BMP Inspection and Maintenance Plan

(IM Plan)

for

Meridian Service Metropolitan District Detention Ponds/BMPs

EL PASO COUNTY, COLORADO

Prepared For:

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I. Compliance with Stormwater Best Management Practices Maintenance Requirements

All property owners are responsible for ensuring that stormwater control measures (CM's) or facilities installed on their property are properly maintained and that they function as designed. In some cases, this maintenance responsibility may be assigned to others through special agreements. The maintenance responsibility for stormwater facilities has been designated to the Meridian Service Metropolitan District (District) on the various subdivision plats. Property owners and the District should be aware of their responsibilities regarding stormwater facility maintenance and need to be familiar with the contents of this BMP Inspection and Maintenance Plan (IM Plan).

II. Inspection & Maintenance - Reporting

Requirements for the inspection and maintenance of stormwater facilities, as well as reporting requirements are included in BMP IM Plan.

Verification that the stormwater CM's have been properly inspected and maintained are to be by the submittal of the required Inspection and Maintenance Forms shall be provided to El Paso County upon request in writing. The reporting form(s) shall be provided to the County sixty (60) days of receipt of the written request.

Copies of the Inspection and Maintenance forms are located in Appendixes C & D. Each form shall be reviewed and submitted by the District to the County upon written request.

III. Preventative Measures to Reduce Maintenance Costs

The most effective way to maintain your water quality facility is to prevent the pollutants from entering the facility. Common pollutants include sediment, trash & debris, chemicals, pet wastes, runoff from stored materials, illicit discharges into the storm drainage system and many others. A thoughtful maintenance program will include measures to address these potential contaminants and will save money and time in the long run. Key points to consider in your maintenance program include:

- Educate property owners/residents to be aware of how their actions affect water quality and how they can help reduce maintenance costs.
- Keep properties, streets and gutters, and parking lots free of trash, debris, and lawn clippings.
- Ensure the proper use, storage, and disposal of hazardous wastes and chemicals. Promptly clean up and spilled materials and dispose of properly.
- Plan lawn care to minimize and properly use chemicals and pesticides.
- Sweep paved surfaces and put the sweepings back on the lawn.
- Be aware of automobiles leaking fluids. Use absorbents such as cat litter to soak up drippings - dispose of properly.
- Encourage pet owners to clean up pet wastes.
- Re-vegetate disturbed and bare areas to maintain vegetative stabilization.
- Clean any private storm drainage system components, including inlets, storm sewers, and outfalls.
- Do not store materials outdoors (including landscaping materials) unless properly protected from runoff.

IV. Access and Right to Enter

All stormwater management facilities located within Meridian Ranch shall have both a designated access location and the County has the right to enter for the purpose of inspecting and for maintaining CM's where the owner has failed to do so.

V. Safety

Keep safety considerations at the forefront of inspection procedures at all times. Likely hazards should be anticipated and avoided. Never enter a confined space (outlet structure, manhole, etc.) without proper training, number of personnel, and equipment.

Potentially dangerous substances (e.g., fuel, chemicals, hazardous materials) found in the areas must be referred to emergency services at 911 (non-emergency number for the County Sheriff's Department is 719.520.7100). If a toxic or flammable substance is discovered, leave the immediate area and contact the local emergency services at 911.

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. If a vertical drop is greater than 48" in height, make the appropriate note/comment on the maintenance inspection form.
If any hazard is found within the facility area that poses an immediate threat to public safety, contact emergency services at 911 immediately.

VI. Field Inspection Equipment

It is imperative that the appropriate equipment is taken to the field with the inspector(s). This is to ensure the safety of the inspector and allow the inspections to be performed as efficiently as possible. Below is a list of the equipment that may be necessary to perform the inspections of all stormwater CM's:

- Protective clothing and boots
- Safety equipment (vest, hard hat, confined space entry equipment [if certified to perform confined space entry])
- Communication equipment
- IM Plan for the site
- Clipboard
- Stormwater CM Inspection Form (See Appendix C)
- Manhole Lid Remover
- Shovel

Some of the items identified above need not be carried by the inspector (manhole lid remover, shovel, and confined space entry equipment), but should be available in the vehicle driven to the site. Specialized equipment may require specific training related to that equipment and should only be used by trained individuals.

VII. Inspecting Stormwater CM's

The quality of stormwater entering the waters of the state relies heavily on the proper operation and maintenance of permanent CM's. Stormwater CM's must be periodically inspected to ensure that they function as designed. The inspection will determine the appropriate maintenance that is required for the facility.

A. Inspection Procedures

All Stormwater CM's are required to be inspected a minimum of once per year. Inspections should follow the inspection guidance found in the SOP for the specific type of facility. (Appendix B of this manual).

