Developing a Robust Municipal Stormwater BMP Maintenance Program

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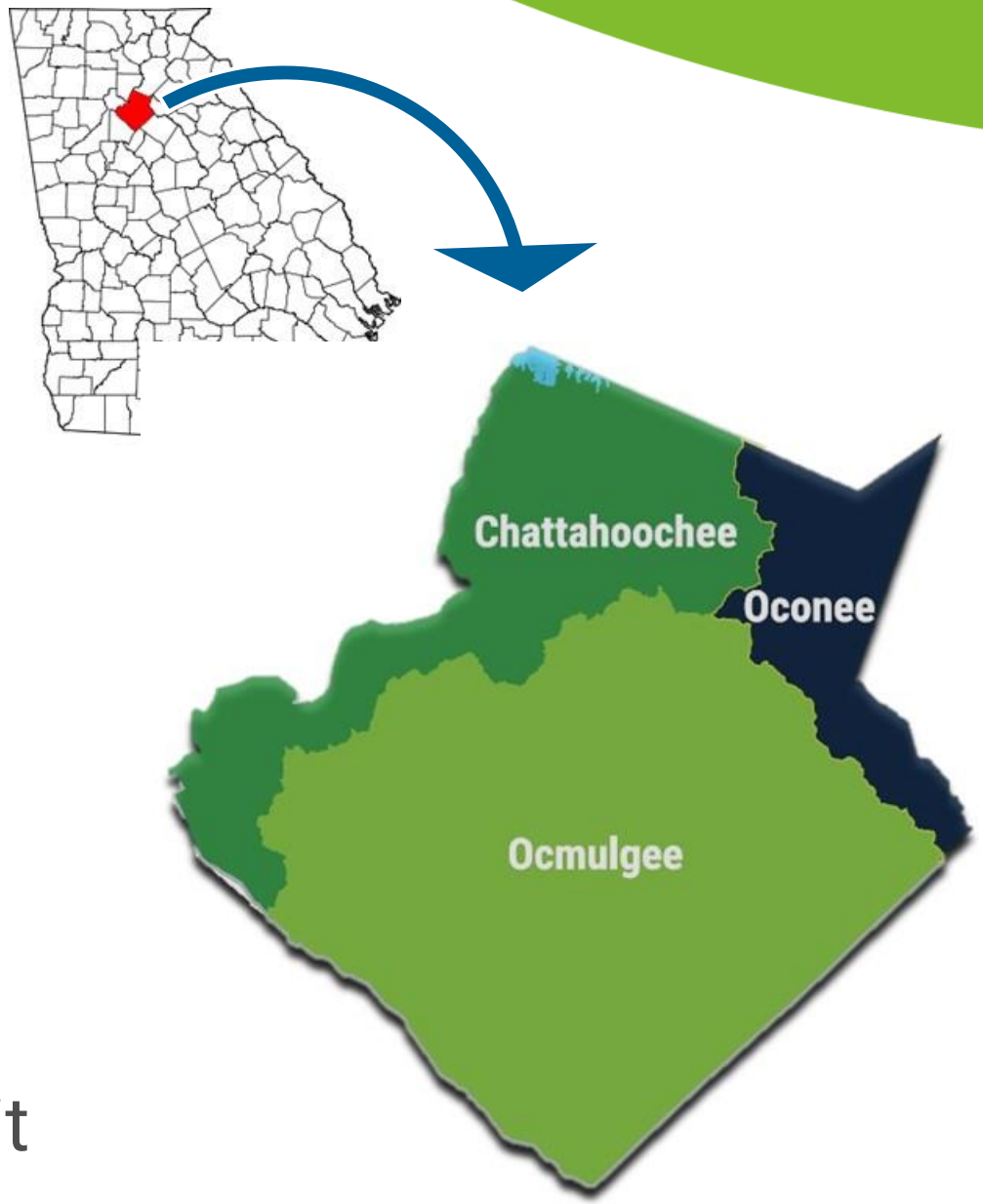
SeSwA Southeast Stormwater Association

Location & Context

- Gwinnett County, GA
  - 440 square miles
  - 2nd most populous county in GA
- GCDWR provides water and wastewater services to over 240,000 customers and maintains the stormwater utility
- NPDES MS4 Phase I Large Permit



