2. Spray Emulsion on Street for Tac Coat
  - a. End of Day Clean Out Operations
    - i. Reverse Pump to suck material out of spray bar back into material tank
    - ii. Return pump to off position
    - iii. Turn Master Control to Clean Out Mode
    - iv. Set Spray Switch to Manual and Rear Control
    - v. Vent lid on Solvent Tank
    - vi. Run Pump in forward position at 100 GPM to suck solvent out of solvent tank
      1. In Clean Out Mode the Material tank valve is in closed position to keep from running solvent into emulsion material
    - vii. Slowly open Solvent Valve on the load line
    - viii. Extend Spray bar out both ways to max
    - ix. Close Solvent Valve on load line
    - x. Open Solvent Circulate Valve
      1. Run for 5 minutes reversing pump at times
      2. This circulates solvent through spray bar and pump
    - xi. Reverse Pump to 50 GPM
    - xii. Close Circulate Valve
    - xiii. Slowly Open Solvent Valve on load line
      1. Run for minimum of 1 minute and then close Solvent Valve
      2. This returns solvent back to tank from bar and pump
    - xiv. Turn off Pump
    - xv. Close Solvent Tank
    - xvi. Bar is Ready for operation next time
    - xvii. When solvent has become diluted by emulsion product it is then emptied into steel container with sand to be blotted and dried for landfill disposal
  - b. Empty any existing SS1 Emulsion into 250 Gal Tote to be used for hand tac for patch crew
  - c. Fill Material Tank with water – Top Load from Hydrant to prevent back flow
    - i. Minimum of 1300 Gal to submerge both heater tubes
  - d. Heat Material Tank on level ground to 160 degrees
3. Operational Change Over Clean Out – Going from SS1 Emulsion to CRS-2P- Chip Seal Operation
  - i. As Per Calumet Refinery Requirements this process is necessary to prevent any possible reactions between Anionic and Cationic Emulsions which may include explosion.

- e. While heating Material Tank bar and pump are also circulating at 25 GPM
- f. Once water is brought to 160 degrees – Turn off burners and let blowers clear any existing fumes for 5-10 minutes
  - i. Reverse pump to suck water from bar to Material Tank
  - ii. Drive in yard to agitate water in Material Tank
- g. Containment Area has already been prepped
  - i. Containment Area consists of a 16 Yard Steel Container
  - ii. Filled with blotting sand
- h. Back Distributor into position over steel container so that spray bar is safely over center of container
  - i. Extend spray bar to max on both sides
  - ii. Turn Master Switch to Spray Circulate
  - iii. Turn pump forward to 10 GPM
  - iv. Open all spay bar sections
  - v. Turn Spray/Circulate Switch to Spray position
    - 1. This opens the snivies and allows water and residual emulsion to spray out.
    - 2. Water is then filtered and blotted within container
    - 3. After dewatering and drying the material is then suitable for disposal as per High Plains Landfill Requirements
  - i. Repeat Steps b – g a second time if necessary
  - j. Park truck inside and open top hatch to allow drying
- 4. After Material Tank is completely dried return to refinery to fill with CRS-2P for Chip Seal applications
- 5. Repeat Steps in Daily Clean Out during Chip Seal Season
- 6. When Chip Seal season is complete repeat Operational Change Over Clean Out – to return to SS1 Emulsion for Overlay Application
  - i. As Per Calumet Refinery Requirements this process is necessary to prevent any possible reactions between Anionic and Cationic Emulsions which may include explosion.
- 7. Fill with SS1 Emulsion for remainder of Overlay Season
- 8. End of Year Clean Out
  - a. Transfer any remaining SS1 Emulsion into tote for winter use as tac material for patching
  - b. Repeat Operational Change Over Clean Out for winter storage
  - c. Park truck for winter- Ready for use in following spring.



