



Appendix H PTP Operation and Maintenance Plans

Includes the following:

- BMP Maintenance Agreement
- BMP location map (example)
- BMP schematics (example)
- BMP maintenance and inspection templates
- Annual BMP report template

Operation and Maintenance Plan

Procedure

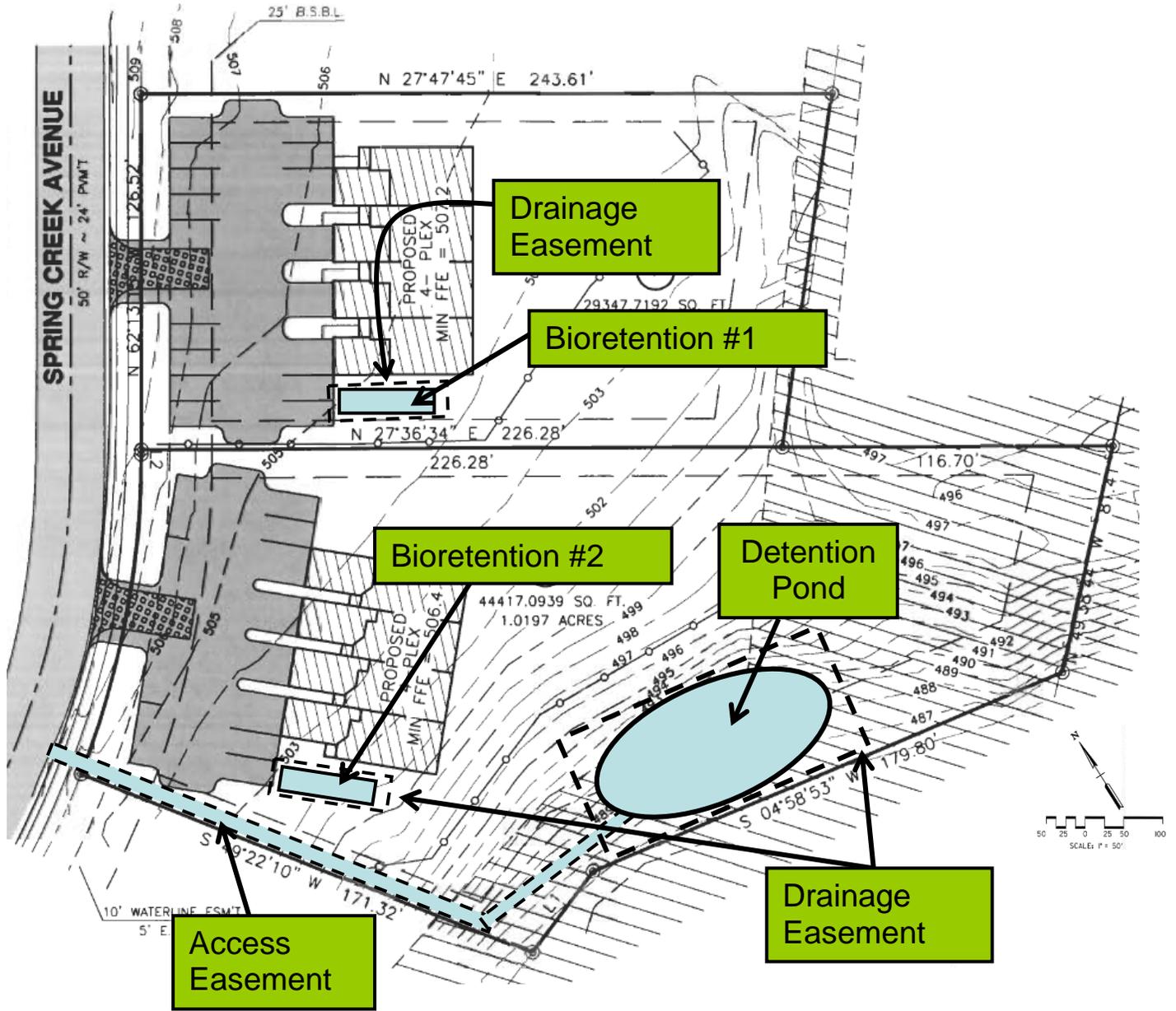
The Operation and Maintenance (O&M) Plan for each site must be finalized prior to final SWMP approval. It is recommended that the designer/developer submit the O&M plan once the City has completed their review of the SWMP to prevent multiple submittals the O&M Plan. It is likely that the SWMP will be modified or revised during the City's review process. Note that the O&M Plan must be recorded with the deed to ensure the information about the PTPs and maintenance requirements is transferred along with the property.

