EXHIBIT C To:

PRIVATE DETENTION BASIN / STORMWATER QUALITY BEST MANAGEMENT PRACTICE MAINTENANCE AGREEMENT AND EASEMENT

STANDARD OPERATION PROCEDURES

for

INSPECTION AND MAINTENANCE OF BIORETENTION SYSTEM (BR)

OWNER:

SECURITY WATER DISTRICT

GMS, Inc.
Consulting Engineers

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INSPECTION AND MAINTENANCE OF BIORETENTION SYSTEM (BR)

PROJECT NO. 2023-053.130

MAY 2026

OWNER:

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1. INTRODUCTION

This plan addresses operation and maintenance of the bioretention system constructed as part of the Security Water District Water Treatment Plant (WTP) Building Addition project located north of the Bradley Road and Lincoln Plaza Drive intersection in El Paso County, Colorado (EPC Project No. PPR262). The bioretention stormwater management system is located on the District's property presently assigned El Paso County Assessor's parcel number 65020-000-138.

The Security Water District WTP site consists of approximately 1.7 acres and is located within the District's larger 70-acre ownership. The bioretention pond was designed to provide Water Quality Capture Volume (WQCV) treatment for runoff generated from within the secured WTP site, including building expansion and associated site paving improvements. The facility functions as a runoff reduction post-construction measure intended to improve stormwater quality through temporary storage, filtration, infiltration, and controlled underdrain discharge. All runoff is directed towards the District's larger property where it will be retained.

2. BACKGROUND

The State of Colorado Department of Public Health and Environment, Water Quality Control Division (CDPHE), has implemented federal regulations within the State of Colorado through permitting, and has included El Paso County as one of numerous Municipal Separate Storm Sewer Systems (MS4s) required to be permitted in compliance with National Pollutant Discharge Elimination System (NPDES) Phase 2 Regulations, as defined within Colorado's Phase 2 Municipal Guidance.

NPDES Phase 2 MS4s stormwater discharges are covered under a general permit under the Colorado Discharge Permit System (CDPS) under Regulation 61, and as a minimum require the MS4's operator (e.g., El Paso County) to develop, implement, and enforce a stormwater management program to reduce the discharge of pollutants to the maximum extent practicable to protect water quality in compliance with the Colorado Water Quality Control Act, Colorado Code of Regulations [CCR] 61.8(11)(a)(i)).

This Stormwater Facilities Operation and Maintenance Plan (O&M Plan) is for the bioretention system constructed as part of the water treatment plant improvement project referenced above. The bioretention pond was designed in accordance with El Paso County drainage criteria and applicable Mile High Flood District Urban Storm Drainage Criteria Manual guidance. The facility improves stormwater quality through temporary storage, filtration through engineered media, biological uptake by native vegetation, and controlled underdrain discharge.

3. ASSOCIATED AGREEMENTS

Operation and maintenance of the bioretention pond is governed by the Private Detention Basin / Stormwater Quality Best Management Practice Maintenance Agreement and Easement executed between El Paso County, Colorado, by and through the Board of County Commissioners, and Security Water District. This agreement establishes the District's ongoing responsibility to inspect, operate, maintain, repair, and, when necessary, reconstruct the stormwater quality best management practice in accordance with this Operation and Maintenance Manual, all at the District's sole cost and expense.

The agreement further establishes a perpetual non-exclusive easement granting El Paso County the right to access and inspect the facility and, if deficiencies are not corrected by the District within the time specified by County notice, to perform necessary maintenance or repairs and recover associated costs from the District. The obligations set forth in the agreement constitute covenants running with the land and are binding upon the District and its successors and assigns. The agreement also requires the District to indemnify and hold harmless El Paso County from claims, damages, or liabilities arising from the construction, operation, inspection, maintenance, or repair of the bioretention facility.

4. FUNDING FOR AND ORGANIZIATION OF FACILITY OPERATION AND MAINTENANCE

Security Water District will be responsible for the operations and maintenance of the bioretention system upon acceptance of the facilities from the constructor.