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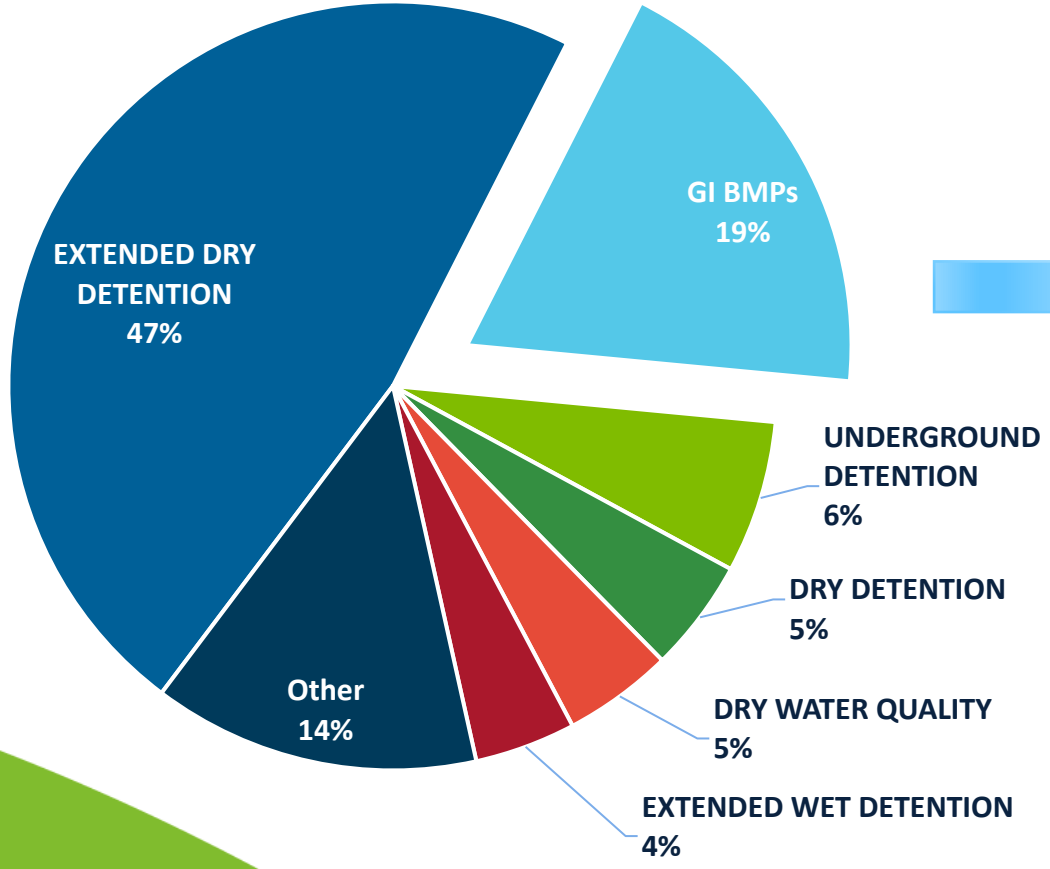
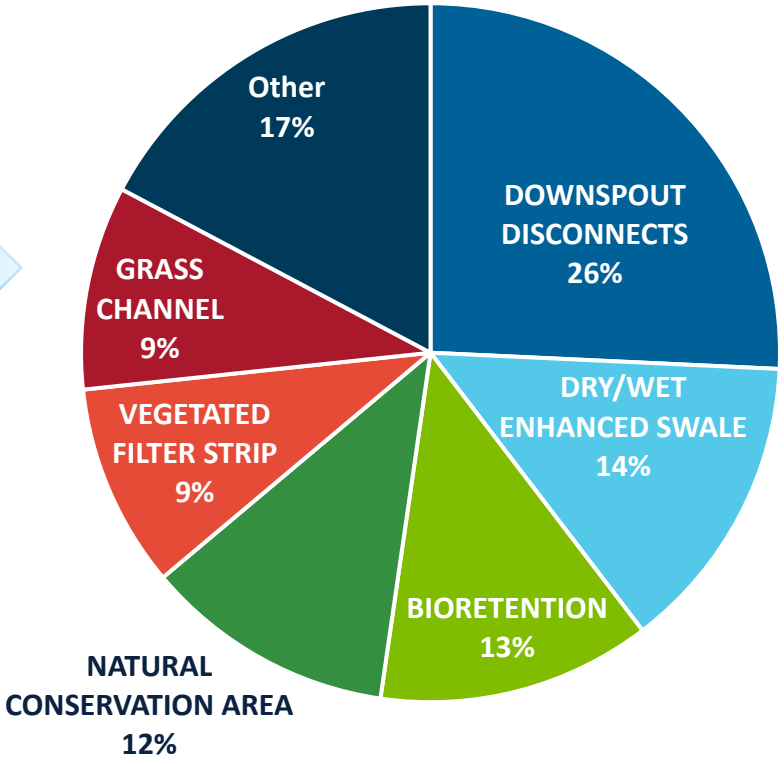
Stormwater BMPs Inventory

