



Post Construction Stormwater Maintenance:
The benefits of proactively maintaining stormwater systems

October 11, 2019

Agenda



Perspective

Inspection Requirements

Compliance

Cost Savings

Property Value



Terms and Definitions



Maintenance: Vegetation management



Terms and Definitions



Maintenance: Trash and debris removal



Terms and Definitions



Inspections: Inspecting all structures for proper function



Terms and Definitions



Non – Routine Maintenance Services: ER callouts, sediment removal



Terms and Definitions



Non – Routine Maintenance Services: Underground propriety cleaning, basin rehab



Reason #1 - Inspection Requirements



Required of the property owner:

- Annual Inspection – Should be performed by stormwater professional
- Certified Inspection – Requires a P.E. or R.L.A. license
- Municipal Inspection – Performed by the regulating municipal body
- All types of inspections are designed to ensure that the stormwater facility is performing as *designed*
- Variable frequency depending on the site and jurisdictional requirements
- Need to be submitted to the regulatory agency on specific anniversary dates
- Inspections identify deficiencies in the system:
 - Municipalities set deadlines, require the property owner to bring systems back into compliance
 - Non-compliance result in possible fines and civil penalties



Constructed Wetland – Durham, NC

Extensive required replanting, wetland not maintained by stormwater experts



**Multiple plant zones (deep pool, shelf, upland)
Good species diversity within zones**

**Complete plant loss in upland zone
Poor species diversity, spreading invasives**



Bio-Retention Bed – Raleigh, NC

No regular maintenance, multiple required repairs that could have been avoided



Mowing had to be completed on short timeline but could be part of preventative maintenance



Bio-Retention Bed – Raleigh, NC

No regular maintenance, multiple required repairs that could have been avoided



Regular vegetative maintenance could prevent mandatory repair to this dissipater pad



Retention Pond – Mooresville, NC

Regular preventative maintenance, passing inspection with no additional repairs



Pond is well vegetated with clean stone in spillway



Retention Pond – Mooresville, NC

Regular preventative maintenance, passing inspection with no required repairs

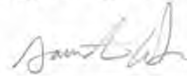


Control structure is clean,
functioning properly,
and exercised

A. Certificate of Compliance

I do certify that I conducted an inspection of the SCM described herein. I certify that at the time of my inspection this SCM was performing properly and was in compliance with the terms and conditions of the approved maintenance agreement as required by the Town of Mooresville Phase II Post Construction and Illicit Discharge and Connection Ordinance.

Original signature and seal of the engineer, surveyor, or landscape architect.



3/28/2019

Signature and title

Date

Seal

NC State BMP
Inspection & Maintenance
Certification
#3052



Reason # 2 - Compliance



- O&M Agreements are legal documents between the responsible party/property owner and the regulatory agency
- Describes the expectations of the regulatory agency on how the stormwater facility is to be maintained, inspected and repaired in perpetuity
- Initiated during the design/permitting phase of the project
- Even where O&M's may not be in place regulators will require stormwater systems to meet minimum requirements such as:
 - Vegetation/invasive species removal
 - Mature tree removal on dam slopes
 - Sediment removal to reestablish capacity
 - Discharge and Outfall Device cleaning



Inspection Certifiers – Greenville, NC

O&M agreement requires specific, qualified certifiers to perform annual inspections



3. The Landowner, its successors and assigns, shall have a qualified professional as defined by Title 9 Chapter 9 of the Greenville City Code inspect the stormwater management/BMP facility and maintain annual inspection reports. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the entire facilities, berms, outlet structure, pond areas, access roads, etc. Deficiencies shall be noted in the inspection report. Annual reports shall be kept on record for a minimum of five years and shall be made available to the City upon request.



***Acceptable qualifications/credentials to submit inspection reports includes current NC license as a Professional Engineer (PE) or certification from EnviroCert Internationals, Inc. as a Certified Professional in Storm Water Quality (CPSWQ). NCSU BMP Maintenance & Inspection certification is recommended but does not itself satisfy the qualification requirements.**



Inspection Penalties – Greenville, NC

O&M entitles municipality to enter property and take their own measures



5. In the event the Landowner, its successors and assigns, fails to maintain the stormwater management/BMP facilities in good working condition acceptable to the City within 60 days after receipt of the inspection findings and a directive to commence with the repairs, the City may enter upon the Property and take whatever steps necessary to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the Landowner, its successors and assigns. This provision shall not be



Inspection Requirements – Grantsboro, NC

O&M agreement requires:



- Semi-annual inspections
- Immediate repair of erosion
- Annual reports summarizing maintenance activities and inspection dates
- Keeping vegetation “visually pleasing”



Reason #3 – Cost Savings



- Preventative Maintenance costs less than reactive repairs
 - Case Study Review
- Older sites that have been completely neglected may require large scale repairs to bring back into compliance – more reason to follow these repairs up with a preventative maintenance program
- N.O.T. Inspections – Define and review
- The more frequent the maintenance visit, the lower the cost of each visit and better your stormwater system will perform



Cost Mitigation

Case Study



- ◆ Owner did not have a preventative maintenance program in place since the property was developed approximately 12 months prior
- ◆ City came out and performed an annual inspection and issued a Notice of Violation to the property owner
- ◆ R+R proposed a repair proposal and a maintenance proposal to address deficiencies
- ◆ Maintenance program for property was approximately \$1,400 per year
- ◆ Repair proposal to bring the site back into compliance was \$13,500



Cost Mitigation



Case Study

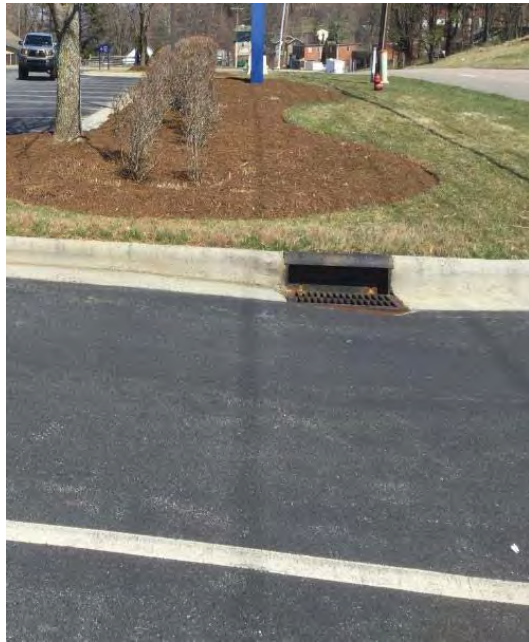


Quarterly Site – West Jefferson, NC

Catch basin sinkhole in entrance lane

- March 20th, 2019

- June 12th, 2019



3 Months...



Reason #4 – Property Values



- Sophisticated buyers are interested in the condition of the stormwater facility
- Poorly maintained systems:
 - Are a liability
 - Postpone closings if deficiencies needs to be addressed prior to the sale
 - Devalue the property
- GA repairs prior to land sale



Repair – GA

Extensive discharge pipe failure found during inspection



- Change of ownership stormwater inspection
- No regular preventative maintenance visit
- 92' of rusted out pipe, huge sinkhole, and a damaged outfall structure that all require full replacement/repair
- Surrounded by environmentally conscious community, heavily wooded area
- Bottom line - **\$128,996**



Who is R+R?



The Stormwater Management Company



- ◆ Nationwide leader of self-performing post-construction stormwater management services
- ◆ Provide stormwater consulting, inspection, maintenance and corrective action services
- ◆ Service commercial, retail, industrial and governmental industries
- ◆ Cater to national retailers





Questions?