5. SITE AND FACILITIES DESCRIPTION

5.1. Pond Location

The bioretention pond is located just outside the WTP fenced site, which is located on the southeast portion of the District's larger 70-acre property. The facility is situated near the southwest extent of the secured WTP site and is positioned to receive runoff generated from the newly constructed building addition, asphalt paving improvements, and adjacent drainage swales.

5.2. Site Access

Access to the bioretention facility is provided via a gravel road next to the WTP entrance from Lincoln Plaza Drive. The facility is located within the stormwater drainage tract and is subject to the drainage and maintenance easements established under the recorded Private Detention Basin / Stormwater Quality Best Management Practice Maintenance Agreement and Easement. Facility design is documented within the approved drainage report, grading and drainage plans, and associated construction drawings for the Security Water District Water Treatment Plant Building Addition project.

5.3. Emergency Spillway

An overflow spillway is provided as the primary emergency overflow control feature for the bioretention facility. The spillway is located along the northwest berm of the facility and is designed to safely convey flows that exceed the WQCV and exceed the capacity of the underdrain system. During larger storm events, runoff that exceeds the storage and infiltration capacity of the bioretention media is directed to the overflow spillway, where it is safely conveyed in a controlled manner into the site's downstream swale system.

The spillway functions as a bypass structure to prevent overtopping and erosion of the bioretention basin during high-intensity rainfall events. Overflow discharge is routed from the spillway into the adjacent vegetated swales. Runoff remaining as surface flow flows westerly across the District's ownership. The runoff that is not infiltrated will be

retained on the District's property with regard to current topographic conditions. The spillway is designed to remain stable under 100-year storm conditions and provides a protected, non-erosive flow path to prevent damage to the bioretention media, underdrain system, and surrounding grading improvements. Routine inspection shall include checking for sediment accumulation, erosion at the spillway entrance and exit points, and any displacement or deterioration of erosion control materials.

A seepage cutoff wall constructed of concrete is incorporated at the emergency spillway to enhance structural stability and reduce the potential for subsurface erosion or piping beneath the spillway section. This feature functions to maintain the integrity of the spillway invert by limiting seepage flow paths through or under the structure, thereby reducing the risk of undermining during prolonged or high-volume overflow events. On the downstream side of the spillway, a riprap apron is provided to dissipate energy and prevent erosion by reducing flow velocities and protecting the receiving swale and adjacent soils from scour during overflow events.

5.4. Stormwater Infrastructure Components

The proposed drainage system includes a series of vegetated swales designed to collect and convey runoff from the secured WTP site to the bioretention pond. These swales receive runoff from the proposed asphalt drives, the expanded WTP building and adjacent disturbed areas and route flows to the stormwater quality facility for treatment. The swales were designed in accordance with El Paso County and Mile High Flood District (MHFD) criteria utilizing Manning's equation, with grass-lined channels generally designed at a minimum longitudinal slope of 0.5 percent and side slopes generally not exceeding 4:1 except where approved by variance due to site constraints. The swale network also includes a concrete cross-pan overflow section located along the east pond to safely convey overflow runoff during events exceeding water quality storage capacity.

The site drainage system incorporates two existing corrugated steel pipe (CSP) culverts that convey runoff beneath internal access drives within the secured WTP site. The smaller culvert consists of an existing 12-inch CSP approximately 30 feet in length with a longitudinal slope of approximately 2.0 percent. This culvert will be extended approximately 10 feet as part of the proposed improvements to accommodate revised pavement grading and discharge at the inlet of the site's second culvert. This culvert

consists of an existing 18-inch CSP approximately 50 feet in length with a longitudinal slope of approximately 1.1 percent. This 18-inch culvert discharges into the newly developed bioretention pond.

At the discharge of the existing 18-inch culvert and the site's westerly grass swale, rock riprap energy dissipation has been provided to reduce outlet velocities and prevent erosion of downstream soils. A forebay is provided using Type M riprap with a D50 of approximately 6 inches, sized in accordance with El Paso County Engineering Criteria Manual and Mile High Flood District guidance for inlet protection and channel stabilization. The riprap is placed to create a stable, non-erodible transition zone that reduces scour potential and promotes deposition of suspended solids prior to entry into the treatment area. Routine inspection of this riprap protection is required to identify displacement, settlement, sediment accumulation, or evidence of erosion, and maintenance shall include replacement or regrading of riprap as necessary to preserve hydraulic performance and downstream stability.