## SOP# STR-11

<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (work rated boots, ear protection, safety glasses, hard hat, field gloves, high visibility clothing).</li> <li>2. Traffic awareness.</li> <li>3. Equipment awareness.</li> </ol>
<b>Responsible Staff:</b>	Foreman, Teamster, Laborer, Operator, Superintendent, Manager
<b>Target pollutants this BMP helps to reduce:</b>	<p><b><u>Total Suspended Solids (TSS)</u></b>            Nutrients: Phosphorus, Nitrogen            Metals            Bacteria            Salinity  <b><u>Oil and Grease</u></b></p>
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek, Whitmore Ravine  <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i>

### References:

#### PW Street

#### Chain-of-command:

1. Dan Palagi, Superintendent, (406) 781-8987
2. Darren Yatsko, Quality Control Foreman, (406)-781-9244
3. Eric Boyd, Manager, (406) 781-1745

#### PW Street

Distributor Cleanout Process Procedure (2018)

### Revision History:

Revision Number	Effective Date	Significant Changes
001 (D. Palagi)	9/21/23	Updated content (Chain of Command)
002 (J. Wang)	9/25/23	Transitioned to ENV standard format → changed from SOP #48 to SOP# STR-11

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b>Chemicals - Paint</b>                  Total Suspended Solids (TSS)                  Nutrients: Phosphorus, Nitrogen                  Metals                  Bacteria                  Salinity                  Oil and Grease</p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek   <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

PW Streets/Traffic Division

SDS located on city computer server at P:\Street Safety Data Sheets (attached)

Chain-of-command:

1. Austin Schultz, foreman, (406) 455 -8123
2. Dan Palagi, Superintendent, (406) 781-8987
3. Darren Yatsko, Quality Control Foreman, (406)-781-9244
4. Eric Boyd, Manager, (406) 781-1745

**Revision History:**

Revision Number	Effective Date	Significant Changes
001 (J. Wang)	9/25/23	Updated content (Chain of Command), Transitioned to ENV standard format → changed from SOP #39 to SOP# STR-12

**Supervisor signature/approval:**

**Date:** \_\_\_\_\_

Name (printed)

\_\_\_\_\_

Signature

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

\_\_\_\_\_

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

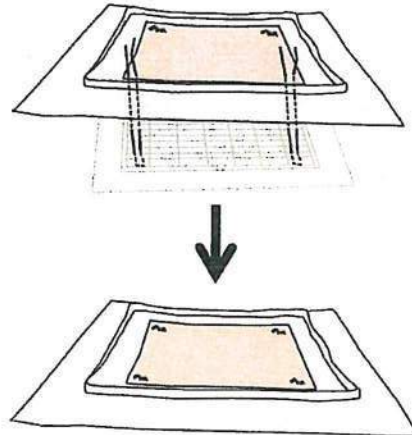
# ERTEC® GR8 Guard™ - Installation Guide - For drainage inlets with grates in paved areas

## Installation Notes

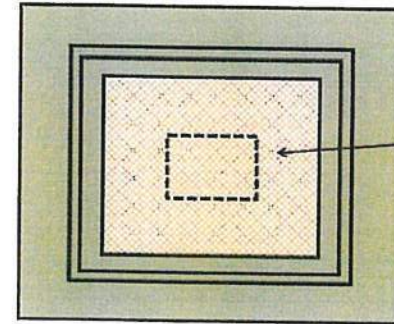
- 1. Placement:** Select correct size (Table 1). Do not remove grate. Lay GR8 Guard™ on top of grate. GR8 Guard™ shall extend at least 3 inches beyond grate in each direction
- 2. Anchor methods:** **A)** Attach with 16 gauge tie wire. Cut wire to 18" lengths. At each corner of GR8 Guard™, feed one end of wire down thru GR8 Guard™, around grate bar, and back-up thru GR8 Guard™. Above ground, pull tight and twist wires several times. Cut off excess (Fig 1) or **B)** Place small snake bags or equivalent (gravel bags) containing clean, pea-sized graded gravel around perimeter of GR8 Guard™ (Fig 3). For better performance and durability install with Top Guard™ adhesive (Loctite® Power Grab All Purpose) caulk. This adhesive peels off easily when GR8 Guard™ is removed. See installation videos: Part I: <https://youtu.be/qMPq9mE2784> Part II: <https://youtu.be/3GfbgpYuHNw>
- 3. Clean:** Accumulation of leaves, debris and sediment can cause backups! Clean after every storm or as necessary.
- 4. Protect:** In stop and go traffic areas where exposed to constant tire abuse, it is useful to place traffic cones or delineators on or near GR8 Guard to discourage run-overs. GR8 Guard works well with periodic run-overs, but does not survive long in constant stop and start traffic.