Percent of Stormwater BMPs by Type (All Types)



Percent of Green Infrastructure BMPs by Type



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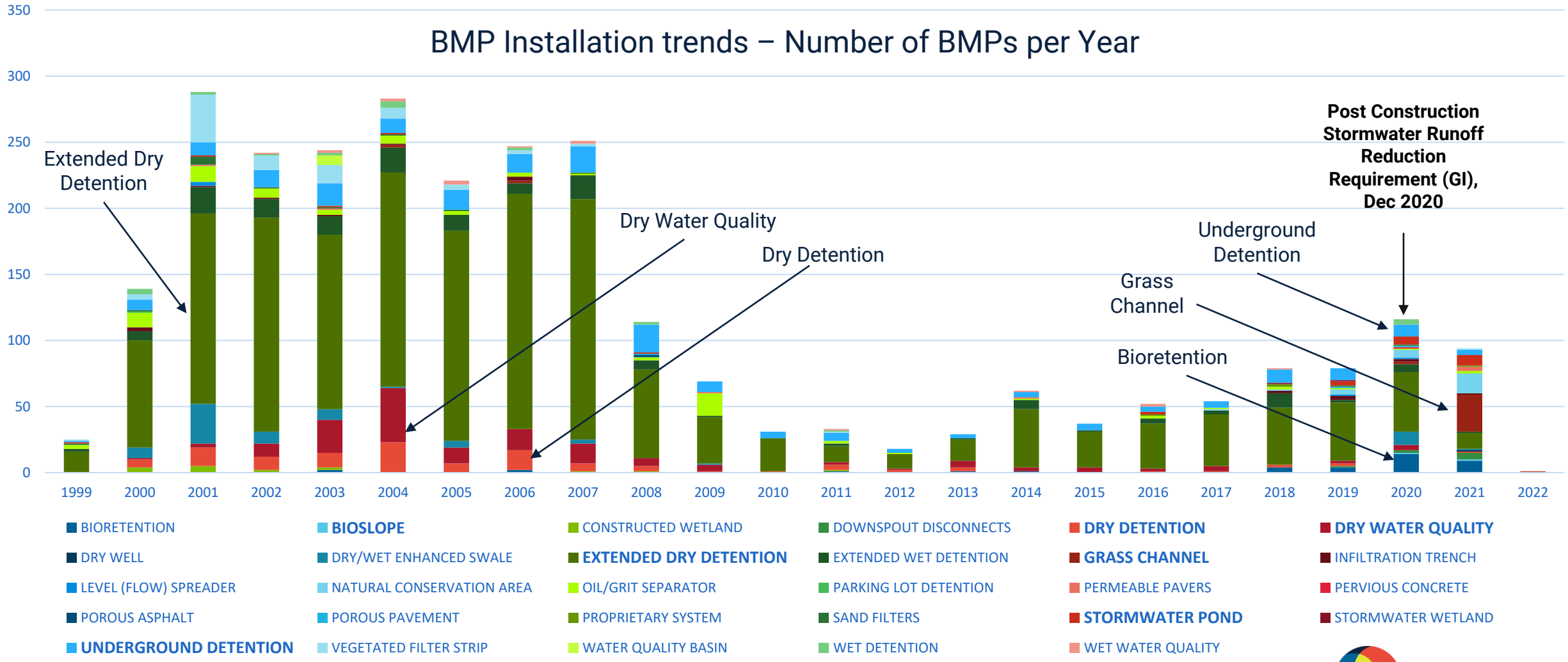
BMP Installation Summary