All the swales and culverts convey runoff into the newly developed bioretention pond. The facility consists of approximately 18 inches of engineered bioretention media underlain by 6 inches of filter sand, a No. 8 aggregate drainage layer, and a 4-inch factory slotted underdrain pipe installed at 0.5 percent slope. The bioretention surface will be vegetated with native, drought-tolerant grasses and plant species selected to promote infiltration, pollutant removal, and long-term stabilization of the media surface. These plantings will be established to provide soil reinforcement, reduce erosion, and enhance overall treatment performance of the facility. The underdrain system includes a 3/4-inch orifice at the daylight discharge to maintain adequate residence time in the bioretention pond. A cleanout assembly at the upstream end of the pond will facilitate inspection and maintenance flushing. Discharge from the underdrain is conveyed to the downstream site drainage system and remains entirely within Security Water District property.

The bioretention facility is designed solely as a WQCV treatment control measure and is not intended to provide extended detention for peak rate attenuation beyond water quality storm events. Based on the approved drainage analysis, the proposed site improvements do not increase off-site peak runoff rates or adversely impact downstream drainage conditions. As a result, an outlet structure designed to replicate historic

discharge rates for larger storm events is not required for flood control purposes. Instead, the facility is sized to fully capture and treat the required WQCV, with stormwater quality flows discharged through the underdrain system at a controlled rate consistent with MHFD and El Paso County criteria. Storm events that exceed the WQCV storage capacity are safely conveyed through the emergency overflow spillway and into the downstream vegetated swale network. These swales are designed to route excess runoff across the secured District property and ultimately to the existing downstream system located entirely within the District's larger 70-acre parcel.

6. BIORETETENTION (BR) SYSTEM DESCRIPTION

The subsections below describe general BR system operations and maintenance.

6.1. GENERAL BIORETENTION SYSTEM CONCEPT

Bioretention facilities are a common permanent stormwater control measure utilized within the Front Range of Colorado. A bioretention facility is a shallow, vegetated filtration and infiltration system designed to capture the required WQCV, temporarily store runoff, and treat stormwater through filtration media, biological uptake, and controlled underdrain discharge. Unlike extended detention basins, bioretention facilities are not designed for extended surface ponding or flood detention; instead, they are designed to drain the WQCV within approximately 12 to 40 hours through a combination of infiltration and underdrain release, depending on soil conditions and design parameters.

The system is considered "drained" between storm events, with no intended permanent pool. The primary treatment process occurs through engineered bioretention media underlain by filter sand, aggregate layers, and a perforated underdrain system. Excess runoff from storm events exceeding the WQCV is safely conveyed via a stabilized emergency overflow spillway and downstream swale network.

The bioretention facility shall meet the following performance criteria to ensure proper function and compliance with El Paso County and MHFD requirements:

- The WQCV shall fully drain within 12 to 40 hours following a storm event.
- The facility is designed to achieve a drawdown time of approximately 13 hours.

- Standing water exceeding 40 hours shall be considered a maintenance concern and trigger inspection of the media and underdrain system.
- The system shall maintain positive drainage between storm events with no permanent pool.

6.2. INSPECTING BIORETENTION SYSTEMS

6.2.1. Access and Easements

Inspection and maintenance personnel may utilize the recorded drainage easements and access agreements, including the Private Detention Basin / Stormwater Quality Best Management Practice Maintenance Agreement and Easement, to access the bioretention facility. Access is typically provided via secured internal drives within the District's property.

6.2.2. Facility Location

Inspection and maintenance personnel shall refer to the attached stormwater facility map located in the back of this manual for the location of the BR system within this development.

6.2.3. Bioretention System Features

Bioretention facilities include several interconnected components that function together to achieve water quality treatment and controlled discharge. The performance of the system depends on proper function of all elements, including inflow distribution, filtration media, underdrain systems, and overflow conveyance features.