Contents

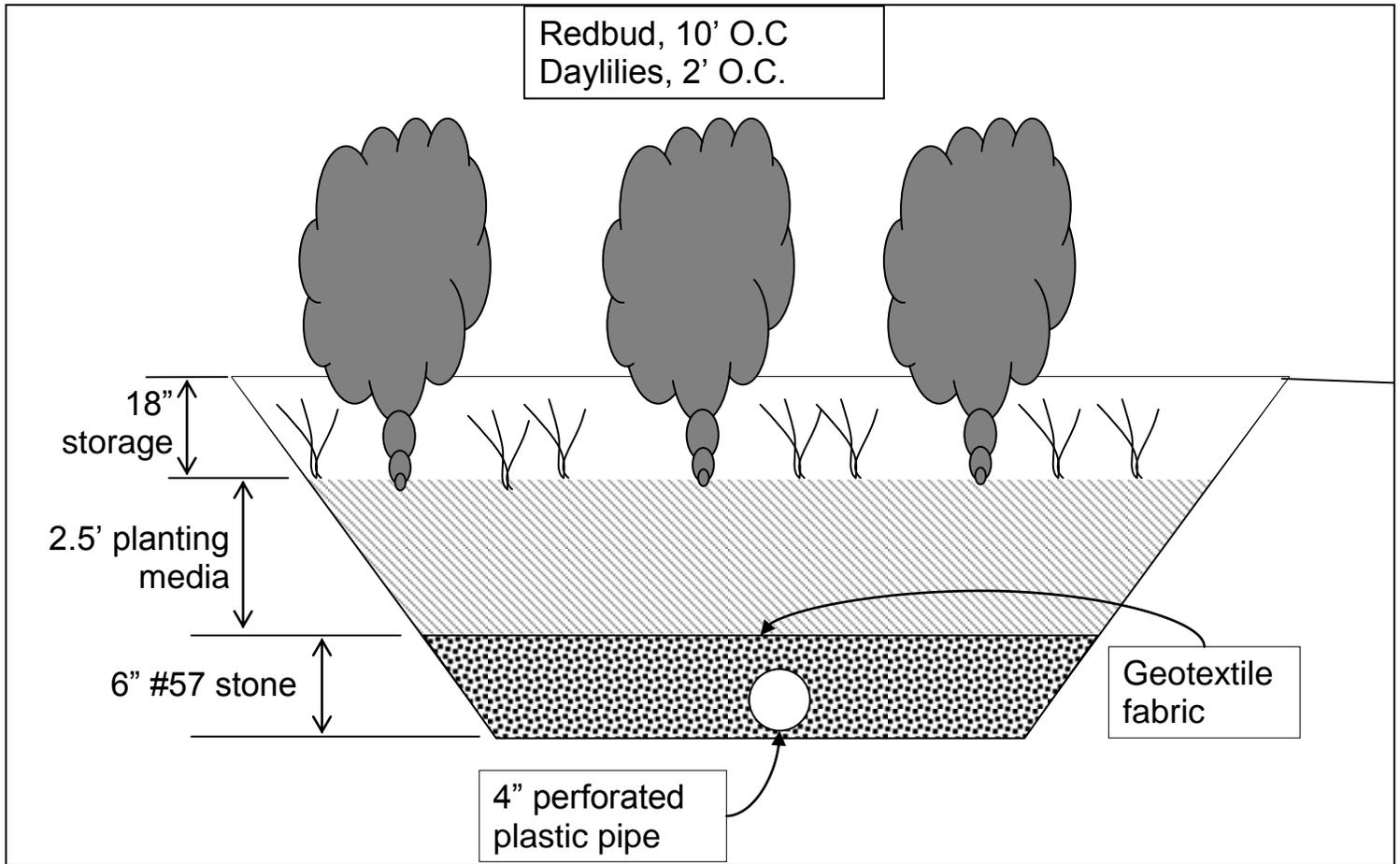
All permanent treatment practices must be maintained perpetually. To facilitate the long term maintenance and functionality of the practices, Bowling Green requires the developer to prepare an Operation and Maintenance (O&M) Plan for each site and requires that the landowner perform an annual inspection of the facility. A template for the inspection is included with the O&M Plan, and the O&M Plan must be recorded with the deed.