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Stormwater BMP Inspection

- DWR inspects BMPs at varying frequency (typically once every five years for private BMPs) once As-Built has been approved
- BMP owners are provided an information packet in the mail with copy of Maintenance Agreement, BMP fact sheet, and inspection form upon purchase/as-built approval
- Inspections are logged into Lucity (CMMS) and a report is sent to the owner noting any deficiencies for correction

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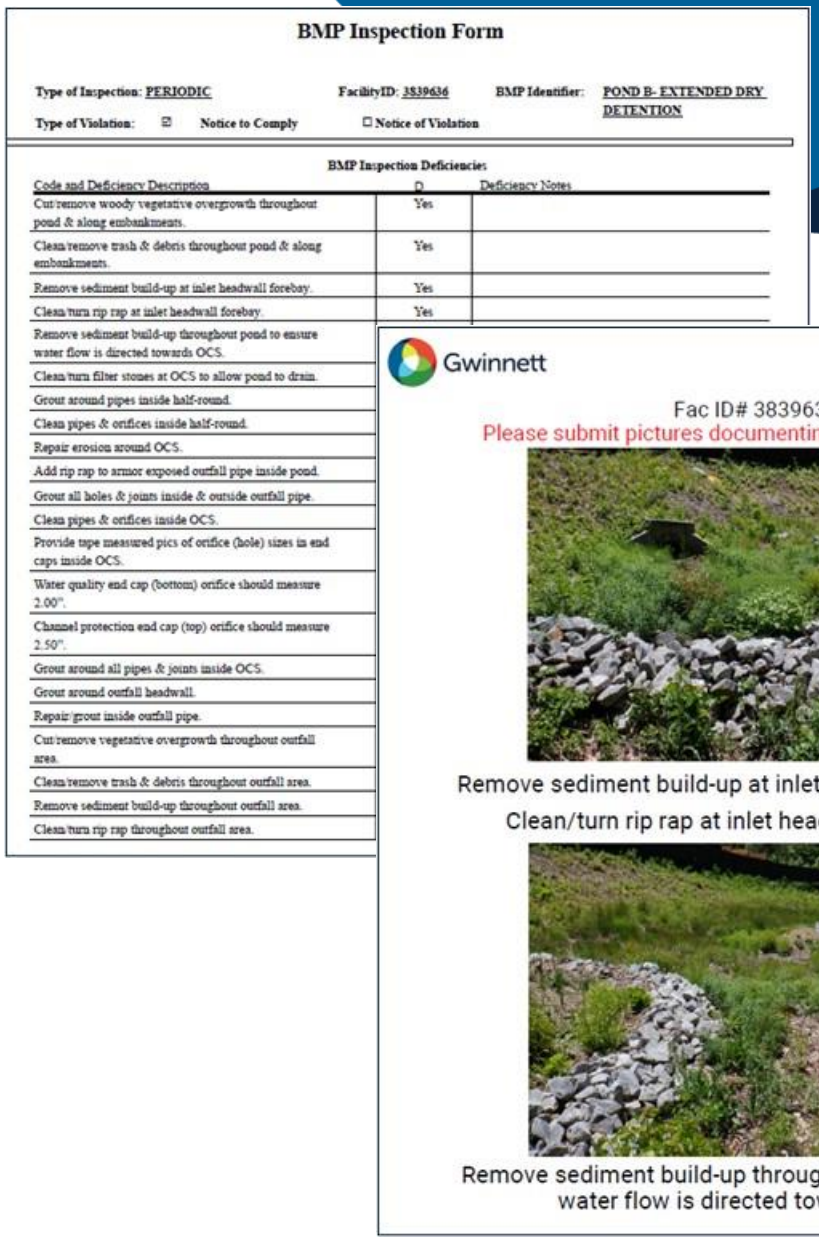
Deficiency Found…. What's Next?

Notice to Comply → Notice to Comply 2 → Notice of Violation → Citation

- Notice to Comply letter is sent to the BMP Owner
- Most BMP Owners are responsive and address deficiencies quickly
- BMP Owners must submit photo documentation illustrating how each of the deficiencies have been addressed.
- Reinspection is performed if photo documentation isn't clear
- Plan of Action developed if Owner is unable to address deficiencies all at once.