Table 1

Grates less than	GG Size
12"x12"	GG 12x12
20"x20"	GG 20x20
28"x28"	GG 28x28
36"x24"	GG 36x24
36"x36"	GG 36x36
42"x28"	GG 42x28
48"x24"	GG 48x24
48"x36"	GG 48x36
48"x48"	GG 48x48
Custom Sizes Are Available	



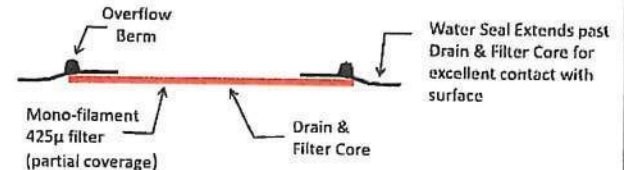
NEW  
Innovative  
Design



Portion of filter removed for high-flow bypass. Minimum 20% of surface area.

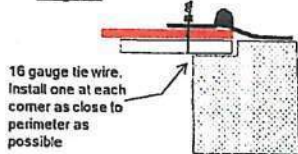
Plan View

Elevation  
View



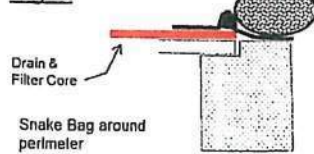
Water Seal Extends past Drain & Filter Core for excellent contact with surface

Fig. 1



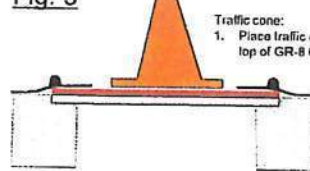
16 gauge tie wire. Install one at each corner as close to perimeter as possible

Fig. 2



Drain & Filter Core  
Snake Bag around perimeter

Fig. 3



Traffic cone:  
1. Place traffic cone on top of GR-8 Guard.

**Maintenance:** Perform maintenance as required. Inspect following rainfall events and at least daily during prolonged rainfall. Maintain to provide an adequate sediment holding capacity. Debris shall be removed daily and sediment shall be removed when the sediment accumulation reaches 50% of the barrier height. Removed sediment shall be incorporated in the project at designated locations.

**Important:** All information, including illustrations, is believed to be reliable. Users, however, should independently evaluate the suitability of each product for their application. ERTEC Environmental Systems makes no warranties as to the accuracy or completeness of the information, and disclaims any liability regarding its use. ERTEC Environmental Systems' only obligations are those in the ERTEC Environmental Systems Standard Terms and Conditions of Sale for this product, and in no case will ERTEC Environmental Systems or its distributors be liable for any incidental, indirect or consequential damages arising from the sale, resale, use or misuse of the product. Specifications are subject to change without notice. In addition, ERTEC Environmental Systems reserves the right to make changes without notification to Buyer, to processing or materials which do not affect compliance with any applicable specification.



U.S. and International Patents and Pending Patents Apply  
©2009-2016 ERTEC Environmental Systems

File Name:  
ERTEC - Installation Guide - GR8 Guard.pdf

Scale: None  
Default Print Size: 8.5"x11"  
Page: 1 of 1



<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>          Nutrients: Phosphorus, Nitrogen  <b><u>Metals</u></b>          Bacteria  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek   <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**References:**

Chain-of-command:

1. **Utilities Superintendent:** Pat Habel
  - Office Number: (406) 455-8141
  - Cell Number: (406) 781-3393
2. **Utilities Division Manager:** Jake McKenna
  - Office Number: (406) 455-8137

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/20/23	Transitioned to Utility specific format & changed from SOP #1 to SOP# Uti-1 (JW); Updated chain of command

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b>  <b>Public Works Department</b>  <i>Utilities Division</i>  <b>Standard Operating Procedure</b></p>	SOP# UTI-2
		Revision # 001
		Effective Date: 06/20/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Hydrant Flushing</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <u><b>#6 Pollution Prevention/Good Housekeeping</b></u></p>
---	--