Therefore, it is critical that each feature of the BR is properly inspected and maintained to ensure long-term functionality and performance. Below is a list and description of the most common features within the BR and the corresponding maintenance inspection items that can be anticipated:

TABLE BR-1

TYPICAL INSPECTION & MAINTENANCE REQUIREMENTS MATRIX

Bioretention System Features	Sediment Removal	Mowing / Weed Control	Trash & Debris Removal	Erosion Repair	Vegetation Management	Standing Water / Drainage Issues	Structure / System Repair
Inflow Points (swale / outfall)	X	X	X	X	X		X
Forebays (riprap)	X		X	X	X		X
Bioretention Surface (Media)	X	X	X	X	X	X	
Underdrain System	X		X			X	X
Overflow Spillway			X	X	X		X
Downstream Swales	X	X	X	X			X
Site Grading / Berms		X		X	X		X

6.2.3.1 Inflow Points (Swales / Culvert Outfall)

Inflow swales convey runoff from impervious surfaces into the bioretention facility. These areas must maintain stable grades and vegetative cover to ensure uniform sheet flow distribution. Routine inspection shall identify erosion, sediment deposition, and obstructions that may cause bypassing of the treatment area. Any concentrated flow erosion shall be immediately stabilized to prevent further degradation of the inflow system. Typical maintenance considerations include:

- Erosion at inflow transitions: Repair and stabilize areas where concentrated flow causes erosion or channelization.
- Sediment accumulation: Remove sediment buildup that may reduce inflow capacity or cause bypassing of the treatment area.
- Vegetation management: Maintain dense vegetative cover to promote uniform flow distribution and pollutant filtration.
- Blockages/debris: Remove debris that may obstruct flow entering the facility.

6.2.3.2 Forebay / Inflow Energy Dissipation Area

A forebay or energy dissipation zone is provided at the primary inflow points to the bioretention facility to reduce incoming flow velocities, dissipate energy, and capture coarse sediment prior to entry into the bioretention media. Energy dissipation will be achieved using Type M riprap with a d_{50} of 6-inches. This area functions as the first stage of treatment and is critical to protecting downstream infiltration capacity and maintaining long-term performance of the bioretention system. Sediment removal within the forebay shall be performed when sediment accumulation reaches approximately 50 percent of the available storage depth, or when sediment begins to migrate into the downstream bioretention media area.

Typical maintenance considerations include:

- Sediment accumulation: Sediment deposition within the forebay is expected and shall be removed regularly to maintain storage volume and prevent migration into the bioretention media.
- Riprap displacement: Type M riprap may shift due to repeated hydraulic loading. Any displacement, settlement, or exposure of underlying subgrade shall be corrected to maintain full energy dissipation performance.
- Erosion at transition zones: Erosion occurring adjacent to or beneath riprap indicates loss of hydraulic stability and shall be repaired immediately using properly graded riprap and geotextile where applicable.
- Debris accumulation: Trash or organic debris shall be removed to prevent blockage and localized ponding.
- Vegetation encroachment: Woody vegetation shall be controlled to prevent disruption of flow patterns and loss of hydraulic capacity.

6.2.3.3 Bioretention Surface and Filter Media Area

The bioretention surface provides primary stormwater treatment through filtration, adsorption, and biological uptake. The system relies on healthy vegetative cover and uncompacted, well-draining engineered media. Inspection shall focus on sediment accumulation, surface sealing, vegetation health, and evidence of reduced infiltration. Standing water exceeding the design drawdown period shall trigger investigation of media clogging or underdrain restriction. Typical maintenance considerations include:

- Sediment accumulation: Remove excess sediment that reduces infiltration capacity.
- Surface sealing or crusting: Scarify or replace upper media if infiltration is reduced.
- Vegetation health: Maintain healthy native vegetation to support evapotranspiration and pollutant uptake.
- Animal burrows or voids: Inspect and repair any subsurface disturbance that compromises media performance. Consult EPC Environmental Division if this becomes an issue.
- Standing water exceeding design drawdown time: Investigate underdrain or media clogging if prolonged ponding occurs beyond design intent.

