

# RADFORD UNIVERSITY

---

## BMP INSPECTION REPORT

Located in:

**Radford, Virginia**

Project Number: 2429.3

Date: August 30, 2024



ENGINEERING • LAND PLANNING • SURVEYING  
1260 Radford Street · Christiansburg, Virginia 24073  
540.381.6011 office · 540.381.2773 fax  
[www.foresightdesignservices.com](http://www.foresightdesignservices.com)

# Radford University BMP Inspection Report

---

## TABLE OF CONTENTS

|  |    |
|--|----|
| EXECUTIVE SUMMARY .....  | 3  |
| DETAILED INSPECTION .....  | 5  |
| ◆ RU-BMP-IF-1 – Underground Storage.....   | 5  |
| ◆ RU-BMP-HF-1 – Underground Storage .....  | 6  |
| ◆ RU-BMP-HF-1 – Grassed Swale .....  | 8  |
| ◆ RU-BMP-WT-1 – Constructed Wetlands.....  | 9  |
| ◆ RU-BMP-AL-1 – Detention Pond .....   | 13 |
| ◆ RU-BMP-AR-1 – Detention Pond.....  | 15 |
| ◆ RU-BMP-CH-1 – Detention Pond .....   | 18 |
| ◆ RU-BMP-SC-1 – Bioretention .....   | 19 |
| ◆ RU-BMP-HU-1 – Underground Detention .....  | 21 |
| ◆ RU-BMP-CU-1 – Detention Pond .....   | 22 |
| ◆ RU-BMP-FF-1 – Underground Detention.....   | 23 |
| APPENDIX A .....   | 24 |
| Operation & Maintenance Inspection for Detention,<br>Retention & Extended Detention Basins Reports |    |
| APPENDIX B .....   | 33 |
| Underground Detention System Inspection & Maintenance Checklist Reports                            |    |
| APPENDIX C .....   | 38 |
| Dry Swales: O&M Checklist  |    |
| APPENDIX D .....   | 43 |
| Constructed Wetlands: O&M Checklist  |    |
| APPENDIX E .....   | 49 |
| Bioretention Practices: O&M Checklist  |    |

# Radford University

---

## BMP INSPECTION REPORT

### EXECUTIVE SUMMARY

Foresight Design Services (FDS) investigated the initial 11 BMP facilities on campus to determine if they met compliance in regard to the original design as well as determining if the facilities were being maintained properly. The 2023 report completed by FDS referenced some of the original three main areas of concern for the existing facilities on campus:

- 1) Sediment accumulation,
- 2) Invasive species,
- 3) Excessive vegetation growth.

Radford University (RU) has been working on the areas of concern and has addressed many of the original concerns in previous reports. In the last year, RU has started a new initiative to manage the existing BMPs onsite and create more consistency with maintenance for the sites. Therefore, excessive growth has been removed and access during annual inspections are easier to conduct onsite. RU is encouraged to continue the new maintenance schedule for future inspection cycles.

The underground detentions have been maintained in excellent condition as well as the majority of the other detention facilities on campus. This report has seen no signs of an increase in sediment in the underground facilities. However, it should be noted that some are close to reaching the 5% mark and may require sediment removal.

The constructed wetland area continues to have similar concerns from the previous reports on invasive species; however, the main concern is a leak in the riser structure reported last year. Attempts to apply temporary solutions to the leak have failed and the wet portions of the pond have drained out. The wetland deep pools cannot fill up until the riser is repaired. The invasive species should be addressed but the major issue currently is repairs to the riser structure as soon as possible before the plants die out due to dry conditions.

In summary, this report emphasizes the need to continue sediment monitoring, continue to manage vegetation growth at the existing BMPs and to address the invasive species at the wetland BMP. However, repairs have become more of an issue with some BMPs, and RU needs to address those on a regular schedule to ensure that the BMP is functioning properly.

See example schedule below for typical mowing and debris removal:

| <b>Detention Pond Inspection and Maintenance Schedule</b>  |  |                                  |   |                                   |
|--|--|----------------------------------|---|-----------------------------------|
| <b>Task</b>  | <b>Frequency*</b>  | <b>Inspection Date and Notes</b> | <b>Maintenance Notes</b>  | <b>Maintenance Date and Notes</b> |
| Mowing   | Monthly. Inspect to determine if monthly mowing will be sufficient |                                  | Monthly mowing will prevent the establishment of woody plants that may damage the embankments.                                |                                   |
| Clean and remove debris from inlet and outlet structures   | Quarterly  |                                  | As needed. Inspect orifice and outlet pipe. Check for water flow through orifice if ponded water exists above orifice height. |                                   |
| Repair undercut or eroded areas  | Annually   |                                  | As needed.  |                                   |
| Monitor sediment accumulation in forebay(s) and detention area   | Annually   |                                  | As needed, expected 5-7 Year activity   |                                   |
| Inspect inlets, low flow channels and overflow weir(s)   | Quarterly  |                                  | As needed   |                                   |
| *Specific site conditions may be cause for modifications to the frequency of inspections or maintenance. |  |                                  |   |                                   |
| <u>Additional Comments:</u>  |  |                                  |   |                                   |
|  |  |                                  |   |                                   |

## DETAILED INSPECTION

### RU-BMP-IF-1 – UNDERGROUND STORAGE

- Manhole access and observation ports checked. Small bits of sediment in sections. Sediment has not reached the 5% range. Recommend cleaning once the 5% level has been reached.



## RU-BMP-HF-1 – UNDERGROUND STORAGE

- Sediment in various sections of pipe and riser. Sediment had previously reached close to the 5% range due to pine needles and riprap from the upper drainage area of the softball field. Much of the sediment, pine needles and riprap were removed. To address this issue, RU removed the pine trees from the softball field. From initial observations, there are some small pieces of riprap in the pipe sections, but the majority of the sediment and needles are gone. Monitoring of the system is recommended at this point to ensure that additional sediment does not increase the total percent. Recommend increase in maintenance schedule.





## RU-BMP-HF-1 – GRASSED SWALE

- RU staff to continue to keep heavy mowing equipment off swale area to avoid bio media compaction. Site stable and well maintained. Check observation ports to make sure equipment is not damaging caps.





## RU-BMP-WT-1 – CONSTRUCTED WETLANDS

- Overall site has some vegetation; therefore, regular maintenance and mowing is required to maintain the slopes and allow better inspection of the entire BMP. Some sediment buildup in the forebay. RU staff to monitor if sediment removal is required.



- Excess vegetation was removed to allow access to all of the BMP. Based upon the 2016 & 2018 report, invasive species were identified in the wetland cells. The original plan has a schedule for the high and low mashes. Currently there are cattails and phragmites within the wetland area. Control of those invasive species should be implemented and monitored if they reach 15% of the wetland cell. RU staff should continue to monitor the extent of the invasive species.



| WETLAND PLANT SCHEDULE |            |                        |                     |
|------------------------|------------|------------------------|---------------------|
| KEY                    | QUANTITY   | SCIENTIFIC NAME        | COMMON NAME         |
| LM                     | LOW MARSH  |                        |                     |
| LM-1                   | 5,328      | POTAMOGETON PECTINATUS | PONDWEED            |
| LM-2                   | 7,018      | CERATOPHYLLUM DEMERSUM | COONTAIL            |
| LM-3                   | 3,575      | VALISNERIA AMERICANA   | WILD CELERY         |
| LM-4                   | 2 BAGS     | LEMNA SPP.             | DUCKWEED            |
| HM                     | HIGH MARSH |                        |                     |
| HM-1                   | 617        | SCIPUS PUNGENS         | COMMON THREE SQUARE |
| HM-2                   | 1,361      | SCIPUS VALIDUS         | SOFT STEM BULRUSH   |
| HM-3                   | 547        | PONTEDERIA CORDATA     | PICKERELWEED        |
| HM-4                   | 566        | PELTANDRA VIRGINICA    | ARROW ARUM          |
| HM-5                   | 3,941      | CAREX SPP.             | SEDGES              |

- The last report determined that there was a leak in the riser structure and RU staff had implemented some temporary measures to plug the leaks. Unfortunately, those measures did not keep the leak from draining the majority of the deep pools and shallow areas of the wetlands. It was observed that the permanent pool areas have been drained and the wetland plants are in danger of dying out from dry conditions. Repairs need to be implemented to the riser immediately.





## RU-BMP-AL-1 – DETENTION POND

- The University had previously seeded the pond to stabilize the facility and it was recommended to increase the normal maintenance cycle due to sediment in the bottom of the facility.

From the previous report, there does not seem to be any additional sediment deposited since the last scheduled removal of debris. Even though there is no additional sediment deposited, it is recommended to camera the pipe starting at the outfall into the basin if more sediment is introduced onto the pond. With the sediment removal previously done, riprap should be added back to missing sections at the outfall. RU staff to continue to monitor any sediment into the pond.



- A vermin hole was located along the berm near the gas line area. Traps should be set to capture the vermin and remove it from the basin area. This one is noted near the area of the gas line and is of concern since this is the weak point on the berm structure.



- It was also noted that the trash rack needs to be reinstalled on the riser structure or replaced.



- As reported in the last inspection, the berm area near the gas line installation shall continue to be monitored for seepage or compromise. No signs of erosion or seepage during this inspection. It is recommended to address the berm section by adding fill to the area. Slopes may be adjusted internally to keep the same volume for the pond to ensure that storage remains adequate. Over time this has the potential to fail for a higher storm event.



#### **RU-BMP-AR-1 – DETENTION POND**

- The University had seeded the pond area for stabilization of the BMP and increased the frequency of the maintenance schedule. It was noted fresh grass clipping should be removed from the trash rack.



- Inlet pipe with outfall concrete channel showed signs of separation which resulted in erosion around structure in 2018. University staff replaced the structure to prevent further erosion on outfall channel. New structure remains in good shape and no signs of erosion.



- Nuisance animals had been noted to be in the area of the BMP and have been caught in recent years. RU staff to keep traps out and fill holes immediately. Recent inspection discovered additional signs of holes along the downstream portion of the basin. Set traps to capture vermin and remove from the area. Recommend increasing the schedule for mowing to allow for better inspection of the berm structure.





Sediment from the parking lot and road area above consists of small gravel deposits. Those deposits have collected in the center of the pond bottom. This has caused the upper section of the pond to not fully drain to the riser section. It is recommended to remove the sediment/gravel deposit from the center of the pond and reseed. This will help drain the pond faster after a rain event.