<p><b>Introduction:</b></p>	<p>Hydrant flushing is needed to ensure serviceability in the event of an emergency, to maintain the Fire Department’s protection rating, and to ensure the hydrants have adequate flow and pressure for firefighting.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Sweep streets prior to flushing.</li> <li>2. Attach Chlorine Diffuser with dechlorination tablet to discharge line.</li> <li>3. Sweep streets after project completion if sediment is present.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. If required, secure an MDEQ General Permit for Disinfected Water and Hydrostatic Testing (MTG770000). All conditions of this permit shall be followed and work shall not begin until permit coverage is obtained.</li> <li>2. Schedule hydrants to be flushed in accordance with street sweeping schedule.</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (ear protection, safety glasses, hard hat, field gloves).</li> <li>2. Traffic, equipment, &amp; high-water pressure awareness.</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Operator, Laborer, Teamster, Pipe-layer, Foreman</p>

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>                  Nutrients: Phosphorus, Nitrogen                  Metals                  Bacteria                  Salinity  <b><u>Oil and Grease</u></b>  <b><u>Chlorine</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**References:**

MDEQ General Permit for Disinfected Water and Hydrostatic Testing (separate document)

Chain-of-command:

1. **Utilities Superintendent:** Pat Habel
  - Office Number: (406) 455-8141
  - Cell Number: (406) 781-3393
2. **Utilities Division Manager:** Jake McKenna
  - Office Number: (406) 455-8137

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/20/23	Transitioned to Utility specific format & changed from SOP #4 to SOP# Uti-2 (JW); Updated chain of command



**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



<p>Target pollutants this BMP helps to reduce:</p>	<p><u>Total Suspended Solids (TSS)</u>  <u>Nutrients: Phosphorus, Nitrogen</u>  <u>Metals</u>  <u>Bacteria</u>  <u>Salinity</u>  <u>Oil and Grease</u>  <u>Chemicals</u></p>
<p>Receiving Waters:</p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

List of 78 chemicals (separate document)  
 SDS documents hard copy only

Chain-of-command:

1. **Utilities Superintendent:** Pat Habel
  - Office Number: (406) 455-8141
  - Cell Number: (406) 781-3393
2. **Utilities Division Manager:** Jake McKenna
  - Office Number: (406) 455-8137

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/20/23	Transitioned to Utility specific format & changed from SOP #6 to SOP# Uti-3 (JW); Updated chain of command

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>                  Nutrients: Phosphorus, Nitrogen  <b><u>Metals</u></b>                  Bacteria                  Salinity  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek   <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**References:**

Chain-of-command:

1. **Utilities Superintendent:** Pat Habel
  - Office Number: (406) 455-8141
  - Cell Number: (406) 781-3393
2. **Utilities Division Manager:** Jake McKenna
  - Office Number: (406) 455-8137

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/20/23	Transitioned to Utility specific format & changed from SOP #9 to SOP# Uti-4 (JW); Updated chain of command

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  <b><u>Metals</u></b>  <b><u>Bacteria</u></b>  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

Chain-of-command:

1. **Utilities Superintendent:** Pat Habel
  - Office Number: (406) 455-8141
  - Cell Number: (406) 781-3393
2. **Utilities Division Manager:** Jake McKenna
  - Office Number: (406) 455-8137

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/20/23	Transitioned to Utility specific format & changed from SOP #40 to SOP# Uti-5 (JW); Updated chain of command

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<b>CITY OF GREAT FALLS</b> <b>Public Works Department</b> <i>Utilities Division</i> <b>Standard Operating Procedure</b>	SOP# UTI-6
		Revision # 001
		Effective Date: 06/20/23
		Authored By: PW-SWMT
		Approved By:
<b>Title: Materials Hauling</b>		

**Control Measure:**

#1 Public Education and Outreach	#2 Public Involvement and Participation
#3 IDDE	#4 Construction Site Storm Water Management
#5 Post-Construction Site Storm Water Management	<b>#6 Pollution Prevention/Good Housekeeping</b>