1. **Completed Operation and Maintenance Agreement**
2. **Location map.** The location map should show the locations of all permanent stormwater management treatment practices and easements. This map should be specific and clear enough for a landowner to identify the practice on the property.
3. **Schematics for the PTP.** These schematics must show the general BMP depth, length, inlets and outlets. For bioretention areas, the schematics should note that the mulch, planting media and vegetation are all components of the PTP. Underdrains must be clearly noted as well. For measures with observation wells, locations of the observation wells must be identified. Pretreatment components must also be identified on the schematics. Note that the schematic is not required to be surveyed.
4. **Template inspection reports.** Each PTP has a template inspection report. The template inspection report must be included in the O&M plan. If the PTP is a proprietary or non-standard practice, the developer/designer is required to provide an inspection report that covers basic maintenance needs with maintenance frequency. The manufacturer of the practice can provide this information. An inspection report for each type of PTP on the project must be included.
5. **Annual inspection report**

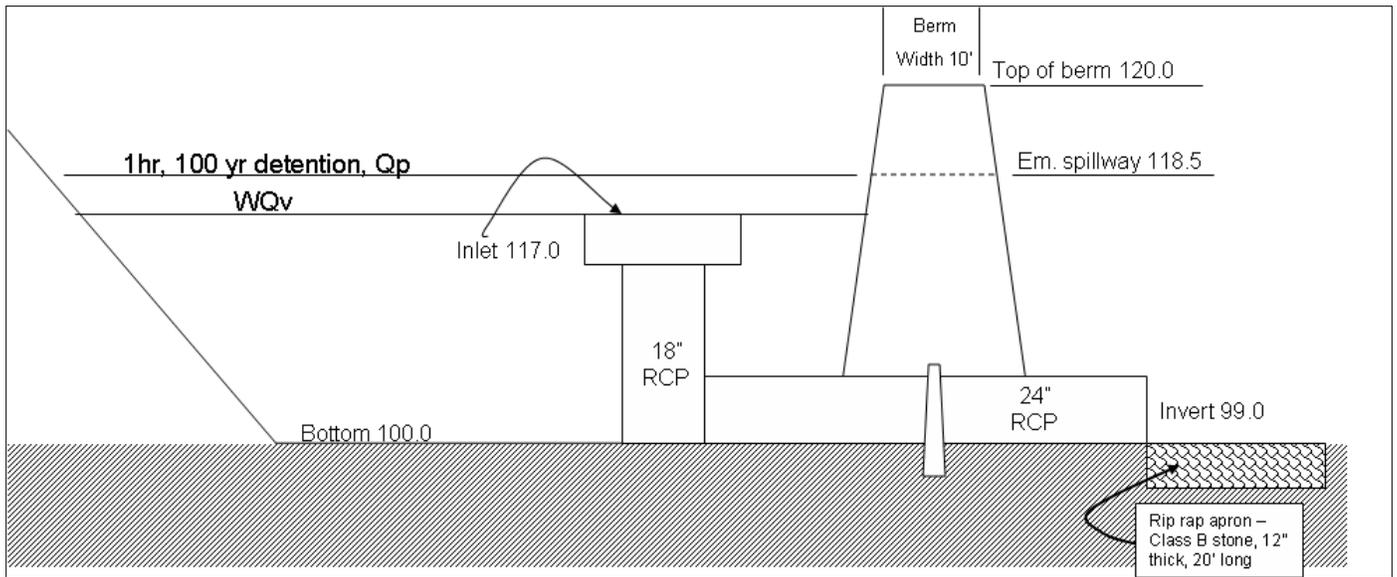
BMP Location Plan (Example)