The engineered bioretention media is critical to system performance and shall be monitored regularly. Media rehabilitation or replacement may be required under the following conditions:

- Standing water persists longer than 48 hours on a consistent basis
- Surface sealing, crusting, or reduced infiltration is observed
- Sediment accumulation exceeds approximately 2 to 3 inches
- Vegetation decline attributable to poor soil/media conditions

Maintenance activities may include removal of sediment, scarification of the surface layer, or partial/full replacement of media to restore proper function.

6.2.3.4 Underdrain System (Outlet Works Equivalent)

The underdrain system conveys treated stormwater from the bioretention media to the downstream drainage network at a controlled rate. Inspection shall include verification of positive drainage, cleanout accessibility, and absence of sediment blockage. Reduced discharge, prolonged ponding, or backup conditions indicate potential clogging and shall require flushing or mechanical cleaning of the underdrain system. An upstream cleanout will be provided for inspection and flushing. Typical maintenance considerations include:

- Clogging of perforations or cleanouts: Flush underdrain system as needed to restore flow capacity.
- Sediment intrusion: Investigate filter media migration into underdrain if flow is reduced.
- Structural damage: Repair cracked or collapsed piping or damaged cleanout assemblies.
- Reduced discharge performance: Verify that drawdown time remains within the design range of 12 to 40 hours in accordance with MHFD WQCV criteria

6.2.3.5 Emergency Overflow Spillway

The emergency overflow spillway provides a safe conveyance path for storm events exceeding the Water Quality Capture Volume. The spillway is typically constructed as a stabilized concrete or armored flow path designed to prevent erosion and protect the integrity of the bioretention system. The spillway shall remain clear of obstructions and maintain stable erosion protection at all times.

Overflow from the spillway is conveyed to downstream vegetated swales for infiltration and ultimately to the District's downstream 70-acre property, where flows are safely routed to the existing infiltration/detention system. Typical maintenance considerations include:

- Erosion or scour at spillway entrance/exit: Repair and stabilize as needed.
- Displacement of riprap or hard armor protection: Replace or reset displaced materials.
- Obstruction by debris or sediment: Remove material to maintain full conveyance capacity.
- Vegetation encroachment: Maintain clear flow path to preserve hydraulic capacity.
- Seepage cutoff wall integrity: Inspect for evidence of settlement, or void formation. Repair immediately to maintain structural stability and prevent loss of foundation support.

6.2.3.6 Swale Conveyance System (Downstream Routing)

Downstream swales convey overflow and treated discharge from the bioretention facility to the larger site infiltration and drainage system. These swales are designed as vegetated channels providing both conveyance and secondary water quality treatment. Typical maintenance considerations include:

- Sediment buildup reducing conveyance capacity
- Erosion in concentrated flow areas
- Overgrown vegetation reducing hydraulic capacity
- Blockages preventing positive drainage to downstream systems

6.2.3.7 Site Grading

Site grading and berms define the hydraulic boundaries of the bioretention facility and control overland flow routing into and around the

treatment area. These features are essential for maintaining design ponding limits, ensuring positive drainage toward the facility, and preventing uncontrolled bypass of untreated runoff.

Berms are typically constructed of compacted soil and are vegetated to provide long-term erosion resistance and stabilization. Proper grading ensures that runoff is directed into designated inflow swales and that overflow is conveyed only through the designed spillway and downstream swale system. Typical maintenance considerations include:

- Erosion of berm slopes: Repair any rills, gullies, or slope failures to maintain structural integrity and prevent breaching.
- Settlement or differential grading: Regrade low areas that may cause unintended ponding or flow concentration.
- Vegetation loss or thinning: Re-establish native vegetation to maintain erosion resistance and hydraulic stability.
- Animal burrows or voids: Inspect and repair any subsurface disturbance that could compromise berm integrity. Consult EPC Environmental Division if this becomes an issue.
- Encroachment or grading modifications: Ensure no unauthorized grading, landscaping, or construction alters approved flow paths or reduces designed storage, ponding and infiltration areas.

6.2.3.8 Vegetation

Healthy vegetation is essential to the performance of the bioretention facility. During the initial establishment period (typically the first two growing seasons):

- Temporary irrigation shall be provided until vegetation is fully established
- A minimum of 70 percent vegetative cover shall be achieved

- Bare or dead areas shall be reseeded or replanted with healthy sod or root bunches promptly
- Noxious weeds and invasive species shall be removed and controlled

Long-term vegetation management shall maintain dense cover to promote filtration, reduce erosion, and enhance pollutant removal.