<b>Introduction:</b>	Material (i.e. sediment, liquids, trash) hauling has the potential to add pollutants to storm water.
<b>Operating Best Management Practices (BMPs) needed:</b>	<ol style="list-style-type: none"> <li>1. Transfer liquid loads to hauling vehicle away from storm water controls (i.e., storm inlets, drainage ditches).</li> <li>2. Transfer to hauling vehicle without spillage.</li> <li>3. Spillage will be cleaned up to ensure material does not enter storm water controls (i.e., storm inlets).</li> </ol>
<b>Administrative BMPs needed:</b>	<ol style="list-style-type: none"> <li>1. Cover loads (i.e., tarp) during transport, if warranted.</li> <li>2. Ensure haul truck beds are structurally sound so liquid loads do not leak during transport.</li> </ol>
<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (ear protection, safety glasses, hard hat, field gloves, high visibility clothing).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. CDL required.</li> <li>4. DOT random drug screens will be administered.</li> </ol>
<b>Responsible Staff:</b>	Foreman, Teamster, Laborer, Operator
<b>Target pollutants this BMP helps to reduce:</b>	<u><b>Total Suspended Solids (TSS)</b></u> <u><b>Nutrients: Phosphorus, Nitrogen</b></u> <b>Metals</b> <b>Bacteria</b> Salinity <u><b>Oil and Grease</b></u>

<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>
--------------------------	---

**References:**

Chain-of-command:

1. **Utilities Superintendent:** Pat Habel
  - Office Number: (406) 455-8141
  - Cell Number: (406) 781-3393
2. **Utilities Division Manager:** Jake McKenna
  - Office Number: (406) 455-8137

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/20/23	Transitioned to Utility specific format & changed from SOP #41 to SOP# Uti-6 (JW); Updated chain of command

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p><b>CITY OF GREAT FALLS</b>  <b>Public Works Department</b>  <i>Utilities Division</i>  <b>Standard Operating Procedure</b></p>	SOP# UTI-7
		Revision # 001
		Effective Date: 06/20/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Ditch &amp; Pond Maintenance</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <b>#6 Pollution Prevention/Good Housekeeping</b></p>
---	---

<p><b>Introduction:</b></p>	<p>Ditch/pond maintenance has the potential to add pollutants to storm water.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Avoid ditch/pond maintenance during saturated conditions.</li> <li>2. Preserve existing vegetation.</li> <li>3. Minimize the area disturbed when removing accumulated sediment/debris (i.e., use the same route access/exit).</li> <li>4. Transfer to hauling vehicle without spillage.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Ditches/ponds are cleaned 3 to 4 times per year; additional cleaning is completed if needed.</li> <li>2. Progress is tracked via work orders.</li> <li>3. Arrange for disposal at City waste pile.</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (ear protection, safety glasses, hard hat, field gloves, high visibility clothing).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. Equipment awareness.</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Operator, Laborer, Teamster, Foreman</p>

<p>Target pollutants this BMP helps to reduce:</p>	<p><u>Total Suspended Solids (TSS)</u>  <u>Nutrients: Phosphorus, Nitrogen</u>  <u>Metals</u>  <u>Bacteria</u>  <u>Salinity</u>  <u>Oil and Grease</u></p>
<p>Receiving Waters:</p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek   <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

Chain-of-command:

1. **Utilities Superintendent:** Pat Habel
  - Office Number: (406) 455-8141
  - Cell Number: (406) 781-3393
2. **Utilities Division Manager:** Jake McKenna
  - Office Number: (406) 455-8137

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/20/23	Transitioned to Utility specific format & changed from SOP #42 to SOP# Uti-7 (JW); Updated chain of command

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



	<p><b>CITY OF GREAT FALLS</b>  <b>Public Works Department</b>  <i>Utilities Division</i>  <b>Standard Operating Procedure</b></p>	SOP# UTI-8
		Revision # 001
		Effective Date: 06/20/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Drying Beds</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p> <p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <b>#6 Pollution Prevention/Good Housekeeping</b></p>
---

<p><b>Introduction:</b></p>	<p>Material present in the drying beds have the potential to add pollutants to the environment and must be kept away from the storm water system.</p>
<p><b>Storm water Best Management Practice (BMP):</b></p>	<ol style="list-style-type: none"> <li>1. Protective barriers around drying beds will be inspected routinely to ensure they are structurally intact.</li> <li>2. Ensure material present in the drying beds is separated from the storm water system.</li> <li>3. Material will be dried prior to removal.</li> <li>4. An end dump transports the dry material to the High Plains Landfill.</li> </ol>
<p><b>Administrative/Structural BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Monitor amount of material in drying beds and schedule transfers before beds are overfilled.</li> <li>2. Training on proper/safe vacuum truck operation.</li> <li>3. Arrange for disposal at High Plains Landfill.</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (ear protection, safety glasses, hard hat, field gloves, high visibility clothing).</li> <li>2. Equipment (vacuum truck) awareness.</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Operator, Laborer, Teamster, Foreman</p>