Bioretention Area 1 (Example)



Detention Pond (Example)





Storm Water Pond

Inspection Checklist for BMP Owners

Site name: _____
 BMP Number: _____
 Owner Change since last inspection? Y N
 Owner Name _____
 Address _____
 Phone Number _____
 Location: _____
 Inspection Date: _____ Time: _____
 Inspector: _____
 Weather Conditions: _____
 Was flow observed: If so, what was the appearance of the water (i.e. color, sheen, estimated flow rate, etc.)?

| Maintenance Item | Inspected? (Yes/No) | Maintenance needed? (Yes/No) | Comments |
|--|------------------------|------------------------------------|----------|
| Embankment and Emergency Spillway (Inspect annually and after major storms) | | | |
| Circle Type: Reinforced concrete, corrugated pipe, masonry, other _____ | | | |
| 1. Vegetation | | | |
| 2. Erosion on embankment | | | |
| 3. Animal burrows | | | |
| 4. Cracking, bulging or sliding of dam | | | |
| A. Location: | | | |
| B. Describe | | | |
| 5. Drains clear and functioning | | | |
| 6. Leaks or seeps on embankment | | | |
| A. Location | | | |
| B. Describe | | | |
| 7. Slope protection failure | | | |
| 8. Emergency spillway clear of obstructions | | | |
| 9. Other (describe) | | | |
| Riser and Principal spillway (Inspect annually) | | | |
| Circle Type: Reinforced concrete, corrugated pipe, masonry, other _____ | | | |
| 1. Low flow orifice blocked | | | |
| 2. Trash rack | | | |
| A. debris removal needed | | | |
| B. corrosion noted | | | |
| 3. Excessive sediment buildup in riser | | | |
| 4. Concrete/Masonry condition | | | |
| A. cracks or displacement | | | |

| Maintenance Item | Inspected? (Yes/No) | Maintenance needed? (Yes/No) | Comments |
|---|------------------------|------------------------------------|----------|
| B. spalling | | | |
| 5. Metal pipe condition | | | |
| 6. Control Valve operational | | | |
| 7. Pond drain valve operational | | | |
| 8. Outfall channels functioning | | | |
| 9. Other (describe) | | | |
| Permanent Pool (Inspect monthly) | | | |
| 1. Undesirable vegetative growth | | | |
| 2. Floatable debris removal needed | | | |
| 3. Visible pollution | | | |
| 4. Shoreline erosion | | | |
| 5. Other (describe) | | | |
| Sediment Forebays | | | |
| 1. Sediment deposition noted | | | |
| 2. Sediment cleanout needed (over 50% full) | | | |
| Other (Inspect monthly) | | | |
| 1. Erosion at outfalls into pond | | | |
| 2. Headwalls and endwalls | | | |
| 3. Encroachment into pond or easement area | | | |
| 4. Complaints from residents | | | |
| 5. Public hazards (describe) | | | |
| 6. Needs to be mowed | | | |
| 7. Other vegetation needs to be removed | | | |

Note: If any inspection items were checked "yes" for maintenance needed, list maintenance actions and dates completed below.

| Maintenance Action Needed | Date Due | Completed? Y/N |
|---------------------------|----------|-------------------|
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Inspector signature: _____



Storm Water Constructed Wetland Inspection Checklist for BMP Owners

Site name: _____
 BMP Number: _____
 Owner Change since last inspection? Y N _____
 Owner Name _____
 Address _____
 Phone Number _____ Location: _____
 Inspection Date: _____ Time: _____
 Inspector: _____
 Weather Conditions: _____
 Was flow observed: If so, what was the appearance of the water (i.e. color, sheen, estimated flow rate, etc.)?