BMP Inspection Form

Type of Inspection: PERIODIC Facility ID: 3839636 BMP Identifier: POND B- EXTENDED DRY DETENTION

Type of Violation: ☑ Notice to Comply ☐ Notice of Violation

BMP Inspection Deficiencies

Code and Deficiency Description	D	Deficiency Notes
Cut/remove woody vegetative overgrowth throughout pond & along embankments.	Yes	
Clean/remove trash & debris throughout pond & along embankments.	Yes	
Remove sediment build-up at inlet headwall forebay.	Yes	
Clean/turn rip rap at inlet headwall forebay.	Yes	
Remove sediment build-up throughout pond to ensure water flow is directed towards OCS.		
Clean/turn filter stones at OCS to allow pond to drain.		
Grout around pipes inside half-round.		
Clean pipes & orifices inside half-round.		
Repair erosion around OCS.		
Add rip rap to armor exposed outfall pipe inside pond.		
Grout all holes & joints inside & outside outfall pipe.		
Clean pipes & orifices inside OCS.		
Provide tape measured pics of orifice (hole) sizes in end caps inside OCS.		
Water quality end cap (bottom) orifice should measure 2.00".		
Channel protection end cap (top) orifice should measure 2.50".		
Grout around all pipes & joints inside OCS.		
Grout around outfall headwall.		
Repair/grout inside outfall pipe.		
Cut/remove vegetative overgrowth throughout outfall area.		
Clean/remove trash & debris throughout outfall area.		
Remove sediment build-up throughout outfall area.		
Clean/turn rip rap throughout outfall area.		

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Fac ID# 3839636

Please submit pictures documenting all completed work.

Remove sediment build-up at inlet headwall forebay.

Clean/turn rip rap at inlet headwall forebay.

Remove sediment build-up throughout pond to ensure water flow is directed towards OCS.