<p>Target pollutants this BMP helps to reduce:</p>	<p><u>Total Suspended Solids (TSS)</u>  <u>Nutrients: Phosphorus, Nitrogen</u>  <u>Metals</u>  <u>Bacteria</u>  <u>Salinity</u>  <u>Oil and Grease</u></p>
<p>Receiving Waters:</p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></p>

**References:**

Chain-of-command:

1. **Utilities Superintendent:** Pat Habel
  - Office Number: (406) 455-8141
  - Cell Number: (406) 781-3393
2. **Utilities Division Manager:** Jake McKenna
  - Office Number: (406) 455-8137

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/20/23	Transitioned to Utility specific format & changed from SOP #43 to SOP# Uti-8 (JW); Updated chain of command

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p align="center"><b>CITY OF GREAT FALLS</b>  <b>Public Works Department</b>  <i>Utilities Division</i>  <b>Standard Operating Procedure</b></p>	SOP# UTI-9
		Revision # 001
		Effective Date: 06/20/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Sanitary Sewer Overflows (SSOs)</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <u><b>#6 Pollution Prevention/Good Housekeeping</b></u></p>
---	--

<p><b>Introduction:</b></p>	<p>Sanitary sewer overflow (SSOs) causes include blockages, line breaks, sewer defects that allow storm water and groundwater to overload the system, power failures, improper sewer design, and vandalism<sup>1</sup>. SSO contains pollutants harmful to humans and the environment and must be separated from the storm water system.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Conduct routine sanitary system cleaning and maintenance to reduce frequency of SSO's.</li> <li>2. Limit fats, oils and grease (FOG) present in the sanitary system.</li> <li>3. Educate the public on how FOG and certain household products impact the sanitary system.</li> <li>4. Reasonable containment methods may include: vacuuming with combination cleaner, building a dike/berm, sandbagging, or bypass pumping to another sanitary sewer main.</li> <li>5. Hydraulic (combination cleaner) or mechanical (rodding machine) equipment will be used to relieve pipe blockage.</li> <li>6. Spillage will be raked or vacuumed to ensure material does not enter storm water controls (i.e., storm inlets).</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Establish notification chain-of-command if SSO is present.</li> <li>2. Utility foreman will determine staffing and equipment needs.</li> <li>3. Sanitary sewer Cartagraph maps are available.</li> <li>4. Overflow/spill information will be recorded in a sewer incident report form (Attached SOP #44 FORM).</li> </ol>

<b>Safety:</b>	<ol style="list-style-type: none"> <li>1. PPE (ear protection, safety glasses, hard hat, field gloves, high visibility clothing).</li> <li>2. Hepatitis B shot.</li> <li>3. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>4. Equipment awareness.</li> </ol>
<b>Responsible Staff:</b>	Operator, Laborer, Teamster, Pipe-layer, Foreman
<b>Target pollutants this BMP helps to reduce:</b>	<p><b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  <b><u>Metals</u></b>  <b><u>Bacteria</u></b>  <b><u>Salinity</u></b>  <b><u>Oil and Grease</u></b></p>
<b>Receiving Waters:</b>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i>NOTE: City of Great Falls Pollutants of Concern: <b><u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**References:**

SSO general information:

<sup>1</sup> <https://www.epa.gov/npdes/sanitary-sewer-overflows-ssos>

Sewer Incident Report form (separate document)

Chain-of-command:

1. **Utilities Superintendent:** Pat Habel
  - Office Number: (406) 455-8141
  - Cell Number: (406) 781-3393
2. **Utilities Division Manager:** Jake McKenna
  - Office Number: (406) 455-8137
3. **Sector Control Technician:** Johnny Cavill
  - Office Number: (406) 455-8142
  - Cell Number: (406) 750-5861

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/20/23	Transitioned to Utility specific format & changed from SOP #44 to SOP# Uti-9 (JW); Updated chain of command