## RU-BMP-CH-1 – DETENTION POND

- Overall, the facility has been kept in good condition. RU staff will continue to pick up trash and debris. No debris near the riser section.



- Add riprap to the outfall section. Noted sediment of gravel mixture buildup at outfall. Source was traced to parking lot. Monitor and remove sediment and debris as needed.



## RU-BMP-SC-1 – BIORETENTION

- The BMP is in good condition with some apparent trash from drainage area. Plants and mulch have been maintained. No issues with the underdrain or media. Cleaned up and removed some debris noted in the forebay area.





## RU-BMP-HU-1 – UNDERGROUND DETENTION

- Sediment in structure is less than 5%. Removal of sediment is required once 5% has been reached to ensure proper function of detention system. It is noted that the Humanities Building HVAC units send condensation water to the facility at various times. Outfall was checked to ensure no blockage was impeding flow.



### RU-BMP-CU-1 –DETENTION POND

- Overall facility is in good condition with no signs of erosion near the roadway.
- Recommend increasing the schedule for vegetation removal along the slopes. Excess vegetation in a few areas.
- Debris and sediment found near the riser orifice. Sediment blocks lower orifice from functioning. Remove immediately. Recommend a new trash rack be installed to help with sediment build up conditions.



## RU-BMP-FF-1 –UNDERGROUND DETENTION POND

- Overall facility is in good condition since it is relatively new. There has been no sediment accumulation occurring due to its recent construction. System should continue to be monitored.



# Radford University BMP Inspection Report

---

## APPENDIX A

### OPERATION & MAINTENANCE INSPECTION FOR DETENTION, RETENTION & EXTENDED DETENTION BASINS

- RU-BMP-AL-1
- RU-BMP-AR-1
- RU-BMP-CH-1
- RU-BMP-CU-1





1260 Radford Street · Christiansburg, Virginia 24073  
 540.381.6011 office · 540.381.2773 fax  
 www.foresightdesignservices.com

## BMP Operation & Maintenance Inspection for Detention, Retention and Extended Detention Basins

|   |   |
|---|---|
| <b>Owner Name: Radford University</b>   | <b>Facility ID # (See Mapping): RU-BMP-AL-1</b>   |
| <b>Date of Inspection: June 20, 2024</b>  | <b>As-Built Plan Available: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</b> |
| <b>Date of Last Inspection: June 1, 2023</b>  | <b>Inspector: Timothy D. Guthrie, P.E.</b>  |
| <b>Were issues identified during the previous inspection that required maintenance? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</b> |   |

| BMP Element                         | Issue   | Yes | No | N/A | Corrective Action  |
|-------------------------------------|---|-----|----|-----|--|
| Contributing<br>Drainage<br>Area    | Excessive trash/debris  |     | x  |     | Remove trash/debris and properly dispose.  |
|                                     | Bare exposed soil   |     | X  |     | Stabilize with seed and mulch. E&S measures may be warranted until stabilized.   |
|                                     | Evidence of erosion   | X   |    |     | Backfill area, seed, much and consider matting. E&S measures may be warranted until stabilized.  |
|                                     | Excessive landscape waste/yard clippings  |     | X  |     | Remove landscape waste and yard clippings to prevent clogging and properly dispose of them.  |
| Pretreatment<br>/Forebay<br>/Inflow | Excessive trash/debris/sediment or other blockage   |     |    | X   | Remove trash/debris/sediment or blockages and properly dispose of.   |
|                                     | Dead vegetation, exposed soil   |     |    | X   | Replace vegetation and stabilize according to plans. E&S measures may be warranted until stabilized.   |
|                                     | Evidence of erosion, undercutting, or bare soils  |     |    | X   | Backfill area, seed, much, and consider matting. E&S measures may be warranted until stabilized.   |
|                                     | Structural deterioration of inlets, outfalls or pretreatment overflow weirs into the facility |     |    | X   | Repair and restabilize area. Consult plans for approved configuration or an engineer. E&S measures may be warranted until stabilized.  |
|                                     | Animal burrows  |     |    | X   | Fill in immediately and stabilize.   |
| Aquatic<br>Bench /<br>Vegetation    | Plantings inconsistent with approved plans  |     |    | X   | Consult approved plans and/or management to ensure no approved plant substitutions were used. Remove unapproved plants and replace any required plantings in kind.   |
|                                     | Dead vegetation/exposed soil  |     |    | X   | Replace vegetation and stabilize according to plans. E&S measures may be warranted until stabilized.   |
|                                     | Invasive plants, such as cattails and phragmites, exceeds 15% of the planted area             |     |    | X   | Invasive plants should be removed immediately. Vegetation may require periodic harvesting for proper long term management.   |
| Berm /<br>Embankment                | Overgrown, including woody growth 5' beyond the outfall pipe and/or embankment                |     | X  |     | Removal of woody species near or on the embankment is critical for proper function and long term stability. Remove all woody growth including stumps. Consult an engineer for backfill specifications. Mow thick growth. |
|                                     | There is sparse vegetative cover and erosion channels are present                             |     | X  |     | Backfill area with structural fill and consult engineer for proper specifications. Stabilize with seed and mulch, consider matting. E&S measures may be warranted until stabilized.                                      |
|                                     | Cracking, bulging, sloughing and seepage  |     | X  |     | Consult an engineer immediately to prevent failure.  |
|                                     | Evidence of animal burrows  | x   |    |     | Fill in immediately and stabilize.   |

|                  |   |   |   |  |   |
|------------------|---|---|---|--|---|
| Riser            | Structural condition of the riser is deteriorating.   |   | X | Consult an engineer to recommend a repair and review the approved plans. |   |
|                  | Adjustable control valve inaccessible and inoperable (if present).  |   |   | X  | Repair valve to be operational.   |
|                  | Pieces of the riser are broken or missing.  | x |   |  | Repair immediately in accordance with the approved plans. Consult and engineer as needed.               |
|                  | Riser or low flow orifice is blocked.   |   | X |  | Remove blockage and properly dispose of.  |
|                  | Rise provides inadequate conveyance out of facility.  |   | X |  | Repair to properly convey drainage to the outfall per the approved plan. Consult an engineer as needed. |
|                  | Evidence of erosion or undermining at/around riser.   |   | X |  | Repair erosion. Consult engineer for structural repairs as needed.                                      |
|                  | Structural deterioration.   |   | X |  | Consult engineer for proper repair procedures.  |
| Outlet / Outfall | Exposed rebar, joint failure, loss of joint material, misalignment, leaking or corrosion  |   | X |  | Repair concrete to cover rebar. Consult engineer for all other structural repairs.                      |
|                  | Excessive trash/debris/sediment or blockages.   |   | X |  | Remove trash/debris/sediment/blockages and properly dispose.  |
|                  | Evidence of erosion and bare soil   |   | X |  | Backfill area, seed, mulch and consider matting. E&S measures may be warranted until stabilized.        |
|                  | Valves, manholes or locks cannot be opened or operated (if present)   |   | X |  | Repair/replace any broken fixtures.   |
|                  | Erosion of outfall channel or riprap deterioration  |   | X |  | Repair and/or supplement riprap outlet protection in accordance with the approved plans.                |
|                  | Outlets provide inadequate conveyance out of facility   |   | X |  | Repair to properly convey drainage to the outfall per the approved plan. Consult an engineer as needed. |
| Overall          | Access to the facility is in need of repair   |   | X |  | Restore access for maintenance equipment per the approved plans.  |
|                  | Encroachment on facility or easement by buildings or other structures   |   | X |  | Contact Facilities Planning.  |
|                  | Evidence of oil/chemical accumulation, odor, algae, color or pollution  |   | X |  | Report to management and consult IDDE manual.   |
|                  | Fences and/or safety signage is inadequate  |   | X |  | Repair fences and signage for public safety.  |
|                  | Trash in the pool   |   | X |  | Remove immediately and observe safety procedures.   |
|                  | Additional notes: <ul style="list-style-type: none"> <li>Noted that area where gas line access is located has the potential to compromise the embankment. RU Staff to continue to monitor berm. No signs of seepage or compromise at this time. Recommend future grading of area to reinforce berm.</li> <li>Inflow pipe to area has a few areas of erosion near outfall. Add riprap in areas.</li> <li>Orifice trash rack reinstall or repair.</li> <li>Vermin hole located along berm near gas line. Set traps to remove vermin from area.</li> </ul> |   |   |  |   |



1260 Radford Street · Christiansburg, Virginia 24073  
 540.381.6011 office · 540.381.2773 fax  
 www.foresightdesignservices.com

## BMP Operation & Maintenance Inspection for Detention, Retention and Extended Detention Basins

|   |   |
|---|---|
| <b>Owner Name: Radford University</b>   | <b>Facility ID # (See Mapping): RU-BMP-AR-1</b>   |
| <b>Date of Inspection: June 20, 2024</b>  | <b>As-Built Plan Available: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</b> |
| <b>Date of Last Inspection: June 1, 2023</b>  | <b>Inspector: Timothy D. Guthrie, P.E.</b>  |
| <b>Were issues identified during the previous inspection that required maintenance? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</b> |   |