6.2.3.9 Miscellaneous

There are a variety of inspection/maintenance issues that may not be attributed to a single feature within the BR. This category on the inspection form is for maintenance items that are commonly found in the BR but may not be attributed to an individual feature. Additional considerations include:

- Illicit Discharges: If evidence of contamination is observed:
  - Identify and isolate the source of the discharge if possible
  - Notify El Paso County Stormwater staff
  - Remove and properly dispose of contaminated soils or media as directed
  - Restore affected areas to maintain system performance
- Graffiti/Vandalism: Damage to the BR infrastructure can be caused by vandals. If criminal mischief is evident, the inspector should forward this information to the local Sheriff's Office.
- Public Hazards: Public hazards include items such as vertical drops of greater than 4-feet, containers of unknown/suspicious substances, exposed metal/jagged concrete on structures. If any hazard is found within the facility area that poses an immediate threat to public safety, contact the Sheriff at 911 immediately.

7. MAINTAINING BIORETENTION (BR) SYSTEMS

7.1. Maintenance Personnel

Maintenance personnel must be qualified to properly maintain BR systems. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

7.2. Equipment

It is imperative that the appropriate equipment and tools are taken to the field with the operations crew. The types of equipment/tools will vary depending on the task at hand. Below is a list of tools, equipment, and material(s) that may be necessary to perform maintenance on an BR:

- Loppers/Tree Trimming Tools
- Mowing Tractors
- Trimmers (extra string)
- Shovels
- Rakes
- All Surface Vehicle (ASVs)
- Skid Steer
- Backhoe
- Track Hoe/Long Reach Excavator
- Dump Truck
- Jet-Vac Machine
- Engineer's Level (laser)
- Riprap (Minimum - Type M)
- Geotextile
- Erosion Control Blanket(s)
- Seed Mix (Native)
- Illicit Discharge Cleanup Kits
- Trash Bags

- Tools (wrenches, screw drivers, hammers, etc.)
- Chain Saw
- Approved Stormwater Facility Operation and Maintenance Manual

Some of the items identified above may not be needed for every maintenance operation; however, this equipment should be available to the maintenance operations crews should the need arise.

7.3. Safety

Vertical drops may be encountered in areas located within and around the facility. Avoid walking on top of retaining walls or other structures that have a significant vertical drop.

7.4. Winter Operations

Winter conditions may affect the function of the bioretention system. Maintenance considerations include:

- Avoid installing anti-skid aggregate on surfaces upstream to prevent sediment clogging
- Inspect underdrain outlets for ice blockage
- Monitor for snowmelt-related sediment transport
- Perform spring inspections to remove accumulated debris and sediment

Freeze-thaw cycles may also impact vegetation and slopes and shall be evaluated during routine inspections.

7.5. Maintenance Categories and Activities

A typical BR Maintenance Program will consist of three broad categories of work: routine, minor, and major maintenance activities. Within each category of work, a variety of maintenance activities can be performed on a BR. A maintenance activity can be specific to each feature within the BR, or general to the overall facility. The maintenance activities range in magnitude from routine trash pickup to the

reconstruction of drainage infrastructure. The following three sub-sections explain each of the categories and briefly describes the typical maintenance activities for a BR system, including the objectives and frequency of actions.

7.6. Routine Maintenance Activities

The majority of this work consists of regularly scheduled mowing and trash and debris pickups for stormwater management facilities during the growing season. This includes items such as the removal of debris/material that may be clogging the culverts, underdrains, weed control, etc. These activities will normally be performed numerous times during the year. These items can be completed without any prior correspondence with the EPC Stormwater; however, completed inspection and maintenance forms shall be retained for each inspection and maintenance activity.

The Maintenance Activities are summarized below, and further described in the following sub-sections.