**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

	<p><b>CITY OF GREAT FALLS</b>  <b>Public Works Department</b>  <i>Utilities Division</i>  <b>Standard Operating Procedure</b></p>	SOP# UTI-10
		Revision # 001
		Effective Date: 06/20/23
		Authored By: PW-SWMT
		Approved By:
<p><b>Title: Water Main Breaks &amp; Repairs</b></p>		

<p><b>Control Measure:</b></p> <p>#1 Public Education and Outreach          #3 IDDE          #5 Post-Construction Site Storm Water Management</p>	<p>#2 Public Involvement and Participation          #4 Construction Site Storm Water Management  <u><b>#6 Pollution Prevention/Good Housekeeping</b></u></p>
---	--

<p><b>Introduction:</b></p>	<p>Water main breaks and repairs have the potential to add pollutants to the storm water system.</p>
<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<ol style="list-style-type: none"> <li>1. Install storm inlet protection prior to any earth disturbing activities (i.e., excavating, asphalt cutting).</li> <li>2. Track pads and street sweeping will reduce the transport of sediment from vehicle tracking.</li> <li>3. Remove inlet protection devices when project is complete.</li> <li>4. Sweep streets when project is complete, if sediment is present.</li> </ol>
<p><b>Administrative BMPs needed:</b></p>	<ol style="list-style-type: none"> <li>1. Utility locates performed prior to excavation.</li> <li>2. Inventory equipment needed to perform work.</li> <li>3. Install track pads and/or schedule street sweepings when vehicle tracking is present.</li> <li>4. Training on proper equipment operation/maintenance/safety procedures.</li> <li>5. Training on proper BMP installation/maintenance procedures.</li> </ol>
<p><b>Safety:</b></p>	<ol style="list-style-type: none"> <li>1. PPE (ear protection, safety glasses, hard hat, field gloves, high visibility clothing).</li> <li>2. Traffic awareness. Be aware of any vehicles entering/exiting the area.</li> <li>3. Equipment awareness.</li> <li>4. Trench safety.</li> </ol>
<p><b>Responsible Staff:</b></p>	<p>Operator, Laborer, Teamster, Pipe-layer, Foreman</p>

<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p><b><u>Total Suspended Solids (TSS)</u></b>  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  Metals  <b><u>Bacteria</u></b>  Salinity  <b><u>Oil and Grease</u></b></p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**References:**

Chain-of-command:

1. **Utilities Superintendent:** Pat Habel
  - Office Number: (406) 455-8141
  - Cell Number: (406) 781-3393
2. **Utilities Division Manager:** Jake McKenna
  - Office Number: (406) 455-8137

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/20/23	Transitioned to Utility specific format & changed from SOP #45 to SOP# Uti-10 (JW); Updated chain of command



**Supervisor signature/approval:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**SOP# WAT-1**

<p><b>Operating Best Management Practices (BMPs) needed:</b></p>	<p><b><u>Handling</u></b>          6. Clean-up/spill response equipment should be readily available. Liquids need absorbent materials; solids need shovel, dust pan, broom and/or buckets.          7. A spill response kit is stored on-site at various locations and clearly labelled and identified</p> <p><b><u>Application</u></b>          8. Follow directions provided by manufacturer or associated SOPs for tests performed</p> <p><b><u>Cleanup</u></b>          9. Empty chemical containers are perforated (or have the bottom cut off) prior to disposal to ensure they are no reused. Oily rags are disposed of daily.</p>
<p><b>Administrative BMPs needed:</b></p>	<p>1. Personnel are directed to call 911 in case of an emergency.          2. If an emergency occurs, notify personnel following the chain-of-command.          3. Safety Data Sheets (SDS) are available as per OSHA Hazard Communication Standard.</p>
<p><b>Safety:</b></p>	<p>1. Use proper PPE when working with chemicals (i.e. safety glasses, nitrile/rubber gloves, aprons, closed toed shoes)</p>
<p><b>Responsible Staff:</b></p>	<p>Technician</p>
<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p>Total Suspended Solids (TSS)  <b><u>Nutrients: Phosphorus, Nitrogen</u></b>  <b><u>Metals</u></b>  <b><u>Bacteria</u></b>  <b><u>Salinity</u></b>          Oil and Grease</p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek</p> <p><b><i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i></b></p>