| BMP Element                         | Issue   | Yes | No | N/A | Corrective Action  |
|-------------------------------------|---|-----|----|-----|--|
| Contributing<br>Drainage<br>Area    | Excessive trash/debris  |     |    |     | Remove trash/debris and properly dispose.  |
|                                     | Bare exposed soil   |     | X  |     | Stabilize with seed and mulch. E&S measures may be warranted until stabilized.   |
|                                     | Evidence of erosion   |     | X  |     | Backfill area, seed, mulch and consider matting. E&S measures may be warranted until stabilized.   |
|                                     | Excessive landscape waste/yard clippings  |     | X  |     | Remove landscape waste and yard clippings to prevent clogging and properly dispose of them.  |
| Pretreatment<br>/Forebay<br>/Inflow | Excessive trash/debris/sediment or other blockage   |     |    | X   | Remove trash/debris/sediment or blockages and properly dispose of.   |
|                                     | Dead vegetation, exposed soil   |     |    | X   | Replace vegetation and stabilize according to plans. E&S measures may be warranted until stabilized.   |
|                                     | Evidence of erosion, undercutting, or bare soils  |     |    | X   | Backfill area, seed, mulch, and consider matting. E&S measures may be warranted until stabilized.  |
|                                     | Structural deterioration of inlets, outfalls or pretreatment overflow weirs into the facility |     |    | X   | Repair and restabilize area. Consult plans for approved configuration or an engineer. E&S measures may be warranted until stabilized.  |
|                                     | Animal burrows  | X   |    |     | Fill in immediately and stabilize.   |
| Aquatic<br>Bench /<br>Vegetation    | Plantings inconsistent with approved plans  |     |    | X   | Consult approved plans and/or management to ensure no approved plant substitutions were used. Remove unapproved plants and replace any required plantings in kind.   |
|                                     | Dead vegetation/exposed soil  |     |    | X   | Replace vegetation and stabilize according to plans. E&S measures may be warranted until stabilized.   |
|                                     | Invasive plants, such as cattails and phragmites, exceeds 15% of the planted area             |     |    | X   | Invasive plants should be removed immediately. Vegetation may require periodic harvesting for proper long term management.   |
| Berm /<br>Embankment                | Overgrown, including woody growth 5' beyond the outfall pipe and/or embankment                |     | X  |     | Removal of woody species near or on the embankment is critical for proper function and long term stability. Remove all woody growth including stumps. Consult an engineer for backfill specifications. Mow thick growth. |
|                                     | There is sparse vegetative cover and erosion channels are present                             |     | X  |     | Backfill area with structural fill and consult engineer for proper specifications. Stabilize with seed and mulch, consider matting. E&S measures may be warranted until stabilized.                                      |
|                                     | Cracking, bulging, sloughing and seepage  |     | X  |     | Consult an engineer immediately to prevent failure.  |
|                                     | Evidence of animal burrows  | x   |    |     | Fill in immediately and stabilize.   |

|                  |  |   |   |   |   |
|------------------|--|---|---|---|---|
| Riser            | Structural condition of the riser is deteriorating.  |   | X |   | Consult an engineer to recommend a repair and review the approved plans.                                |
|                  | Adjustable control valve inaccessible and inoperable (if present).   |   |   | X | Repair valve to be operational.   |
|                  | Pieces of the riser are broken or missing.   |   | X |   | Repair immediately in accordance with the approved plans. Consult and engineer as needed.               |
|                  | Riser or low flow orifice is blocked.  | x |   |   | Remove blockage and properly dispose of.  |
|                  | Rise provides inadequate conveyance out of facility.   |   | X |   | Repair to properly convey drainage to the outfall per the approved plan. Consult an engineer as needed. |
|                  | Evidence of erosion or undermining at/around riser.  |   | X |   | Repair erosion. Consult engineer for structural repairs as needed.                                      |
|                  | Structural deterioration.  |   | X |   | Consult engineer for proper repair procedures.  |
| Outlet / Outfall | Exposed rebar, joint failure, loss of joint material, misalignment, leaking or corrosion   |   | X |   | Repair concrete to cover rebar. Consult engineer for all other structural repairs.                      |
|                  | Excessive trash/debris/sediment or blockages.  |   | X |   | Remove trash/debris/sediment/blockages and properly dispose.  |
|                  | Evidence of erosion and bare soil  |   | X |   | Backfill area, seed, mulch and consider matting. E&S measures may be warranted until stabilized.        |
|                  | Valves, manholes or locks cannot be opened or operated (if present)  |   | X |   | Repair/replace any broken fixtures.   |
|                  | Erosion of outfall channel or riprap deterioration   |   | X |   | Repair and/or supplement riprap outlet protection in accordance with the approved plans.                |
|                  | Outlets provide inadequate conveyance out of facility  |   | X |   | Repair to properly convey drainage to the outfall per the approved plan. Consult an engineer as needed. |
| Overall          | Access to the facility is in need of repair  |   | X |   | Restore access for maintenance equipment per the approved plans.  |
|                  | Encroachment on facility or easement by buildings or other structures  |   | X |   | Contact Facilities Planning.  |
|                  | Evidence of oil/chemical accumulation, odor, algae, color or pollution   |   | X |   | Report to management and consult IDDE manual.   |
|                  | Fences and/or safety signage is inadequate   |   | X |   | Repair fences and signage for public safety.  |
|                  | Trash in the pool  |   | X |   | Remove immediately and observe safety procedures.   |
|                  | Additional notes: <ul style="list-style-type: none"> <li>• Continue to set traps to capture groundhogs and other vermin. Located vermin hole on the downstream side of the berm. Set traps and remove vermin from area.</li> <li>• Some fresh grass clippings in the trash rack. Remove and maintain.</li> <li>• Clean out sediment in basin area. Sediment in center of basin has created a barrier and causing water to pond in the southeast part of the pond.</li> </ul> |   |   |   |   |



1260 Radford Street · Christiansburg, Virginia 24073  
 540.381.6011 office · 540.381.2773 fax  
 www.foresightdesignservices.com

## BMP Operation & Maintenance Inspection for Detention, Retention and Extended Detention Basins

|   |   |
|---|---|
| <b>Owner Name: Radford University</b>   | <b>Facility ID # (See Mapping): RU-BMP-CH-1</b>   |
| <b>Date of Inspection: June 12, 2024</b>  | <b>As-Built Plan Available: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</b> |
| <b>Date of Last Inspection: June 1, 2023</b>  | <b>Inspector: Timothy D. Guthrie, P.E.</b>  |
| <b>Were issues identified during the previous inspection that required maintenance? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</b> |   |

| BMP Element                         | Issue   | Yes | No | N/A | Corrective Action  |
|-------------------------------------|---|-----|----|-----|--|
| Contributing<br>Drainage<br>Area    | Excessive trash/debris (gravel)   | X   |    |     | Remove trash/debris and properly dispose.  |
|                                     | Bare exposed soil   |     | X  |     | Stabilize with seed and mulch. E&S measures may be warranted until stabilized.   |
|                                     | Evidence of erosion   |     | X  |     | Backfill area, seed, mulch and consider matting. E&S measures may be warranted until stabilized.   |
|                                     | Excessive landscape waste/yard clippings  |     | X  |     | Remove landscape waste and yard clippings to prevent clogging and properly dispose of them.  |
| Pretreatment<br>/Forebay<br>/Inflow | Excessive trash/debris/sediment or other blockage   |     | X  |     | Remove trash/debris/sediment or blockages and properly dispose of.   |
|                                     | Dead vegetation, exposed soil   |     | X  |     | Replace vegetation and stabilize according to plans. E&S measures may be warranted until stabilized.   |
|                                     | Evidence of erosion, undercutting, or bare soils  |     | X  |     | Backfill area, seed, mulch, and consider matting. E&S measures may be warranted until stabilized.  |
|                                     | Structural deterioration of inlets, outfalls or pretreatment overflow weirs into the facility |     | X  |     | Repair and restabilize area. Consult plans for approved configuration or an engineer. E&S measures may be warranted until stabilized.  |
|                                     | Animal burrows  |     | X  |     | Fill in immediately and stabilize.   |
| Aquatic<br>Bench /<br>Vegetation    | Plantings inconsistent with approved plans  |     |    | X   | Consult approved plans and/or management to ensure no approved plant substitutions were used. Remove unapproved plants and replace any required plantings in kind.   |
|                                     | Dead vegetation/exposed soil  |     |    | X   | Replace vegetation and stabilize according to plans. E&S measures may be warranted until stabilized.   |
|                                     | Invasive plants, such as cattails and phragmites, exceeds 15% of the planted area             |     |    | X   | Invasive plants should be removed immediately. Vegetation may require periodic harvesting for proper long term management.   |
| Berm /<br>Embankment                | Overgrown, including woody growth 5' beyond the outfall pipe and/or embankment                |     | X  |     | Removal of woody species near or on the embankment is critical for proper function and long term stability. Remove all woody growth including stumps. Consult an engineer for backfill specifications. Mow thick growth. |
|                                     | There is sparse vegetative cover and erosion channels are present                             |     | X  |     | Backfill area with structural fill and consult engineer for proper specifications. Stabilize with seed and mulch, consider matting. E&S measures may be warranted until stabilized.                                      |
|                                     | Cracking, bulging, sloughing and seepage  |     | X  |     | Consult an engineer immediately to prevent failure.  |
|                                     | Evidence of animal burrows  |     | X  |     | Fill in immediately and stabilize.   |

|                  |  |   |   |   |   |
|------------------|--|---|---|---|---|
| Riser            | Structural condition of the riser is deteriorating.  |   | X |   | Consult an engineer to recommend a repair and review the approved plans.                                |
|                  | Adjustable control valve inaccessible and inoperable (if present).   |   | X |   | Repair valve to be operational.   |
|                  | Pieces of the riser are broken or missing.   |   | X |   | Repair immediately in accordance with the approved plans. Consult and engineer as needed.               |
|                  | Riser or low flow orifice is blocked.  |   | X |   | Remove blockage and properly dispose of.  |
|                  | Rise provides inadequate conveyance out of facility.   |   | X |   | Repair to properly convey drainage to the outfall per the approved plan. Consult an engineer as needed. |
|                  | Evidence of erosion or undermining at/around riser.  |   | X |   | Repair erosion. Consult engineer for structural repairs as needed.                                      |
|                  | Structural deterioration.  |   | X |   | Consult engineer for proper repair procedures.  |
| Outlet / Outfall | Exposed rebar, joint failure, loss of joint material, misalignment, leaking or corrosion   |   | X |   | Repair concrete to cover rebar. Consult engineer for all other structural repairs.                      |
|                  | Excessive trash/debris/sediment or blockages.  |   | X |   | Remove trash/debris/sediment/blockages and properly dispose.  |
|                  | Evidence of erosion and bare soil  |   | X |   | Backfill area, seed, mulch and consider matting. E&S measures may be warranted until stabilized.        |
|                  | Valves, manholes or locks cannot be opened or operated (if present)  |   |   | X | Repair/replace any broken fixtures.   |
|                  | Erosion of outfall channel or riprap deterioration   | X |   |   | Repair and/or supplement riprap outlet protection in accordance with the approved plans.                |
|                  | Outlets provide inadequate conveyance out of facility  |   | X |   | Repair to properly convey drainage to the outfall per the approved plan. Consult an engineer as needed. |
| Overall          | Access to the facility is in need of repair  |   | X |   | Restore access for maintenance equipment per the approved plans.  |
|                  | Encroachment on facility or easement by buildings or other structures  |   | X |   | Contact Facilities Planning.  |
|                  | Evidence of oil/chemical accumulation, odor, algae, color or pollution   |   | X |   | Report to management and consult IDDE manual.   |
|                  | Fences and/or safety signage is inadequate   |   | X |   | Repair fences and signage for public safety.  |
|                  | Trash in the pool  |   | X |   | Remove immediately and observe safety procedures.   |
|                  | Additional notes: <ul style="list-style-type: none"> <li>• Add riprap at outfall.</li> <li>• Some debris in the riser section.</li> <li>• Overall, in good condition.</li> </ul> |   |   |   |   |