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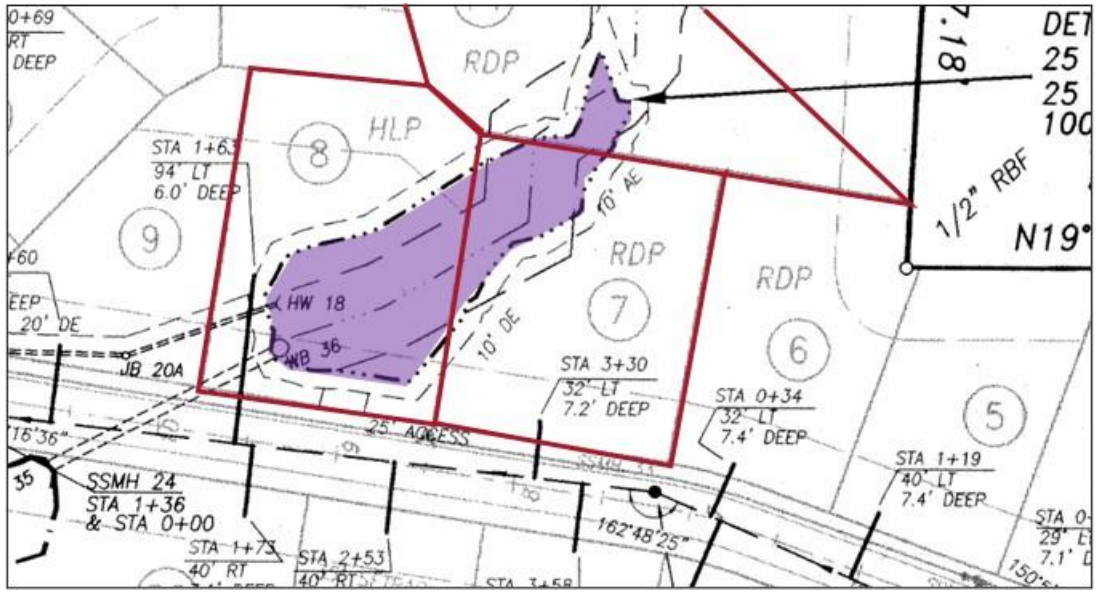
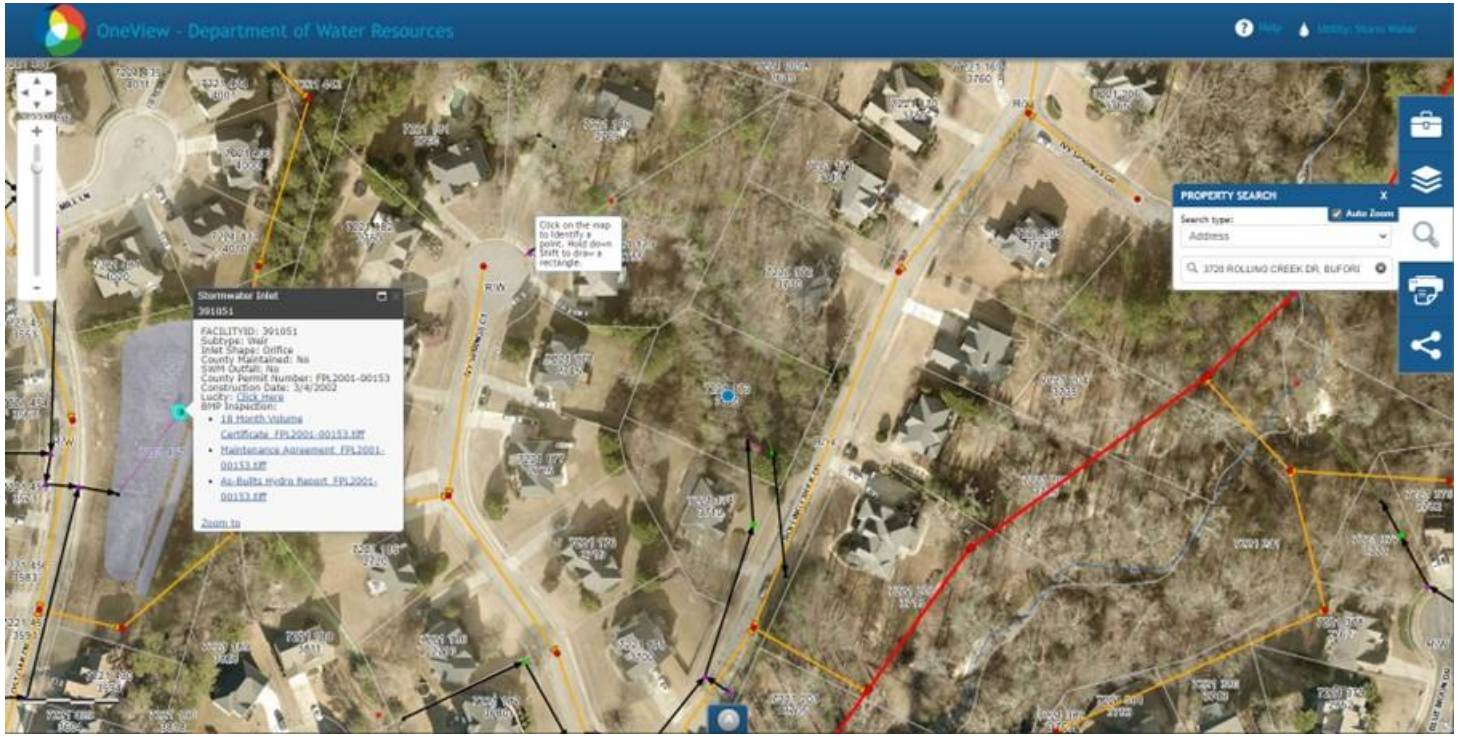
Complicated Ownership

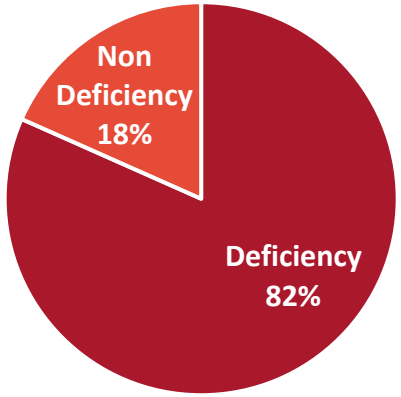
- Determining ownership or who is responsible for addressing deficiencies can be difficult
- For example, a BMP may be owned by:
  - A defunct corporation
  - Multiple property owners
  - Property under foreclosure
  - Ownership changes hands once an NTC is issued