B. Inspection Report

The person(s) conducting the inspection activities shall complete the appropriate inspection report for the specific facility. An Inspection Report is located in Appendix C. A copy of each inspection form shall be kept by the owner a minimum of 5 years.
The following information explains how to fill out the Inspection Forms:

General Information

This section identifies the facility location, person conducting the inspection, the date and time the facility was inspected, and approximate days since the last rainfall. Property classification is identified as single-family residential, multi-family residential, commercial, or other.

The reason for the inspection is also identified on the form depending on the nature of the inspection. All facilities must be inspected on an annual basis at a minimum. In addition, all facilities should be inspected after a significant precipitation event to ensure the facility is draining appropriately and to identify any damage that occurred as a result of the increased runoff.

Inspection Scoring

For each inspection item, a score must be given to identify the urgency of required maintenance. The scoring is as follows:

- 0= No deficiencies identified
- 1 = Monitor -Although maintenance may not be required at this time, a potential problem exists that will most likely need to be addressed in the future. This can include items like minor erosion, concrete cracks/spalling, or minor sediment accumulation. This item should be revisited at the next inspection
- 2 = Routine Maintenance Required -Some inspection items can be addressed through the routine maintenance program. This can include items like vegetation management or debris/trash removal
- 3 = Immediate Repair Necessary -This item needs immediate attention because failure is imminent or has already occurred. This could include items such as structural failure of a feature (outlet works, forebay, etc), significant erosion, or significant sediment accumulation. This score should be given to an item that can significantly affect the function of the facility.
- N/A = This is checked by an item that may not exist in a facility. Not all facilities have all of the features identified on the form (forebay, micro-pool, etc.).

Inspection Summary/Additional Comments

Additional explanations to inspection items, and observations about the facility not covered by the form, are recorded in this section.

Overall Facility Rating

An overall rating must be given for each facility inspected. The overall facility rating should correspond with the highest score (0, 1, 2, 3) given to any single feature on the inspection form.

C. Verification of Inspection and Form Submittal

The Stormwater CM Inspection Form provides a record of inspection of the facility. An Inspection Form is provided in Appendix C. Verification of the inspection of the stormwater facilities and the facility inspection form(s) shall be provided to the County when requested. The verification and the inspection form(s) shall be reviewed and submitted by the District.

Refer to Section II of this Manual regarding reporting of inspections.

VIII. Maintaining Stormwater CM's

Stormwater CM's must be properly maintained to ensure that they operate correctly and provide the water quality treatment for which they were designed. Routine maintenance performed on a frequently scheduled basis, can help avoid more costly rehabilitative maintenance that results when facilities are not adequately maintained.

A. Maintenance Categories

Stormwater CM maintenance programs are separated into three broad categories of work. The categories are separated based upon the magnitude and type of the maintenance activities performed. A description of each category follows:

Routine Work

The majority of this work consists of 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 outlet structure well screens and trash racks. It also includes activities such as weed control, mosquito treatment, and algae treatment. These activities normally will be performed numerous times during the year. These items can be completed without any prior correspondence with the County; however, inspection and maintenance forms shall be completed with the information also being reported on the annual report forms.

Restoration Work

This work consists of a variety of isolated or small-scale maintenance and work needed to address operational problems. Most of this work can be completed by a small crew, with minor tools, and small equipment. These items do not require prior correspondence with the County, but do require that completed maintenance forms be included with the annual report forms.

Rehabilitation Work

This work consists of large-scale maintenance and major improvements needed to address failures within the stormwater CM. This work requires consultation with the County and may require an engineering design with construction plans to be prepared for review and approval by the County. This work may also require more specialized maintenance equipment, surveying, construction permits or assistance through private contractors and consultants. These items require prior correspondence with the County and require that completed maintenance forms be submitted to the County.

B. Maintenance Personnel

Maintenance personnel should be qualified to properly maintain stormwater CM's, especially for restoration or rehabilitation work. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

C. Maintenance Forms

The Stormwater CM Maintenance Form provides a record of maintenance activities and includes general cost information to assist the District in budgeting for future maintenance. A Maintenance Form is provided in Appendix D. The Maintenance Form shall be completed by the District, or contractor completing the required maintenance items. The form shall then be reviewed by the District and submitted within sixty (60) days of receiving written request of the inspections to the following address:

Department of Public Works
Storm Water Team
3275 Akers Drive
Colorado Springs, CO 80922

Refer to Section II of this Manual regarding the reporting of inspections and maintenance activities performed.