TABLE BR-2
SUMMARY OF ROUTINE MAINTENANCE ACTIVITIES

MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR	MAINTENANCE ACTION
Mowing	Twice annually	Excessive grass height/aesthetics	Mow grass to a height of 4” to 6”
Trash/Debris Removal	Twice annually	Trash & debris in BR	Remove and dispose of trash and debris
Outlet Works Cleaning	As needed – after significant rain events – twice annually at a minimum	Clogged culverts and underdrains ponding water	Remove and dispose of debris/trash/sediment to allow outlet to function properly
Weed control	Minimum twice annually	Noxious weeds; Unwanted vegetation	Treat w/ herbicide or hand pull; Consult the local weed specialist

7.6.1. Mowing

Occasional mowing is necessary to limit unwanted vegetation and to improve the overall appearance of the BR. Native vegetation should be mowed to a height of 4-to-6 inches tall. Grass clippings should be collected and disposed of properly.

Frequency: Minimum of twice annually or depending on aesthetics

7.6.2. Trash / Debris Removal

Trash and debris must be removed from the entire BR area to minimize outlet clogging and to improve aesthetics. This activity must be performed prior to mowing operations.

Frequency: Minimum of twice annually or depending on aesthetics

7.6.3. Outlet Works Cleaning

Debris and other materials can clog culverts, underdrain slots, and the orifice plate. This activity must be performed anytime other maintenance activities are conducted to ensure proper operation.

Frequency: After significant rainfall event or concurrently with other maintenance activities.

7.6.4. Weed Control

Noxious weeds and other unwanted vegetation must be treated as needed throughout the BR. This activity can be performed either through mechanical means (mowing/pulling) or with herbicide. Consultation with the EPC Environmental Division at 719-520-7878 is highly recommended prior to the use of herbicide.

Frequency: As needed based on inspections.

7.7. Minor Maintenance Activities

This work consists of a variety of isolated or small-scale maintenance or operational activities. Most of this work can be completed by a small crew, tools, and small equipment. These items may require prior correspondence with EPC Stormwater and require completed inspection and maintenance forms to be submitted to EPC upon request for each inspection and maintenance activity.

TABLE BR-3
SUMMARY OF MINOR MAINTENANCE ACTIVITIES

MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR	MAINTENANCE ACTION
Sediment Removal	As needed; typically every 1–2 years	Sediment build-up; decrease in pond volume	Remove and dispose of sediment
Erosion Repair	As needed, based upon inspection	Rills/gullies forming on side slopes, trickle channel, other areas	Repair eroded areas Revegetate; address source of erosion
Vegetation Removal/Tree Thinning	As needed, based upon inspection	Large trees/wood vegetation in lower stage of pond	Remove vegetation; restore grade and surface
Drain Cleaning/Jet Vac	As needed, based upon inspection	Sediment build-up/ non draining system	Clean drains; Jet Vac if needed

7.7.1. Sediment Removal

Sediment removal is necessary to maintain the original design volume of the BR and to ensure proper function of the infrastructure. Regular sediment removal (minor) from the forebay, inflow(s), and underdrain can significantly reduce the frequency of major sediment removal activities (dredging). The minor sediment removal activities can typically be addressed with shovels and smaller equipment. Major sediment removal activities will require larger and more specialized equipment. The major sediment activities will also require surveying with an engineer's level, and consultation with EPC Stormwater Staff to ensure design volumes/grades are maintained.

Stormwater sediments removed from BRs do not meet the criteria of, “hazardous waste”; however, these sediments are contaminated with a wide array of organic and inorganic pollutants and handling must be done with care. Sediments from permanent pools must be carefully removed to minimize turbidity, further sedimentation, or other adverse water quality impacts. Sediments should be transported by motor vehicle only after they are dewatered. All sediments must be taken to a landfill for proper disposal. Prompt and thorough cleanup is important should a spill occur during transportation.

Frequency: As necessary based upon inspections. Sediment removal in the forebay and underdrain may be necessary as frequently as every 1 to 2 years.

7.7.2. Erosion Repair

The repair of eroded areas is necessary to ensure the proper function of the BR, minimize sediment transport, and to reduce potential impacts to other features. Erosion can vary in magnitude from minor repairs to energy dissipaters, and drilling to major gullies in the embankments and spillways. The repair of eroded areas may require the use of excavators, earthmoving equipment, riprap, concrete, erosion control blankets, and turf reinforcement mats. Major erosion repair to the pond embankments, spillways, and adjacent to structures will require consultation with EPC Stormwater Staff.