| Maintenance Item | Inspected? (Yes/No) | Maintenance needed? (Yes/No) | Comments |
|--|------------------------|------------------------------------|----------|
| Embankment and Emergency Spillway (Inspect annually and after major storms) | | | |
| Circle Type: Reinforced concrete, corrugated pipe, masonry, other _____ | | | |
| 1. Vegetation | | | |
| 2. Erosion on embankment | | | |
| 3. Animal burrows | | | |
| 4. Cracking, bulging or sliding of dam | | | |
| A. Location: | | | |
| B. Describe | | | |
| 5. Drains clear and functioning | | | |
| 6. Leaks or seeps on embankment | | | |
| A. Location | | | |
| B. Describe | | | |
| 7. Slope protection failure | | | |
| 8. Emergency spillway clear of obstructions | | | |
| 9. Other (describe) | | | |
| Riser and Principal spillway (Inspect annually) | | | |
| Circle Type: Reinforced concrete, corrugated pipe, masonry, other _____ | | | |
| 1. Low flow orifice blocked | | | |
| 2. Trash rack | | | |
| A. debris removal needed | | | |
| B. corrosion noted | | | |
| 3. Excessive sediment buildup in riser | | | |
| 4. Concrete/Masonry condition | | | |
| A. cracks or displacement | | | |
| B. spalling | | | |
| 5. Metal pipe condition | | | |
| 6. Control Valve operational | | | |
| 7. Pond drain valve operational | | | |

| Maintenance Item | Inspected? (Yes/No) | Maintenance needed? (Yes/No) | Comments |
|--|------------------------|------------------------------------|----------|
| 8. Outfall channels functioning | | | |
| 9. Other (describe) | | | |
| Permanent Pool (Inspect monthly) | | | |
| 1. Undesirable vegetative growth | | | |
| 2. Floatable debris removal needed | | | |
| 3. Visible pollution | | | |
| 4. Shoreline erosion | | | |
| 5. Sediment deposits noted | | | |
| 6. Other (describe) | | | |
| Sediment Forebays | | | |
| 1. Sediment deposition noted | | | |
| 2. Sediment cleanout needed (over 50% full) | | | |
| Other (Inspect monthly) | | | |
| 1. Erosion at outfalls | | | |
| 2. Headwalls and endwalls | | | |
| 3. Encroachment into pond or easement area | | | |
| 4. Complaints from residents | N/A | | |
| 5. Public hazards (describe) | N/A | | |
| 6. Needs to be mowed | | | |
| 7. Other vegetation needs to be removed | | | |
| Constructed Wetland Area (inspect annually) | | | |
| 1. Vegetation healthy | | | |
| 2. Evidence of invasive species | | | |
| 3. Sediment deposits noted in wetland area (clean out when 50% full or when vegetation damage noted) | | | |

Note: If any inspection items were checked "yes" for maintenance needed, list maintenance actions and dates completed below.

| Maintenance Action Needed | Date Due | Completed? Y/N |
|---------------------------|----------|-------------------|
| | | |
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Inspector signature: _____



Storm Water Bioretention Area Inspection Checklist for BMP Owners

Site name: _____
 BMP Number: _____
 Owner Change since last inspection? Y N _____
 Owner Name _____
 Address _____
 Phone Number _____ Location: _____
 Inspection Date: _____ Time: _____
 Inspector: _____
 Weather Conditions: _____
 Was flow observed: If so, what was the appearance of the water (i.e. color, sheen, estimated flow rate, etc.)?

| Maintenance Item | Inspected? (Yes/No) | Maintenance needed? (Yes/No) | Comments |
|--|------------------------|------------------------------------|----------|
| Treatment area (Inspect after major storm events) | | | |
| 1. Evidence of drainage (Is water ponding less than 24 hrs after rain event?) | | | |
| 2. Signs of erosion noted (in contributing watershed or in bioretention area?) | | | |
| 3. Mulch condition – thin or decomposing? | | | |
| 4. Sediment deposits noted in treatment area? | | | |
| 5. Vegetation condition | | | |
| 6. Overflow spillway in good condition? | | | |
| 7. Other (describe) | | | |
| | | | |

Note: If any inspection items were checked "yes" for maintenance needed, list maintenance actions and dates completed below.