1260 Radford Street · Christiansburg, Virginia 24073  
 540.381.6011 office · 540.381.2773 fax  
 www.foresightdesignservices.com

## BMP Operation & Maintenance Inspection for Detention, Retention and Extended Detention Basins

|   |   |
|---|---|
| <b>Owner Name: Radford University</b>   | <b>Facility ID # (See Mapping): RU-BMP-CU-1</b>   |
| <b>Date of Inspection: June 12, 2024</b>  | <b>As-Built Plan Available: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (Only plan set)</b> |
| <b>Date of Last Inspection: June 1, 2023</b>  | <b>Inspector: Timothy D. Guthrie, P.E.</b>  |
| <b>Were issues identified during the previous inspection that required maintenance? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</b> |   |

| BMP Element                         | Issue   | Yes | No | N/A | Corrective Action  |
|-------------------------------------|---|-----|----|-----|--|
| Contributing<br>Drainage<br>Area    | Excessive trash/debris  |     | X  |     | Remove trash/debris and properly dispose.  |
|                                     | Bare exposed soil   |     | X  |     | Stabilize with seed and mulch. E&S measures may be warranted until stabilized.   |
|                                     | Evidence of erosion   |     | X  |     | Backfill area, seed, mulch and consider matting. E&S measures may be warranted until stabilized.   |
|                                     | Excessive landscape waste/yard clippings  |     | X  |     | Remove landscape waste and yard clippings to prevent clogging and properly dispose of them.  |
| Pretreatment<br>/Forebay<br>/Inflow | Excessive trash/debris/sediment or other blockage   |     |    | X   | Remove trash/debris/sediment or blockages and properly dispose of.   |
|                                     | Dead vegetation, exposed soil   |     |    | X   | Replace vegetation and stabilize according to plans. E&S measures may be warranted until stabilized.   |
|                                     | Evidence of erosion, undercutting, or bare soils  |     |    | X   | Backfill area, seed, mulch, and consider matting. E&S measures may be warranted until stabilized.  |
|                                     | Structural deterioration of inlets, outfalls or pretreatment overflow weirs into the facility |     |    | X   | Repair and restabilize area. Consult plans for approved configuration or an engineer. E&S measures may be warranted until stabilized.  |
|                                     | Animal burrows  |     |    | X   | Fill in immediately and stabilize.   |
| Aquatic<br>Bench /<br>Vegetation    | Plantings inconsistent with approved plans  |     |    | X   | Consult approved plans and/or management to ensure no approved plant substitutions were used. Remove unapproved plants and replace any required plantings in kind.   |
|                                     | Dead vegetation/exposed soil  |     |    | X   | Replace vegetation and stabilize according to plans. E&S measures may be warranted until stabilized.   |
|                                     | Invasive plants, such as cattails and phragmites, exceeds 15% of the planted area             |     |    | X   | Invasive plants should be removed immediately. Vegetation may require periodic harvesting for proper long term management.   |
| Berm /<br>Embankment                | Overgrown, including woody growth 5' beyond the outfall pipe and/or embankment                |     | X  |     | Removal of woody species near or on the embankment is critical for proper function and long term stability. Remove all woody growth including stumps. Consult an engineer for backfill specifications. Mow thick growth. |
|                                     | There is sparse vegetative cover and erosion channels are present                             |     | X  |     | Backfill area with structural fill and consult engineer for proper specifications. Stabilize with seed and mulch, consider matting. E&S measures may be warranted until stabilized.                                      |
|                                     | Cracking, bulging, sloughing and seepage  |     | X  |     | Consult an engineer immediately to prevent failure.  |
|                                     | Evidence of animal burrows  |     | X  |     | Fill in immediately and stabilize.   |

|                  |  |   |   |   |   |
|------------------|--|---|---|---|---|
| Riser            | Structural condition of the riser is deteriorating.  |   | X |   | Consult an engineer to recommend a repair and review the approved plans.                                |
|                  | Adjustable control valve inaccessible and inoperable (if present).   |   | X |   | Repair valve to be operational.   |
|                  | Pieces of the riser are broken or missing.   |   | X |   | Repair immediately in accordance with the approved plans. Consult and engineer as needed.               |
|                  | Riser or low flow orifice is blocked.  | X |   |   | Remove blockage and properly dispose of.  |
|                  | Rise provides inadequate conveyance out of facility.   |   | X |   | Repair to properly convey drainage to the outfall per the approved plan. Consult an engineer as needed. |
|                  | Evidence of erosion or undermining at/around riser.  |   | X |   | Repair erosion. Consult engineer for structural repairs as needed.                                      |
|                  | Structural deterioration.  |   | X |   | Consult engineer for proper repair procedures.  |
| Outlet / Outfall | Exposed rebar, joint failure, loss of joint material, misalignment, leaking or corrosion   |   |   | X | Repair concrete to cover rebar. Consult engineer for all other structural repairs.                      |
|                  | Excessive trash/debris/sediment or blockages.  |   |   | X | Remove trash/debris/sediment/blockages and properly dispose.  |
|                  | Evidence of erosion and bare soil  |   |   | X | Backfill area, seed, mulch and consider matting. E&S measures may be warranted until stabilized.        |
|                  | Valves, manholes or locks cannot be opened or operated (if present)  |   |   | X | Repair/replace any broken fixtures.   |
|                  | Erosion of outfall channel or riprap deterioration   |   |   | X | Repair and/or supplement riprap outlet protection in accordance with the approved plans.                |
|                  | Outlets provide inadequate conveyance out of facility  |   |   | X | Repair to properly convey drainage to the outfall per the approved plan. Consult an engineer as needed. |
| Overall          | Access to the facility is in need of repair  |   | X |   | Restore access for maintenance equipment per the approved plans.  |
|                  | Encroachment on facility or easement by buildings or other structures  |   | X |   | Contact Facilities Planning.  |
|                  | Evidence of oil/chemical accumulation, odor, algae, color or pollution   |   | X |   | Report to management and consult IDDE manual.   |
|                  | Fences and/or safety signage is inadequate   |   |   | X | Repair fences and signage for public safety.  |
|                  | Trash in the pool  |   | X |   | Remove immediately and observe safety procedures.   |
|                  | Additional notes: <ul style="list-style-type: none"> <li>• Some excess vegetation in areas. Recommend increase in frequency of maintenance.</li> <li>• Debris near the riser section orifice seems to be blocking inflow. Remove immediately.</li> <li>• Erosion at back of riser. Add select fill and seed area.</li> <li>• Clean the sediment for orifice, fill hole around riser.</li> <li>• Recommend a trash rack for riser.</li> </ul> |   |   |   |   |



# Radford University BMP Inspection Report

---

## APPENDIX B

### UNDERGROUND DETENTION SYSTEM INSPECTION & MAINTENANCE CHECKLIST

- RU-BMP-HF-1
- RU-BMP-IF-1
- RU-BMP-HU-1
- RU-BMP-FF-1



1260 Radford Street · Christiansburg, Virginia 24073  
 540.381.6011 office · 540.381.2773 fax  
 www.foresightdesignservices.com

## Underground Detention System Inspection and Maintenance Checklist

|   |                    |                                  |  |
|---|--------------------|----------------------------------|--|
| <b>Facility:</b> RU-BMP-HF-1  |                    |                                  |  |
| <b>Location/Address:</b> Radford University   |                    |                                  |  |
| <b>Date:</b> June 12, 2024  | <b>Time:</b> 11:44 | <b>Weather Conditions:</b> Clear | <b>Date of Last Inspection:</b> June 1, 2023 |
| <b>Inspector:</b> Timothy D. Guthrie, P.E.  |                    | <b>Title:</b> Project Engineer   |  |
| <b>Rain in Last 48 Hours</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <b>If yes, list amount and timing:</b>   |                    |                                  |  |
| <b>Pretreatment:</b> <input type="checkbox"/> vegetated filter strip <input type="checkbox"/> swale <input type="checkbox"/> turf grass <input type="checkbox"/> forebay <input type="checkbox"/> other, specify: |                    |                                  | <input checked="" type="checkbox"/> none     |
| <b>Site Plan or As-Built Plan Available:</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Drawing files, Sheets Locate/No As-Builts)  |                    |                                  |  |

\*Do not enter underground detention chambers to inspect system unless Occupational Safety & Health Administration (OSHA) regulations for confined space entry are followed.

\*Follow inspection and maintenance instructions and schedules provided by system manufacturer and installer.

\*Properly dispose of all wastes.

| Inspection Item   | Comment  | Action Needed   |
|---|--|---|
| <b>1. PRETREATMENT</b>  |  |   |
| Sediment has accumulated.   | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Trash & debris have accumulated.  | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>2. INLETS</b>  |  |   |
| Inlets are in poor structural condition.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Sediment, trash, or debris have accumulated and/or is blocking the inlets.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>3. CHAMBERS</b>  |  |   |
| Sediment accumulation threshold has been reached.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Trash & debris have accumulated in chambers.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>4. OTHER SYSTEM COMPONENTS</b>   |  |   |
| Structural deterioration is evident.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>5. OUTLETS</b>   |  |   |
| Outlets in poor structural condition  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Sediment, trash or debris are blocking outlets.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Erosion is occurring around outlets.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>6. OTHER</b>   |  |   |
| Evidence of ponding water on area draining to system.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Evidence that water is not being conveyed through the system.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>Additional Notes</b>   |  |   |
| <ol style="list-style-type: none"> <li>1. Field material in chambers under 5%</li> <li>2. No recommendations at this time.</li> </ol> |  |   |
| <b>Wet weather inspection needed</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No                              |  |   |



1260 Radford Street · Christiansburg, Virginia 24073  
 540.381.6011 office · 540.381.2773 fax  
 www.foresightdesignservices.com

## Underground Detention System Inspection and Maintenance Checklist

|   |                    |                                  |  |
|---|--------------------|----------------------------------|--|
| <b>Facility:</b> RU-BMP-IF-1  |                    |                                  |  |
| <b>Location/Address:</b> Radford University   |                    |                                  |  |
| <b>Date:</b> June 12, 2024  | <b>Time:</b> 10:23 | <b>Weather Conditions:</b> Sunny | <b>Date of Last Inspection:</b> June 1, 2023 |
| <b>Inspector:</b> Timothy D. Guthrie, P.E.  |                    | <b>Title:</b> Project Engineer   |  |
| <b>Rain in Last 48 Hours</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <b>If yes, list amount and timing:</b>   |                    |                                  |  |
| <b>Pretreatment:</b> <input type="checkbox"/> vegetated filter strip <input type="checkbox"/> swale <input type="checkbox"/> turf grass <input type="checkbox"/> forebay <input type="checkbox"/> other, specify: |                    |                                  | <input checked="" type="checkbox"/> none     |
| <b>Site Plan or As-Built Plan Available:</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Plan sheets)  |                    |                                  |  |

\*Do not enter underground detention chambers to inspect system unless Occupational Safety & Health Administration (OSHA) regulations for confined space entry are followed.