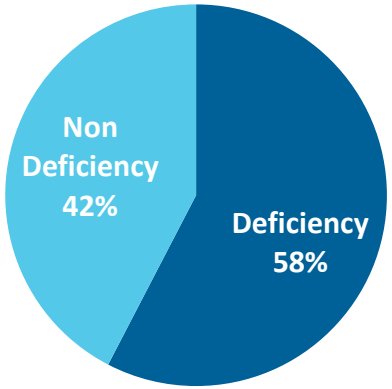


BMP Condition by Owner

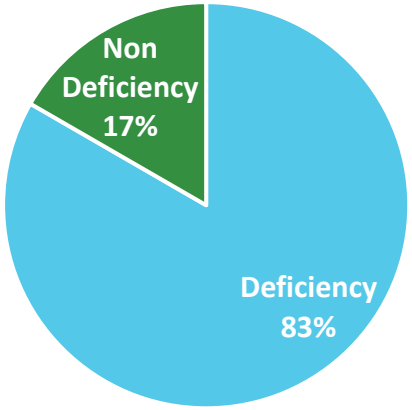
County Owned



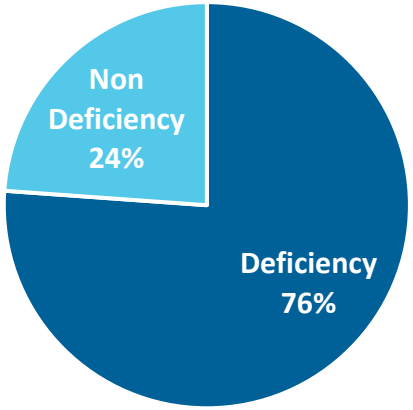
Privately Owned



Facility Acceptance



Green Infrastructure



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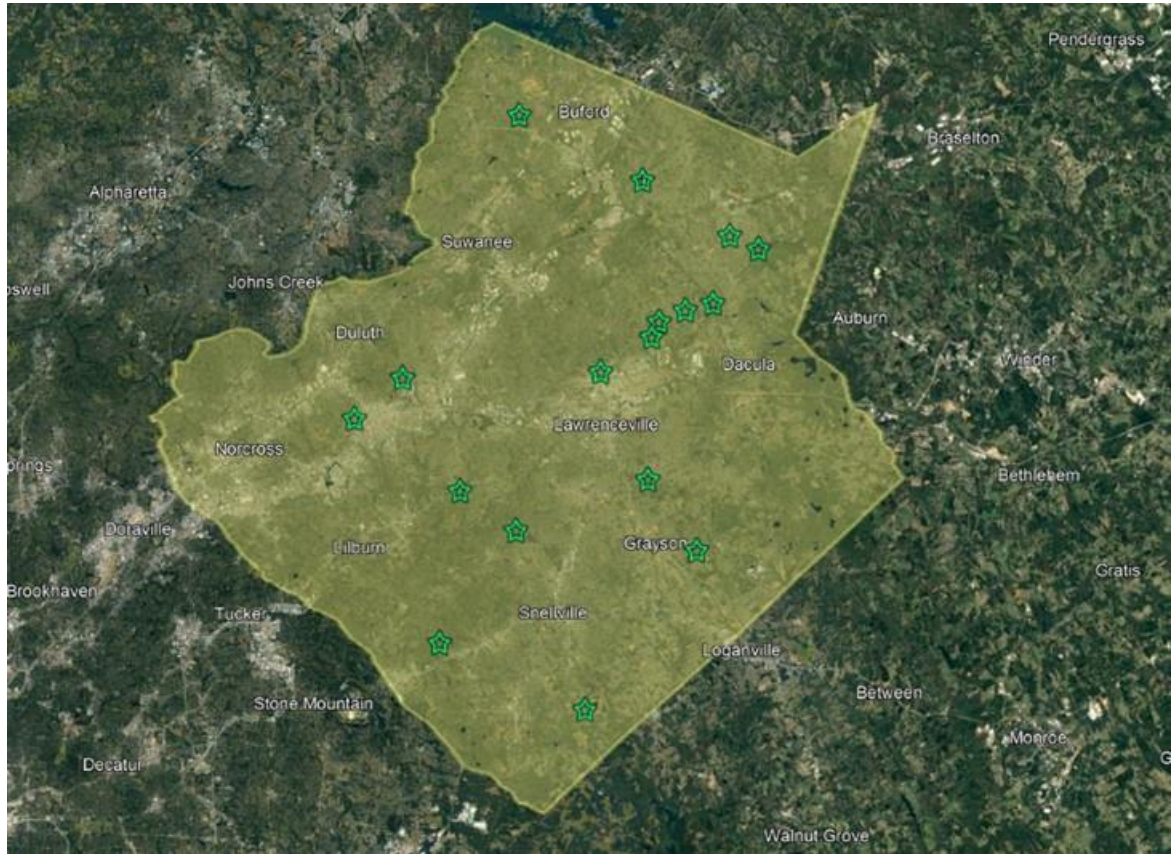
Project Locations

The Facility Acceptance Program (FAP) includes 18 Best Management Practices (BMPs) throughout the County at 17 locations on private property for which the County is jointly responsible for maintenance.