Appendix A

Description of Stormwater Facilities

Meridian Service Metropolitan District is responsible to maintain both temporary and permanent CM's, with some temporary CM's capable of becoming permanent if necessary. Permanent CM's consist of Extended Detention Basin (EDB) outlet structures, outlet pipe, outlet protection and rip rap emergency overflow. The temporary CM's incorporated in the design include silt fencing and straw bale barriers/check dams. Each facility is described in detail below:

Permanent CM's

Extended Detention Basin w/ Outlet Structure

The EDB are designed to collect and detain stormwater, allowing only historic peak runoff flow rates to proceed downstream of the development. Water Quality Control Volume (WQCV) was also designed into the EDB to improve water quality by providing adequate time for sediment to fall out in the basin before being released downstream.

An outlet structure was integrated in the EDB to release WQCV and the full spectrum of historic design storm flow rates. This structure is comprised of a plate with orifice holes and inlet grate.

When a minor storm event occurs, runoff will collect and settle in the EDB while being released through the orifices at a very gradual rate. The water quality plate must be inspected/cleaned as needed after significant rain events (or monthly at a minimum).

When larger storm events occurs (or when an event occurs and the WQCV orifices are plugged) water will enter into the outlet structure via an opening in the side of the concrete outlet structure. Or in the case of a 100-year storm event, the EDB was designed so that the water will enter into the outlet structure over the top. The top of the structure is equipped with a trash rack to prevent floating trash from entering the storm drain system. The outlet structure and trash rack must be inspected/cleaned as needed after significant rain events (or monthly at a minimum).

In the case of a greater than 100-year storm event, the EDB was designed with an overflow/spillway crest to release 100-year developed flows. Spillways are constructed of riprap.

Below the spillway and along the dam is a "riprap rundown channel." Water that overtops the spillway will flow down the riprap rundown channel before being directed downstream.

Water Quality Control Structure

Water Quality Control (WQ) is provided such that storm drainage runoff is designed to improve water quality by providing adequate time for sediment to fall out in the basin before being released downstream. This structure is comprised of a plate with orifice hole(s), well screen, inlet grate and micro-pool.

When a minor storm event occurs, runoff will collect and settle out large particles while being released through the orifice(s) at a very gradual rate. The water quality plate, well screen, and micro-pool must be inspected/cleaned as needed after significant rain events (or monthly at a minimum).

When larger storm events occur (or when an event occurs and the WQCV orifice(s) are plugged) water will enter into the structure via the top grated opening. The top of the structure is equipped with a trash rack to prevent floating trash from entering the storm drain system. The top grated outlet

structure and trash rack must be inspected/cleaned as needed after significant rain events (or monthly at a minimum).

Runoff Reduction

Runoff volume reduction is an important part of stormwater management and is fundamental to effectively manage stormwater runoff. Quantifying volume reduction associated with LID practices and other BMPs is important for watershed master planning as well as conceptual and final site design. The primary intent is to direct the runoff from impervious surfaces to flow over grass-covered areas and/or permeable pavement, and to provide sufficient travel time to facilitate the removal of suspended solids before runoff leaves the site, enters a curb and gutter system, or enters another stormwater collection system. Thus, to the extent practical, impervious surfaces are designed to drain over grass buffer strips or other pervious surfaces before reaching a stormwater conveyance system.

The following requirements apply for the maintenance of runoff reduction permanent control measures (PCMs):

- The Runoff Reduction Areas (RPAs) are considered PCMs and require regular maintenance.
- The RPAs are located within a tract shown on the final plat and identified this drainage report and the GEC Plans.
- The vegetation in RPAs should have a maintained uniform density of at least 80%.
- Signage shall be posted in RPAs and should provide text that identifies the RPA as a water quality treatment area stating that the area is to remain vegetated and maintained.

Outlet Pipe Protection

Outlet Pipe Protection consists of riprap aprons below the outlets to decrease flow velocities and help prevent erosion. Riprap aprons are designed below the pipes that discharge the EDB and the storm drain pipes that discharge into the EDB.

Temporary CM's

Silt Fencing

Silt fencing is a temporary sediment barrier constructed of filter fabric stretched across supporting posts. The bottom edge of the fabric is entrenched and covered with backfill. Sediment must be periodically removed from behind the silt fence when it accumulates to half the fence height. Silt fencing shall be removed when adequate vegetative cover has been attained.

Straw Bale Barriers

A straw bale barrier consists of a row of straw bales used to retain sediment from runoff in areas of disturbed soil. The bales are entrenched and anchored to prevent them from being carried downstream in storm events. As with silt fencing, sediment must be periodically removed from behind the bales when it accumulates to half the height of the barrier. Bales must be replaced as needed, and the barriers can be removed when adequate vegetative cover has been attained.