\*Follow inspection and maintenance instructions and schedules provided by system manufacturer and installer.

\*Properly dispose of all wastes.

| Inspection Item  | Comment  | Action Needed  |
|--|--|--|
| <b>1. PRETREATMENT</b>   |  |  |
| Sediment has accumulated.  | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Trash & debris have accumulated.   | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>2. INLETS</b>   |  |  |
| Inlets are in poor structural condition.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Sediment, trash, or debris have accumulated and/or is blocking the inlets.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>3. CHAMBERS</b>   |  |  |
| Sediment accumulation threshold has been reached.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Trash & debris have accumulated in chambers.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>4. OTHER SYSTEM COMPONENTS</b>  |  |  |
| Structural deterioration is evident.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>5. OUTLETS</b>  |  |  |
| Outlets in poor structural condition   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Sediment, trash or debris are blocking outlets.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Erosion is occurring around outlets.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>6. OTHER</b>  |  |  |
| Evidence of ponding water on area draining to system.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Evidence that water is not being conveyed through the system.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>Additional Notes</b>  |  |  |
| <ol style="list-style-type: none"> <li>1. <b>Good condition.</b></li> <li>2. <b>Less than 5% sediment in section of chambers &amp; overflow pipe.</b></li> <li>3. <b>No recommendations at this time.</b></li> </ol> |  |  |
| <b>Wet weather inspection needed</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No   |  |  |



1260 Radford Street · Christiansburg, Virginia 24073  
 540.381.6011 office · 540.381.2773 fax  
 www.foresightdesignservices.com

## Underground Detention System Inspection and Maintenance Checklist

|   |                   |                                  |  |
|---|-------------------|----------------------------------|--|
| <b>Facility:</b> RU-BMP-HU-1  |                   |                                  |  |
| <b>Location/Address:</b> Radford University   |                   |                                  |  |
| <b>Date:</b> June 12, 2024  | <b>Time:</b> 9:45 | <b>Weather Conditions:</b> Clear | <b>Date of Last Inspection:</b> June 1, 2023 |
| <b>Inspector:</b> Timothy D. Guthrie, P.E.  |                   | <b>Title:</b> Project Engineer   |  |
| <b>Rain in Last 48 Hours</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <b>If yes, list amount and timing:</b>   |                   |                                  |  |
| <b>Pretreatment:</b> <input type="checkbox"/> vegetated filter strip <input type="checkbox"/> swale <input type="checkbox"/> turf grass <input type="checkbox"/> forebay <input type="checkbox"/> other, specify: |                   |                                  | <input checked="" type="checkbox"/> none     |
| <b>Site Plan or As-Built Plan Available:</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |                   |                                  |  |

\*Do not enter underground detention chambers to inspect system unless Occupational Safety & Health Administration (OSHA) regulations for confined space entry are followed.

\*Follow inspection and maintenance instructions and schedules provided by system manufacturer and installer.

\*Properly dispose of all wastes.

| Inspection Item  | Comment  | Action Needed   |
|--|--|---|
| <b>1. PRETREATMENT</b>   |  |   |
| Sediment has accumulated.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Trash & debris have accumulated.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>2. INLETS</b>   |  |   |
| Inlets are in poor structural condition.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Sediment, trash, or debris have accumulated and/or is blocking the inlets.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>3. CHAMBERS</b>   |  |   |
| Sediment accumulation threshold has been reached.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Trash & debris have accumulated in chambers.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>4. OTHER SYSTEM COMPONENTS</b>  |  |   |
| Structural deterioration is evident.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>5. OUTLETS</b>  |  |   |
| Outlets in poor structural condition   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Sediment, trash or debris are blocking outlets.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Erosion is occurring around outlets.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| <b>6. OTHER</b>  |  |   |
| Evidence of ponding water on area draining to system.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Evidence that water is not being conveyed through the system.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>Additional Notes</b>  |  |   |
| <ol style="list-style-type: none"> <li>1. Condensation water to the system seen at this time as noted in previous reports.</li> <li>2. Water ponding in chambers with evidence of sediment. Monitor area to ensure no sediment is blocking the flow out of the BMP. Recommend vacuum/removal of sediment. No additional sediment seen as of last report.</li> <li>3. Outflow checked to confirm no blockage of orifice.</li> </ol> |  |   |
| Wet weather inspection needed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  |  |   |



1260 Radford Street · Christiansburg, Virginia 24073  
 540.381.6011 office · 540.381.2773 fax  
 www.foresightdesignservices.com

## Underground Detention System Inspection and Maintenance Checklist

|  |                   |                                  |  |
|--|-------------------|----------------------------------|--|
| <b>Facility:</b> RU-BMP-FF-1   |                   |                                  |  |
| <b>Location/Address:</b> Radford University  |                   |                                  |  |
| <b>Date:</b> June 12, 2024   | <b>Time:</b> 9:38 | <b>Weather Conditions:</b> Sunny | <b>Date of Last Inspection:</b> June 1, 2023 |
| <b>Inspector:</b> Timothy D. Guthrie, P.E.   |                   | <b>Title:</b> Project Engineer   |  |
| <b>Rain in Last 48 Hours</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <b>If yes, list amount and timing:</b>  |                   |                                  |  |
| <b>Pretreatment:</b> <input type="checkbox"/> vegetated filter strip <input type="checkbox"/> swale <input type="checkbox"/> turf grass <input type="checkbox"/> forebay <input checked="" type="checkbox"/> other, specify: Sumps |                   |                                  | <input type="checkbox"/> none                |
| <b>Site Plan or As-Built Plan Available:</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Plan sheets)   |                   |                                  |  |

\*Do not enter underground detention chambers to inspect system unless Occupational Safety & Health Administration (OSHA) regulations for confined space entry are followed.

\*Follow inspection and maintenance instructions and schedules provided by system manufacturer and installer.

\*Properly dispose of all wastes.

| Inspection Item  | Comment  | Action Needed  |
|--|--|--|
| <b>1. PRETREATMENT</b>   |  |  |
| Sediment has accumulated.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Trash & debris have accumulated.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>2. INLETS</b>   |  |  |
| Inlets are in poor structural condition.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Sediment, trash, or debris have accumulated and/or is blocking the inlets.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>3. CHAMBERS</b>   |  |  |
| Sediment accumulation threshold has been reached.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Trash & debris have accumulated in chambers.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>4. OTHER SYSTEM COMPONENTS</b>  |  |  |
| Structural deterioration is evident.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>5. OUTLETS</b>  |  |  |
| Outlets in poor structural condition   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Sediment, trash or debris are blocking outlets.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Erosion is occurring around outlets.   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>6. OTHER</b>  |  |  |
| Evidence of ponding water on area draining to system.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Evidence that water is not being conveyed through the system.  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>Additional Notes</b>  |  |  |
| <ol style="list-style-type: none"> <li>1. <b>Good condition.</b></li> <li>2. <b>No sediment in section of chambers &amp; overflow pipe.</b></li> <li>3. <b>No recommendations at this time.</b></li> </ol> |  |  |
| <b>Wet weather inspection needed</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No   |  |  |

# Radford University BMP Inspection Report

---

## APPENDIX C

### DRY SWALES: O&M CHECKLIST

- RU-BMP-HF-1

### 9-C.11.0. DRY SWALES: O&M CHECKLIST

Inspection Date 6/12/2024  
 Project RU-BMP-HF-1 Site Plan/Permit Number \_\_\_\_\_  
 Location Radford University Date BMP Placed in Service 2014  
 Date of Last Inspection 6/1/2023 Inspector Timothy D. Guthrie, P.E.  
 Owner/Owner's Representative \_\_\_\_\_  
 As-Built Plans available: **No (Plan sheets)**

Facility Type: Level 1 \_\_\_\_\_ Level 2 Dry swale

Facility Location:

- Surface
- Underground

Hydraulic Configuration:

- On-line facility
- Off-line facility

Filtration Media:

- No filtration (e.g., dry well, permeable pavement, infiltration facility, etc.)
- Sand
- Bioretention Soil
- Peat
- Other: \_\_\_\_\_

Type of Pre-Treatment Facility:

- Sediment forebay (above ground)
- Sedimentation chamber
- Plunge pool
- Stone diaphragm
- Grass filter strip
- Grass channel
- Other: \_\_\_\_\_