Stormwater sediments removed from BRs do not meet the criteria of “hazardous waste”; however, these sediments are contaminated with a wide array of organic and inorganic pollutants and handling must be done with care. Sediments from permanent pools must be carefully removed to minimize turbidity, further sedimentation, or other adverse water quality impacts. Sediments should be transported by motor vehicle only after they are dewatered. All sediments must be taken to a landfill for proper disposal. Prompt and thorough cleanup is important should a spill occur during transportation.

Frequency: As necessary based upon inspections.

7.7.3. Vegetation Removal/Tree Thinning

Dense stands of woody vegetation (willows, shrubs, etc) or trees can create maintenance problems for the infrastructure within a BR system. Tree roots can damage structures and invade pipes/channels thereby blocking flows. A small tree is easier to remove than a large tree; therefore, regular removal/thinning is preferred. All trees and woody vegetation that is growing in the bottom of the BR system or near structures (inflows, underdrains, emergency spillways, etc) should be removed. Any trees or woody vegetation in the BR should be limited to the upper portions of the pond banks.

Frequency: As necessary based upon inspections.

7.7.4. Clearing Drains/Jet-Vac

A BR system contains many structures, openings, and pipes that can be frequently clogged with debris. These blockages can result in a decrease of hydraulic capacity and create standing water on top of the media. Often the blockage to this infrastructure can be difficult to access and/or clean. Specialized equipment (jet-vac machines) may be necessary to clear debris from these difficult areas.

Frequency: As necessary based upon inspections.

7.8. Major Maintenance Activities

This work consists of larger maintenance/operational problems and failures within the stormwater management facilities. All of this work requires consultation with EPC Stormwater Staff to ensure the proper maintenance is performed. This work requires that the staff review the original design and construction drawings to assess the situation and assign the necessary maintenance. An ESQCP permit may be required for major maintenance activities. This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants

TABLE BR-4

SUMMARY OF MAJOR MAINTENANCE ACTIVITIES

MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR	MAINTENANCE ACTION
Major Sediment Removal	As needed – based upon scheduled inspections	Large quantities of sediment; reduced pond capacity	Remove and dispose of sediment. Repair vegetation as needed
Major Erosion Repair	As needed – based upon scheduled inspections	Severe erosion including gullies, excessive soil displacement, areas of settlement, holes	Repair erosion – find cause of problem and address to avoid future erosion
Structural Repair	As needed – based upon scheduled inspections	Deterioration and/or damage to structural components – broken concrete, damaged pipes, outlet works	Structural repair to restore the structure to its original design

7.8.1. Major Sediment Removal

Major sediment removal consists of removal of large quantities of sediment or removal of sediment from vegetated areas. Care shall be given when removing large quantities of sediment and sediment deposited in vegetated areas. Large quantities of sediment need to be carefully removed, transported, and disposed of. Vegetated areas need special care to ensure design volumes and grades are preserved.

Frequency: Repair as needed based upon inspections.

7.8.2. Major Erosion Repair

Major erosion repair consists of filling and revegetating areas of severe erosion. Determining the cause of the erosion as well as correcting the condition that caused the erosion should also be part of the erosion repair. Care should be given to ensure design grades and volumes are preserved.

Frequency: Repair as needed based upon inspections.

7.8.3. Structural Repair

A BR system includes a variety of structures that can deteriorate or be damaged during the course of routine maintenance. Some structures are constructed of concrete that can degrade or be damaged and may need to be repaired or re-constructed from time to time.

These structures include items like outlet works (underdrains), spillway, forebays, inflows, and other features. In-house operations staff can perform some of the minor structural repairs. Major repairs to structures may require input from a structural engineer and specialized contractors. Consultation with EPC Stormwater Staff should take place prior to all structural repairs.

Frequency: Repair as needed based upon inspections.

Reference:
This Manual is adapted from the El Paso County, Colorado, Standard Operating Procedure for Inspection and Maintenance of Extended Detention Basins (EDB) revised in April 2021.