| Maintenance Action Needed | Date Due | Com- pleted? Y/N |
|---------------------------|----------|------------------------|
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Inspector signature: _____



Storm Water Open Channel Systems

Wet and Dry Inspection Checklist for BMP Owners

Site name: _____
 BMP Number: _____ Channel Type: (circle) Wet Dry
 Owner Change since last inspection? Y N
 Owner Name _____
 Address _____
 Phone Number _____ Location: _____
 Inspection Date: _____ Time: _____
 Inspector: _____
 Weather Conditions: _____
 Was flow observed: If so, what was the appearance of the water (i.e. color, sheen, estimated flow rate, etc.)?

| Maintenance Item | Inspected? (Yes/No) | Maintenance needed? (Yes/No) | Comments |
|--|------------------------|------------------------------------|----------|
| Channel treatment area (Inspect after major storm events) | | | |
| 1. Evidence of trash/debris build up? | | | |
| 2. Signs of erosion noted in channel | | | |
| 3. Evidence of ponding | | | |
| A. In dry swale, more than 12 hrs | | | |
| B. In wet swale, more than 48 hrs | | | |
| 4. Vegetation in good condition? | | | |
| Spillway systems (Inspect annually) | | | |
| 1. Dry Swale – outlet of underdrain stabilized? | | | |
| 2. Wet Swale - Check dam(s) in good condition? | | | |
| 3. Other (specify) | | | |

Note: If any inspection items were checked "yes" for maintenance needed, list maintenance actions and dates completed below.

| Maintenance Action Needed | Date Due | Com- pleted? Y/N |
|----------------------------------|-----------------|---------------------------------|
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Inspector signature: _____



Storm Water Infiltration Trench/Basin Inspection Checklist for BMP Owners

Site name: _____
 BMP Number: _____
 Owner Change since last inspection? Y N
 Owner Name _____
 Address _____
 Phone Number _____ Location: _____
 Inspection Date: _____ Time: _____
 Inspector: _____
 Weather Conditions: _____
 Was flow observed: If so, what was the appearance of the water (i.e. color, sheen, estimated flow rate, etc.)?

| Maintenance Item | Inspected? (Yes/No) | Maintenance needed? (Yes/No) | Comments |
|---|------------------------|------------------------------------|----------|
| Treatment area (Inspect after major storm events) | | | |
| 1. Treatment area – free of debris/trash? | | | |
| 2. Treatment area – free of erosion? | | | |
| 3. Contributing watershed – stabilized? | | | |
| 4. Treatment area – water ponding more than 24 hrs? | | | |
| 5. Observation well(s) – water within 1 foot of bottom of trench/basin? | | | |
| 6. Signs of subsurface collapse in treatment area? | | | |
| 7. Other (describe) | | | |
| | | | |

Note: If any inspection items were checked "yes" for maintenance needed, list maintenance actions and dates completed below.

| Maintenance Action Needed | Date Due | Completed? Y/N |
|---------------------------|----------|-------------------|
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Inspector signature: _____



Storm Water Manufactured BMP Inspection Checklist for BMP Owners

Site name: _____
 BMP Product Name: _____
 BMP Number: _____
 Owner Change since last inspection? Y N
 Owner Name _____
 Address _____
 Phone Number _____ Location: _____
 Inspection Date: _____ Time: _____
 Inspector: _____
 Weather Conditions: _____
 Was flow observed: If so, what was the appearance of the water (i.e. color, sheen, estimated flow rate, etc.)?

Note: The following maintenance plan items must be filled in based upon the manufacturer's recommendations and submitted to the City of Bowling Green for approval with the maintenance agreement.

| Maintenance Item/Maintenance Frequency | Inspected? (Yes/No) | Maintenance needed? (Yes/No) | Comments |
|--|---------------------|------------------------------|----------|
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Note: If any inspection items were checked "yes" for maintenance needed, list maintenance actions and dates completed below.

| Maintenance Action Needed | Date Due | Completed? Y/N |
|---------------------------|----------|----------------|
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Inspector signature: _____