*Ideally, Dry Swales should be inspected annually in the Spring, triggering such maintenance activities as sediment removal, spot revegetation, inlet stabilization, and repairs to check dams, underdrains and outlets.*

| Element of BMP                   | Potential Problem  | Problem? Y/N |  |  | How to Fix Problem  | Who Will Address Problem                | Comments |
|----------------------------------|--|--------------|--|--|---|---|----------|
| Contributing Drainage Area       | There is excessive trash and debris  | N            |  |  | Remove immediately  | Owner or professional                   |          |
|                                  | There is evidence of erosion and / or bare or exposed soil   | N            |  |  | Stabilize immediately   | Owner or professional                   |          |
|                                  | There are excessive landscape waste or yard clippings  | N            |  |  | Remove immediately and recycle or compost   | Owner or professional                   |          |
| Pre-Treatment and Flow Spreaders | There is adequate access to the pre-treatment facility.  |              |  |  | Establish adequate access   | Professional and, perhaps, the locality |          |
|                                  | There is excessive trash, debris, or sediment.   |              |  |  | Remove immediately  | Owner or professional                   |          |
|                                  | There is evidence of erosion and / or exposed soil   |              |  |  | Stabilize immediately   | Owner or professional                   |          |
|                                  | There is evidence of clogging (standing water, noticeable odors, water stains, algae or floating aquatic vegetation) |              |  |  | Identify and eliminate the source of the problem. If necessary, remove and clean or replace the clogged material. | Professional                            |          |

| Element of BMP                                      | Potential Problem  | Problem? Y / N |  |  | How to Fix Problem   | Who Will Address Problem | Comments |
|---|--|----------------|--|--|--|--------------------------|----------|
| <b>Pre-Treatment and Flow Spreaders (continued)</b> | There is dead vegetation or exposed soil in the grass filter   |                |  |  | Restabilize and revegetate as necessary  | Owner or professional    |          |
|   | The pea gravel diaphragm is at the correct level   |                |  |  | Correct the installation, as needed  | Professional             |          |
| <b>Inlet and Swale Sides and Base</b>               | The inlet provides a stable conveyance into the swale  | N              |  |  | Stabilize immediately, as needed, and clear blockages.   | Owner or professional    |          |
|   | There is excessive trash, debris, or sediment.   | N              |  |  | Remove immediately   | Owner or professional    |          |
|   | There is evidence of erosion at or around the inlet  | N              |  |  | Repair erosion damage and reseed   | Owner or professional    |          |
| <b>Check Dams</b>                                   | A check dam is not functioning properly.   | N              |  |  | Check upstream and downstream sides of check dams for evidence of undercutting, side cutting or erosion and repair immediately.  | Professional             |          |
|   | There is a large accumulation of sediment or trash/debris behind the check dam.  | N              |  |  | Remove sediment when the accumulation exceeds 25% of the original Tv. Remove trash/debris and clear blockages of weep holes.   | Professional             |          |
| <b>Vegetation</b>                                   | Invasive species or weeds make up at least 10% of the facility's vegetation  |                |  |  | Remove invasive species and excessive weeds immediately and replace vegetation as needed.  | Owner or professional    |          |
|   | Trees form an overhead canopy that may drop leaf litter, fruit and other vegetative materials that may cause clogging. | N              |  |  | Prune or remove vegetation and organic litter as necessary.  | Owner or professional    |          |
|   | Grass height is not consistent with standards.   | N              |  |  | Dry Swales must be mowed to keep grass at a height of 4" to 9". Remove grass clippings after mowing.   | Owner or professional    |          |
|   | The grass cover is not dense enough or is dead or dying  | N              |  |  | Increase watering and reseed, if necessary, to maintain 95% turf cover, but avoid using chemical fertilizers unless absolutely necessary. Replace salt-killed vegetation with salt-tolerant species. | Professional             |          |
| <b>Filter Media/ Soil</b>                           | There is evidence that chemicals, fertilizers, and/or oil are present  | N              |  |  | Remove undesirable chemicals from media and facility immediately, and replace mulch or media as needed   | Professional             |          |



| Element of BMP                    | Potential Problem   | Problem? Y / N |  | How to Fix Problem   | Who Will Address Problem                | Comments |
|-----------------------------------|---|----------------|--|--|---|----------|
| Filter Media/<br>Soil (continued) | There is excessive trash, debris, or sediment.  | N              |  | Remove trash and debris immediately. Check plant health and, without damaging plants, manually remove the sediment, especially if the depth exceeds 20% of the facility's design depth.  | Owner or professional                   |          |
|                                   | There is evidence of erosion and / or exposed soil  | N              |  | Stabilize immediately  | Owner or professional                   |          |
|                                   | There is evidence that chemicals, fertilizers, and/or oil are present   | N              |  | Remove undesirable chemicals from media immediately, and replace mulch or media as needed  | Professional                            |          |
| Underdrain                        | The perforated pipe is not conveying water as designed  | N              |  | Determine if the pipe is clogged with debris or if woody roots have pierced the pipe. Immediately clean out or replace the pipe, as necessary.   | Professional                            |          |
|                                   | The underlying soil interface is clogged (there is evidence on the surface of soil crusting, standing water, the facility does not dewater between storms, or water ponds on the surface of basin for more than 48 hours after an event). | N              |  | Measure the draw-down rate of the observation well for three days following a storm event in excess of 1/2 inches in depth. After three days, if there is standing water on top but not in the underdrain, this indicates a clogged soil layer. If standing water is both on the surface and in the underdrain, then the underdrain is probably clogged. This should be promptly investigated and remediated to restore proper filtration. Grading changes may be needed or underdrain repairs made. | Professional                            |          |
| Outlet                            | Outlets are obstructed or erosion and soil exposure is evident below the outlet.  | N              |  | Remove obstructions and stabilize eroded or exposed areas.   | Owner or Professional                   |          |
|                                   | There is excessive trash, debris, or sediment at the outlet   | N              |  | Remove immediately, and keep the contributing area free of trash and debris.   | Owner or professional                   |          |
| Overall                           | Access to the Infiltration facility or its components is adequate   | N              |  | Establish adequate access. Remove woody vegetation and debris that may block access. Ensure that hardware can be opened and operated.  | Professional and, perhaps, the locality |          |

| Element of BMP      | Potential Problem  | Problem? Y / N |  |  | How to Fix Problem  | Who Will Address Problem                         | Comments |
|---------------------|--|----------------|--|--|---|--|----------|
| Overall (continued) | Mosquito proliferation   | N              |  |  | Eliminate stagnant pools and establish vegetation; treat for mosquitoes as needed. If sprays are considered, then a mosquito larvicide, such as Bacillus thurendensis or Altoside formulations can be applied <i>only if absolutely necessary</i> . | Owner or professional                            |          |
|                     | Complaints from local residents  | N              |  |  | Correct real problems.  | Owner or professional                            |          |
|                     | Encroachment on the swale or easement by buildings or other structures | N              |  |  | Inform involved property owners of BMPs status ; clearly mark the boundaries of the receiving pervious area, as needed  | Owner or professional (and perhaps the locality) |          |

1. Check cleanout tops. (Some filled in/Check for sediment).
2. Continue to keep heavy mowing equipment off swale area to avoid compacting the media.
3. Overall in good condition.

# Radford University BMP Inspection Report

---

## APPENDIX D

### CONSTRUCTED WETLANDS: O&M CHECKLIST

- RU-BMP-WT-1

### 9-C.14.0. CONSTRUCTED WETLANDS: O&M CHECKLIST

**Inspection Date** 6/20/2024  
**Project** RU-BMP-WT-1 **Site Plan/Permit Number** \_\_\_\_\_  
**Location** Radford University **Date BMP Placed in Service** JULY 2007  
**Date of Last Inspection** 6/1/2023 **Inspector** Timothy D. Guthrie, P.E.  
**Owner/Owner's Representative** \_\_\_\_\_  
**As-Built Plans available:** No

**Facility Type:** Level 1 \_\_\_\_\_ Level 2 \_\_\_\_\_

**Hydraulic Configuration:**

- On-line facility
- Off-line facility

**Type of Pre-Treatment Facility:**

- Sediment forebay (above ground)
- Vegetated buffer area
- Grass filter strip
- Grass channel
- Other: \_\_\_\_\_

**Type of wetland**

- Emergent
- Forested

During the first 6 months following construction, the wetland should be inspected twice after storm events that exceed 1/2 inch of rainfall. Bare or eroding areas in the CDA or around the wetland buffer should be stabilized immediately with grass cover. Trees planted in the buffer and on wetland islands and peninsulas need to be watered every 3 days for the first month, and then weekly during the remainder of the first growing season (April-October), depending on rainfall. Due to typical vegetation survival problems, it is typical to plan and budget for a round of reinforcement planting after one or two growing seasons. Constructed wetlands should be inspected and cleaned up annually. A wetland professional should inspect the facility every 5 years, especially to determine if there is any significant negative change in the wetland species composition from the design or an otherwise healthy wetland.

| Element of BMP                    | Potential Problem  | Problem? Y / N | Investigate? Y / N | Repaired? Y / N | How to Fix Problem   | Who Will Address Problem                | Comments              |
|-----------------------------------|--|----------------|--------------------|-----------------|--|---|-----------------------|
| <b>Contributing Drainage Area</b> | Adequate vegetation  | Y              |                    |                 | Supplement as needed   | Owner                                   |                       |
|                                   | There is excessive trash and debris                                  | N              |                    |                 | Remove immediately.  | Owner or professional                   |                       |
|                                   | There is evidence of erosion and/or bare or exposed soil             | N              |                    |                 | Stabilize immediately.   | Owner or professional                   |                       |
|                                   | There are excessive landscape waste and yard clippings               | N              |                    |                 | Remove immediately and recycle or compost  | Owner or professional                   |                       |
| <b>Pre-Treatment</b>              | There is adequate access to the pre-treatment facility               | Y              |                    |                 | Establish adequate access  | Professional and, perhaps, the locality |                       |
|                                   | There is excessive trash and debris                                  | N              |                    |                 | Remove immediately.  | Owner or professional                   |                       |
|                                   | There is evidence of erosion and/or exposed soil.                    | N              |                    |                 | Immediately identify and correct the cause of the erosion and stabilize the eroded or bare area.                     | Owner or professional                   |                       |
|                                   | Sediment deposits are 50% or more of forebay capacity.               | N              |                    |                 | Dredge the sediment to restore the design capacity; sediment should be dredged from forebays at least every 5 years. | Professional                            |                       |
| <b>Pre-Treatment (continued)</b>  | The sediment marker is not vertical.                                 | N              |                    |                 | Adjust the sediment depth marker to a vertical alignment   | Professional                            |                       |
|                                   | There is dead vegetation   | N              |                    |                 | Revegetate, as needed  | Owner or professional                   |                       |
| <b>Inlets</b>                     | The inlet provides a stable conveyance.                              | N              |                    |                 | Stabilize immediately, as needed; clear blockages.   | Owner or professional                   |                       |
|                                   | There is excessive trash, debris, or sediment.                       | N              |                    |                 | Remove immediately   | Owner or professional                   |                       |
|                                   | There is evidence of erosion/undercutting at or around the inlet     | N              |                    |                 | Repair erosion damage and reseed   | Owner or professional                   |                       |
|                                   | There is cracking, bulging, erosion or sloughing of the forebay dam. | N              |                    |                 | Repair and restabilize immediately.  | Professional                            |                       |
|                                   | There is woody growth on the forebay dam.                            | N              |                    |                 | Remove within 2 weeks of discovery.  | Professional                            |                       |
|                                   | There is evidence of nuisance animals.                               | N              |                    |                 | Animal burrows must be backfilled and compacted. Burrowing animals should be humanely removed from area              | Professional                            |                       |
| <b>Vegetation (trees, shrubs,</b> | Plant composition is consistent with the                             | Y              |                    |                 | Determine if existing plant materials are at least   | Professional                            | Some invasive plants. |