**References:**

Internal References:

Safety protocol, materials inventory, chemical inventory

External References:

Montana Department of Environmental Quality (DEQ) Municipal Separate Storm Sewer System (MS4) permit

**Chain-of-command:**

1. **Water Plant Superintendent:** Shawn Hickman
  - Office Number: (406) 455-8589
2. **Water Treatment Branch Manager:** Jason Fladland
  - Office Number: (406) 455-8587

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/14/23	Transitioned to ENV standard format; Updated key personnel info (JW)
002	11/8/23	Water Treatment Branch manager approved





<b>Responsible Staff:</b>	Technician
<b>Target pollutants this BMP helps to reduce:</b>	<u>Total Suspended Solids (TSS)</u> <u>Nutrients: Phosphorus, Nitrogen</u> <u>Metals</u> <u>Bacteria</u> <u>Salinity</u> <u>Oil and Grease</u>
<b>Receiving Waters:</b>	Missouri River, Lower Sun River, Sand Coulee Creek  <i>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></i>

### References:

#### Internal References:

O&M documentation

#### External References:

- Montana Department of Environmental Quality (DEQ) Municipal Separate Storm Sewer System (MS4) permit
- Water Treatment Plant Residuals Management documents:
  - EPA guidelines:  
<https://www.epa.gov/sites/default/files/2015-11/documents/dw-treatment-residuals-mgmt-tech-report-sept-2011.pdf>
  - West Virginia University NDWC Tech brief:  
<https://www.nesc.wvu.edu/files/d/4ef3a1a4-0e7e-43b6-9339-728dd56d669b/wt-trtmnt-plant-residuals-mngmnt.pdf>

### Chain-of-command:

1. **Water Plant Superintendent:** Shawn Hickman
  - Office Number: (406) 455-8589
2. **Water Treatment Branch Manager:** Jason Fladland
  - Office Number: (406) 455-8587

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/14/23	Transitioned to ENV standard format; Updated key personnel info (JW); Updated documents
002	11/8/23	Water Treatment Branch manager approved

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---





<p><b>Target pollutants this BMP helps to reduce:</b></p>	<p>Total Suspended Solids (TSS)          Nutrients: Phosphorus, Nitrogen  <u><b>Metals</b></u>  <u><b>Bacteria</b></u>          Salinity          Oil and Grease          Chlorinated water</p>
<p><b>Receiving Waters:</b></p>	<p>Missouri River, Lower Sun River, Sand Coulee Creek   <i><b>NOTE: City of Great Falls Pollutants of Concern: <u>Phosphorus, Nitrogen, &amp; Sediment</u></b></i></p>

**References:**

Internal References:

O&M documentation

External References:

- Montana Department of Environmental Quality (DEQ) Municipal Separate Storm Sewer System (MS4) permit
- Finished Water Storage Facilities:
  - AWWA report for EPA guidelines:  
[https://www.epa.gov/sites/default/files/2015-09/documents/2007\\_05\\_18\\_disinfection\\_tcr\\_whitepaper\\_tcr\\_storage.pdf](https://www.epa.gov/sites/default/files/2015-09/documents/2007_05_18_disinfection_tcr_whitepaper_tcr_storage.pdf)  
[https://www.epa.gov/system/files/documents/2022-04/ds-toolbox-fact-sheets\\_sfi\\_final-508\\_revised.pdf](https://www.epa.gov/system/files/documents/2022-04/ds-toolbox-fact-sheets_sfi_final-508_revised.pdf)
  - West Virginia University NDWC Tech brief:  
<https://www.nesc.wvu.edu/files/d/b9af0568-fabf-42d6-b05e-e413d51ef2d9/res-towers-and-tanks.pdf>

**Chain-of-command:**

1. **Water Plant Superintendent:** Shawn Hickman
  - Office Number: (406) 455-8589
2. **Water Treatment Branch Manager:** Jason Fladland
  - Office Number: (406) 455-8587

**Revision History:**

Revision Number	Effective Date	Significant Changes
001	06/14/23	Transitioned to ENV standard format; Updated key personnel info (JW); Updated documents
002	11/8/23	Water Treatment Branch manager approved

**Signatures after training:**

Date: \_\_\_\_\_

Name (printed)

Signature

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---