Appendix B

Standard Operating Procedures (SOP's) for Each Facility

Below are Standard Operating Procedures for each facility described in Appendix A:

Extended Detention Basin Maintenance Considerations

Required Action	Maintenance Objective	Frequency of Action
Mowing	Occasional mowing to limit unwanted vegetation. Maintain native grasses to 6 inches.	Routine -Depending on aesthetic requirements.
Debris and Litter Removal	Remove debris and litter from the entire pond to minimize outlet clogging and improve aesthetics.	Routine -Including just before annual storm seasons (that is, April and May) and following significant rainfall events.
Erosion and Sediment Control	Repair and re-vegetate eroded areas in the basin and channels.	Non-routine -Periodic and repair as necessary based on inspection.
Structural	Repair pond inlets, outlets, low-flow channel liners, and energy dissipators whenever damage is discovered.	Non-routine -Repair as needed based on regular inspections.
Inspections	Inspect basins to insure that the basin continues to function as initially intended. Examine the outlet for clogging, erosion, slumping, excessive sedimentation levels, overgrowth, embankment and spillway integrity, and damage to any structural element.	Routine -Annual inspection of hydraulic and structural facilities. Also check for obvious problems during routine maintenance visits, especially for plugging of outlets.
Nuisance Control	Address odor, insects, and overgrowth issues associated with stagnant or standing water in the bottom zone.	Non-routine -Handle as necessary per inspection or local complaints.
Sediment Removal	Remove accumulated sediment from the bottom of the basin.	Non-routine -Performed when sediment accumulation occupies 20 percent of the WQCV. This may vary considerably, but expect to do this every 10 to 20 years, as necessary, if no construction activities take place in the tributary watershed. More often if they do occur.

* From Table EOB-1 in the EPC OCM Vol. /I

Equipment requirements will vary depending on the maintenance that is deemed necessary. Some work may need to be contracted out if the District does not have the equipment or skill set required.

Runoff Reduction Area Maintenance Considerations

Required Action	Maintenance Objective	Frequency of Action
Mowing	Occasional mowing to limit unwanted vegetation. Maintain native grasses to 6 inches.	Routine -Depending on aesthetic requirements.
Debris and Litter Removal	Remove debris and litter from the entire area to improve aesthetics, prevent gully development and prevent debris from being washed offsite.	Routine – as needed by inspection.
Erosion and Sediment Control	Repair and re-vegetate eroded areas in the basin and channels.	Non-routine -Periodic and repair as necessary based on inspection.
Inspections	Inspect to assure that the area continues to function as initially intended. Examine for erosion, overgrowth, and damage to any structural element.	Routine -Annual inspection, check for obvious problems during routine maintenance visits, especially for erosion and rilling.

Culvert Outlet Protection Maintenance Considerations

Required Action	Maintenance Objective	Frequency ofAction
Debris and Litter Removal	Retain downstream integrity and prevent blockages of culvert outlet.	Routine -Inspection of facilities. Also check for damage to riprap apron.
Stone/Riprap Replacement	Retain apron integrity.	Non-routine -Periodic and repair as necessary based on inspection.
Inspections	Inspect aprons to insure that they continue to function as initially intended. Examine the structure for damage and missing stones/riprap.	Routine -Inspection of facilities. Also check for obvious problems during routine maintenance visits.

Silt Fencing Maintenance Considerations

Required Action	Maintenance Objective	Frequency of Action
Sediment Removal	Maintain area for sediment to accumulate during storm events	Non-routine -After each storm event or when 1/2 of the original height of the fence is reached.
Debris and Litter Removal	Maintain area for sediment to accumulate during storm events.	Non-routine -After each storm event or when 1/2 of the original height of the fence is reached.
Geotextile and Anchor Replacement	Retain fence integrity	Non-routine -Periodic and repair as necessary based on inspection.
Inspections	Inspect fence to insure that it continues to function as initially intended. Examine the structure for damage and sedimentation levels.	Routine -Inspection of facilities. Also check for obvious problems during routine maintenance visits, especially sediment removal.

Appendix C

INSPECTION FORM

As discussed in Appendix A, Meridian Ranch Filing No. 31 contains both temporary and permanent CM's, with some temporary CM's capable of becoming permanent if necessary. Below is an Inspection Form to be used to record inspections, items found, maintenance, and corrective actions taken. Also record any training received by personnel with regard to erosion control, materials handling, and any inspections by outside agencies.

Date	Item	Initials

Appendix D

MAINTENANCE FORM

Below is a Maintenance Form to be used to record maintenance performed on each facility in Meridian Ranch Filing 3.

Date	Maintenance Activity (I.E. Mowing, Debris Removal, Item Replacement, Repair, Etc.)	Initials