| Element of BMP  | Potential Problem   | Problem? Y / N   | Investigate? Y / N | Repaired? Y / N | How to Fix Problem   | Who Will Address Problem   | Comments                       |
|---|---|--|--------------------|-----------------|--|--|--------------------------------|
| aquatic plants)   | approved plans  | N  |                    |                 | consistent with the general Constructed Wetland design criteria, and replace inconsistent species.   |  |                                |
|   | Invasive species are present.   | Y  |                    |                 | Remove invasive species immediately and replace vegetation as needed. As a general rule, control of undesirable invasive species (e.g., cattail and Phragmites) should commence when their coverage exceeds more than 15% of a wetland cell area. Although the application of herbicides is not recommended, some types, such as Glyphosate, have been used to control cattails with some success. Extended periods of dewatering may also work, since early manual removal provides only short-term relief from invasive species. | Professional   | <u>Remove INVASIVE SPECIES</u> |
|   | Vegetation is dead or reinforcement planting is needed.   | N  |                    |                 | Remove and replace dead or dying vegetation.   | Professional   |                                |
|   | Trees planted in the buffer and on wetland islands and peninsulas need watering during the first growing season | N  |                    |                 | Consider watering every 3 days for first month, and then weekly during first year (April – October), depending on rainfall.  | Owner or professional  |                                |
|   | <b>Vegetation</b><br>(trees, shrubs, aquatic plants)<br><b>(continued)</b>                                      | Practice has become overgrown and is not developing into a mature wetland. | N                  |                 |  | Harvest vegetation periodically if the wetland becomes overgrown or to guide maturing of forested wetlands (typically 5 and 10 years after constr.). | Owner or professional          |
| <b>Wetland Cells and Pools</b>                          | Sediment accumulation is 50% or more of capacity.   | N  |                    |                 | Dredge the sediment to restore the design capacity   | Professional   |                                |
|   | There is evidence of floating debris, sparse vegetative cover, erosion or slumping of side slopes.              | N  |                    |                 | Remove debris. Repair and stabilize.   | Owner or professional  |                                |
|   | Open water is becoming overgrown.   | N  |                    |                 | Harvest the unwanted vegetation.   | Professional   |                                |
|   | There is evidence of nuisance animals.  | N  |                    |                 | Animal burrows must be backfilled and compacted. Burrowing animals should be humanely removed from the area.   |  |                                |
| <b>Riser/Principle Spillway and Low-Flow Orifice(s)</b> | There is adequate access to riser for maintenance.  | N  |                    |                 | Establish adequate access  | Professional and, perhaps, the locality  |                                |
|   | Pieces of the riser are deteriorating,  | N  |                    |                 | Repair immediately.  | Professional   |                                |

| Element of BMP                            | Potential Problem   | Problem? Y / N | Investigate? Y / N | Repaired? Y / N | How to Fix Problem  | Who Will Address Problem | Comments                   |
|---|---|----------------|--------------------|-----------------|---|--------------------------|----------------------------|
|   | misaligned, broken or missing.  | N              |                    |                 |   |                          |                            |
|   | Adjustable control valves are accessible and operational.   | N/A            |                    |                 | Repair, as needed.  | Professional             |                            |
|   | Reverse-slope pipes and flashboard risers are in good condition.  | N/A            |                    |                 | Repair, as needed.  | Professional             |                            |
|   | There is excessive trash, debris, or other obstructions in the trash rack.  | N/A            |                    |                 | Remove immediately.   | Owner or professional    |                            |
|   | Seepage into conduit  | N/A            |                    |                 | Seal the conduit  | Professional             |                            |
| <b>Berm/Dam/ Embankment and Abutments</b> | There is sparse veg. cover, settlement, cracking, bulging, misalignment, erosion rills deeper than 2 inches, or sloughing of the dam. | Y              |                    |                 | Repair and restabilize immediately.   | Professional             | <u>REPAIR/STOP SEEPAGE</u> |
|   | There are soft spots, boggy areas, seepage or sinkholes present.  | N              |                    |                 | Reinforce, fill and stabilize immediately.  | Professional             |                            |
|   | There is evidence of nuisance animals.  | N              |                    |                 | Animal burrows must be backfilled and compacted. Burrowing animals should be humanely removed from area.                                    | Professional             |                            |
|   | There is woody vegetation on the embankment.  | N              |                    |                 | Removal of woody species near or on the embankment and maintenance access areas should be done when discovered, but at least every 2 years. |                          |                            |
| <b>Emergency Spillway</b>                 | There is woody growth on the spillway.  | N              |                    |                 | Removal of woody species near or on the emergency spillway should be done when discovered, but at least every 2 years.                      | Owner or professional    |                            |
|   | There is excessive trash, debris, or other obstructions.  | N              |                    |                 | Remove immediately.   | Owner or professional    |                            |
|   | There is evidence of erosion/back-cutting   | N              |                    |                 | Repair erosion damage and reseed  | Owner or professional    |                            |
|   | There are soft spots, seepage or sinkholes.   | N              |                    |                 | Reinforce, fill and stabilize immediately.  | Owner or professional    |                            |
| <b>Outlet</b>                             | The outlet provides stable conveyance from the wetland.   | Y              |                    |                 | Stabilize as needed.  | Professional             |                            |
|   | There are excessive sediment deposits.  | N              |                    |                 | Remove sediment.  | Professional             |                            |
|   | Released water is causing undercutting, erosion or displaced rip-rap at or around the outlet  | N              |                    |                 | Repair, reinforce or replace rip rap as needed, and restabilize.  | Professional             |                            |
|   | Woody growth within 5 feet of the outlet pipe barrel.   | N              |                    |                 | Prune vegetation back to leave a clear discharge area.  | Owner or Professional    |                            |
|   | There is excessive  | N              |                    |                 | Remove immediately.   | Owner or                 |                            |

| Element of BMP             | Potential Problem  | Problem? Y / N | Investigate? Y / N | Repaired? Y / N | How to Fix Problem  | Who Will Address Problem                         | Comments             |
|----------------------------|--|----------------|--------------------|-----------------|---|--|----------------------|
|                            | trash, debris, or other obstructions.                                    | N              |                    |                 |   | professional                                     |                      |
| <b>Overall</b>             | Access to the facility or its components is adequate.                    | N              |                    |                 | Establish adequate access. Remove woody vegetation and debris that may block access. Ensure that hardware can be opened and operated.   | Professional and, perhaps, the locality          |                      |
|                            | Water levels in one or more cells are abnormally high or low.            | Y              |                    |                 | Clear blockages of the riser or orifice(s) and make other adjustments needed to meet the approved design specifications.  | Professional                                     | Water levels too low |
|                            | Complaints from local residents  | N              |                    |                 | Correct real problems.  | Owner or professional                            |                      |
|                            | Mosquito proliferation   | N              |                    |                 | Eliminate stagnant pools if feasible, and treat for mosquitoes as needed. If sprays are considered, then a mosquito larvicide, such as Bacillus thurendensis or Altoside formulations can be applied <i>only if absolutely necessary</i> . Can also stock the basin with mosquito fish to provide natural mosquito & midge control. | Owner or professional                            |                      |
|                            | Encroachment on the wetland or easement by buildings or other structures | N              |                    |                 | Inform involved property owners of BMPs status ; clearly mark the boundaries of the receiving pervious area, as needed  | Owner or professional (and perhaps the locality) |                      |
| <b>Overall (continued)</b> | Safety signage is not adequate.  | N              |                    |                 | Provide sufficient, legible safety signage.   | Owner or professional                            |                      |

Note:

1. Invasive species in areas need removal.
2. Inspection of the Serpentine Berm reveals sections have eroded some due to previous rain events. Areas need repair.
3. Wet pond is dry and water levels have dropped significantly below required treatment volume.
4. Riser structure has leak and needs repairs immediately.



# Radford University BMP Inspection Report

---

## APPENDIX E

### BIORETENTION PRACTICES: O&M CHECKLIST

- RU-BMP-SC-1

### 9-C.10.0. BIORETENTION PRACTICES: O&M CHECKLIST

Inspection Date 6/12/2024  
 Project RU-BMP-SC-1 Site Plan/Permit Number \_\_\_\_\_  
 Location Radford University Date BMP Placed in Service \_\_\_\_\_  
 Date of Last Inspection 6/1/2023 Inspector Timothy D. Guthrie, P.E.  
 Owner/Owner's Representative \_\_\_\_\_  
 As-Built Plans available: **Yes**

Facility Type: Level 1 \_\_\_\_\_ Level 2 Bioretention

Facility Location:

- Surface
- Underground

Hydraulic Configuration:

- On-line facility
- Off-line facility

Filtration Media:

- No filtration (e.g., dry well, permeable pavement, infiltration facility, etc.)
- Sand
- Bioretention Soil
- Peat
- Other: \_\_\_\_\_

Type of Pre-Treatment Facility:

- Sediment forebay (above ground)
- Sedimentation chamber
- Plunge pool
- Stone diaphragm
- Grass filter strip
- Grass channel
- Other: Needs riprap/cleanout

*Ideally, Bioretention facilities should be inspected and cleaned up annually, preferably during the Spring. During the first 6 months following construction of a bioretention facility, the site should be inspected at least twice after storm events that exceed 1/2-inch of rainfall. Watering is needed once a week during the first 2 months following installation, and then as needed during the first growing season (April-October), depending upon rainfall. If vegetation needs to be replaced, one-time spot fertilization may be needed, preferably using an organic rather than a chemical fertilizer. Each facility should have a customized routine maintenance schedule addressing issues such as the following: grass mowing, weeding, trash removal, mulch raking and maintenance, erosion repair, reinforcement plantings, tree and shrub pruning, and sediment removal.*

| Element of BMP             | Potential Problem  | Problem? Y/N |     |           | How to fix problem   | Who Will Address Problem                | Comments |
|----------------------------|--|--------------|-----|-----------|--|---|----------|
|                            |  | Investigate? | Y/N | Repaired? |  |   |          |
| Contributing Drainage Area | Adequate vegetation  | N            |     |           | Supplement as necessary  | Owner or professional                   |          |
|                            | There is excessive trash and debris                                    | N            |     |           | Remove immediately   | Owner or professional                   |          |
|                            | There is evidence of erosion and / or bare or exposed soil             | N            |     |           | Stabilize immediately  | Owner or professional                   |          |
|                            | There are excessive landscape waste or yard clippings                  | N            |     |           | Remove immediately and recycle or compost  | Owner or professional                   |          |
|                            | Oil, grease or other unauthorized substances are entering the facility | N            |     |           | Identify and control the source of this pollution. It may be necessary to erect fences, signs, etc | Owner or professional                   |          |
| Pre-Treatment              | There is adequate access to the pre-treatment facility                 | N            |     |           | Establish adequate access  | Professional and, perhaps, the locality |          |

| Element of BMP                             | Potential Problem   | Problem?<br>Y / N | Investigate?<br>Y / N | Repaired?<br>Y / N | How to fix problem   | Who Will Address Problem | Comments    |
|--|---|-------------------|-----------------------|--------------------|--|--------------------------|-------------|
|  |   |                   |                       |                    |  |                          |             |
|  | Excessive trash, debris, or sediment.   | Y                 |                       |                    | Remove immediately   | Owner or professional    | some debris |
| Pre-Treatment (continued)                  | There is evidence of clogging (standing water, noticeable odors, water stains, algae or floating aquatic vegetation, or oil/grease)                 | N                 |                       |                    | Identify and eliminate the source of the problem. If necessary, remove and clean or replace the clogged material.                              | Professional             |             |
|  | There is evidence of erosion and / or exposed soil  | N                 |                       |                    | Stabilize immediately  | Owner or professional    |             |
|  | There is dead vegetation or exposed soil in the grass filter  | N                 |                       |                    | Restabilize and revegetate as necessary  | Owner or professional    |             |
| Inlets                                     | Check for sediment build-up at curb cuts, gravel diaphragms or pavement edges that prevent flow from getting into the bed, and check for bypassing. | N                 |                       |                    | Remove sediment and correct any other problems that block inflow.  | Owner or professional    |             |
|  | There is excessive trash, debris, or sediment.  | N                 |                       |                    | Remove immediately   | Owner or professional    |             |
|  | There is evidence of erosion at or around the inlet   | N                 |                       |                    | Repair erosion damage and reseed or otherwise restabilize with vegetation  | Owner or professional    |             |
|  | Inflow is hindered by trees and/or shrubs.  | N                 |                       |                    | Remove woody vegetation from points of inflow and directly above underdrains. (Trees and shrubs may be located closer to the perimeter.)       | Owner or professional    |             |
| Side Slopes (Annually, after major storms) | There is evidence of rill or gully erosion or bare soil   | N                 |                       |                    | Identify the source of erosion damage and prevent it from recurring. Repair erosion damage and reseed or otherwise restabilize with vegetation | Owner or professional    |             |
|  | There is excess sediment accumulation   | N                 |                       |                    | Remove immediately   | Owner or professional    |             |
|  | Side slopes support nuisance animals.   | N                 |                       |                    | Animal burrows must be backfilled and compacted. Burrowing animals should be humanely removed from the area.                                   | Professional             |             |
| Vegetation (monthly)                       | Plant composition is consistent with the approved plans and any stakes or wires are in good condition.  | N                 |                       |                    | Determine if existing plant materials are at least consistent with general Bioretention design criteria and replace inconsistent species.      | Professional             |             |
|  | There should be 75-90% cover (mulch plus vegetation), and the mulch cover should be 2-3 inches deep.  | N                 |                       |                    | Supplement vegetation and mulch as needed.   |                          |             |

| Element of BMP  | Potential Problem  | Problem? | Investigate? | Repaired? | How to fix problem   | Who Will Address Problem | Comments   |
|---|--|----------|--------------|-----------|--|--------------------------|------------|
|   |  | Y / N    | Y / N        | Y / N     |  |                          |            |
| <b>Vegetation</b><br><i>(monthly)</i><br><b>(continued)</b> | There is evidence of hydrocarbons or other deleterious materials, resulting in unsatisfactory plant growth or mortality, | N        |              |           | Replace contaminated mulch. If problem persists, test soils for hydrocarbons and other toxic substances. If excess levels are found, the soils, plants and mulch may all need to be replaced in accordance with the approved construction plans.   | Professional             |            |
|   | Invasive species or weeds make up at least 10% of the facility's vegetation  | Y        |              |           | Remove invasive species and excessive weeds immediately and replace vegetation as needed.  | Owner or professional    | some weeds |
|   | The grass is too high  | N        |              |           | Mow within a week. Grass species should be selected that have dense cover, are relatively slow growing, and require the least mowing and chemical inputs. Grass should be from 6-10 inches high.   | Owner or professional    |            |
|   | Vegetation is diseased, dying or dead  | N        |              |           | Remove and replace. Increase watering, but avoid using chemical fertilizers, unless absolutely necessary.  | Professional             |            |
|   | Winter-killed or salt-killed vegetation is present.  | N        |              |           | Replace with hardier species.  | Owner or professional    |            |
| <b>Filter Media</b><br><i>(Annually)</i>                    | The filter media is too low, too compacted, or the composition is inconsistent with design specifications                | N        |              |           | Raise the level, loosen and amend or replace the media, as needed, to be consistent with the state design criteria for Bioretention (85-88% sand 8-12% soil fines 3-5% organic matter in form of leaf compost). Other remediation options are described in the maintenance section of the state design criteria for Bioretention | Professional             |            |
|   | The mulch is older than 3 years or is otherwise in poor condition  | N        |              |           | The mulch must be replaced every 2-3 years   | Professional             |            |
|   | There is evidence that chemicals, fertilizers, and/or oil/grease are present   | N        |              |           | Remove undesirable chemicals from media and facility immediately, and replace mulch or media as needed   | Professional             |            |
|   | There is excessive trash, debris, or sediment.   | N        |              |           | Remove trash and debris immediately. Check plant health and, without damaging plants, manually remove the sediment, especially if the depth exceeds 20% of the facility's design depth.  | Owner or professional    |            |
|   | There is evidence of concentrated flows, erosion or exposed soil   | N        |              |           | Identify the source of erosion damage and prevent it from recurring. Repair the erosion damage and reseed or otherwise restabilize with vegetation.  | Professional             |            |

| Element of BMP   | Potential Problem   | Problem? Y / N     |                 |  | How to fix problem  | Who Will Address Problem | Comments |
|--|---|--------------------|-----------------|--|---|--------------------------|----------|
|  |   | Investigate? Y / N | Repaired? Y / N |  |   |                          |          |
| <b>Filter Media</b><br><i>(Annually)</i><br><b>(continued)</b> | The filter bed is clogged and/or filled inappropriately   | N                  |                 |  | Redistribute the soil substrate and remove sediment within 2 weeks.   | Professional             |          |
|  | The topsoil is in poor condition (e.g., the pH level is not 6-7, the composition is inappropriate, etc.)  | N                  |                 |  | Ensure a 3-inch surface depth of topsoil consistent with the state design criteria for Bioretention (loamy sand or sandy loam texture, with less than 5% clay content, and organic matter content of at least 2%). If the pH is less than 6.5, spread limestone.  | Professional             |          |
| <b>Underdrain/ Proper Drainage</b>                             | The perforated pipe is not conveying water as designed  | N                  |                 |  | Determine if the pipe is clogged with debris or if woody roots have pierced the pipe. Immediately clean out or replace the pipe, as necessary.  | Professional             |          |
|  | The underlying soil interface is clogged (there is evidence on the surface of soil crusting, standing water, the facility does not dewater between storms, or water ponds on the surface of basin for more than 48 hours after an event). | N                  |                 |  | Measure the draw-down rate of the observation well for three days following a storm event in excess of 1/2 inches in depth. After three days, if there is standing water on top but not in the underdrain, this indicates a clogged soil layer. If standing water is both on the surface and in the underdrain, then the underdrain is probably clogged. This should be promptly investigated and remediated to restore proper filtration. Grading changes may be needed or underdrain repairs made. The filter media may need to be raked, excavated and cleaned or replaced to correct the problem. Holes that are not consistent with the design and allow water to flow directly through a planter to the ground must be plugged. | Professional             |          |
| <b>Planters</b>  | The planter is unable to receive or detain stormwater prior to infiltration. Water does not drain from the reservoir within 3-4 hours of after a storm event.   |                    |                 |  | Identify and correct sources of clogging. Topsoil and sand/peat layer may need to be amended with sand or replaced all together.  | Owner or professional    |          |
|  | The planter has structural deficiencies, including rot, cracks, and failure, or the planter is unable to contain the filter media or vegetation   |                    |                 |  | Make needed repairs immediately.  | Owner or professional    |          |
| <b>Outlet/ Overflow Spillway</b>                               | Outlets are obstructed or erosion and soil exposure is evident below the outlet.  | N                  |                 |  | Remove obstructions and stabilize eroded or exposed areas.  | Owner or Professional    |          |

| Element of BMP                                 | Potential Problem  | Problem? Y / N | Investigate? | Repaired? | How to fix problem  | Who Will Address Problem                         | Comments |
|--|--|----------------|--------------|-----------|---|--|----------|
|  |  |                | Y / N        | Y / N     |   |  |          |
| Outlet/<br>Overflow<br>Spillway<br>(continued) | There is excessive trash, debris, or sediment at the outlet                        | N              |              |           | Remove immediately, and keep the contributing area free of trash and debris.  | Owner or professional                            |          |
|  | Any grates present are in good condition   | N              |              |           | Repair or replace as necessary  | Owner or professional                            |          |
| Observation Well                               | Is the observation well still capped?  | N              |              |           | Repair, as necessary.   | Professional                                     |          |
| Overall  | Access to the Infiltration facility or its components is adequate                  | N              |              |           | Establish adequate access. Remove woody vegetation and debris that may block access. Ensure that hardware can be opened and operated.   | Professional and, perhaps, the locality          |          |
|  | There is evidence of standing water  | N              |              |           | Fill in low spots and stabilize; correct flow problems causing ponding.   | Owner or professional                            |          |
|  | Mosquito proliferation   | N              |              |           | Eliminate stagnant pools and establish vegetation; treat for mosquitoes as needed. If sprays are considered, then a mosquito larvicide, such as Bacillus thurendensis or Altoside formulations can be applied <i>only if absolutely necessary</i> . | Owner or professional                            |          |
|  | Complaints from local residents  | N              |              |           | Correct real problems   | Owner or professional                            |          |
|  | Encroachment on the bioretention area or easement by buildings or other structures | N              |              |           | Inform involved property owners of BMPs status ; clearly mark the boundaries of the receiving pervious area, as needed  | Owner or professional (and perhaps the locality) |          |

1. Few pieces of debris.
2. Overall in good condition.
3. Some weeds present.