<u>BMP Type Breakdown</u>

- 9 Dry Detention Ponds
- 5 Extended Dry Detention Ponds
- 2 Dry Water Quality Ponds
- 1 Constructed Wetland
- 1 Extended Wet Detention Pond

- Ranging from 17 to 49 years of service
- All 18 located in residential areas
- Accepted into the program at the request of the homeowner or HOA

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BMP Investigation Project Goals

- Conduct a desktop and field review of each BMP and associated components
- Develop a comprehensive cost estimate for associated maintenance activities for the BMPs using Watershed Improvement Program (WIP) Annual Contractor 2022-23-unit costs
- Develop a BMP maintenance prioritization plan and schedule

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BMP Maintenance Project Goals

- Restore BMPs to their original design conditions so that they can provide their intended level of service
- Reduce risk of infrastructure failure, which would affect adjacent homeowners and environment
- Establish working relationships with new homeowners and HOA points of contact

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Desktop Study

- Desktop Study - Reviewed information available through:
  - Gwinnett County's GIS Database
  - Historical information provided by GCDWR (e.g., as-builts/final plats, past inspection reports)
  - Publicly available databases (e.g., USGS, NWI)
  - Aerial photography

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CCTV Review

CCTV Review focused on the following potential issues:

- Missing or Corroded Inverts
- Dislocations at Pipe Joints
- Cracks or Deformations in Pipe Wall
- Infiltration of Groundwater

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Field Investigation

FAP BMP Rating Guide	
Maintenance Item	**Condition Rating Explanation**
General Inspection	
Access to the site. Is the BMP access point free of barriers, such as dense vegetation, a fence or gate, a poorly defined path, not visible easily from the street?	Can be answered as "Yes – inspector was able to access the site" or "No – inspector was not able to access the site".
Condition of area around site access point.	1 – Area is completely inaccessible. 100% of access point is overgrown or blocked. 2 – Area is severely (50-100%) overgrown or blocked. 3 – Area is moderately (25-50%) overgrown or blocked. 4 – Area is minorly (<25%) overgrown or blocked. 5 – Area is completely free of vegetation and debris.
Inlet Structure	
Condition of vegetation around the inlet structure(s). Is mowing needed?	1 – Inlet structure is inaccessible, and vegetation is completely overgrown. Trees are observed growing directly on top of inlet structure. 2 – Vegetation around inlet structure is severely (50-100%) overgrown. 3 – Vegetation around inlet structure is moderately (25-50%) overgrown. 4 – Vegetation around inlet structure is minorly (<25%) overgrown. 5 – Area around inlet structure is completely free of vegetation taller than 3-4 inches.
Are gullies, rills, or excessive erosion present around the inlet structure(s)?	1 – Area around inlet structure is entirely eroded away and pipe has been exposed. 2 – Severe (i.e., greater than one foot) gullies, rills, or excessive erosion are present. 3 – Moderate gullies, rills, or excessive erosion are present. 4 – Minor gullies, rills, or excessive erosion are present. 5 – No gullies, rills, or excessive erosion are present.
Condition of inlet structure(s). Is it operational?	1 – Inlet structure in not functional. Inlet structure has collapsed, or pipe has separated from headwall. 2 – Inlet structure is in poor condition. Moderate to severe signs of wear and damage, such as cracking or missing pieces of concrete, but structure is functional. 3 – Inlet structure is in fair condition. Minor signs of wear. Signs of minor damage, but structure is functional. 4 – Inlet structure is in good condition. Minor signs of wear; no signs of damage, i.e., cracking. 5 – Inlet structure is in excellent condition. No signs of wear or damage.
Condition of inlet pipe(s). Is it operational?	1 – Inlet pipe is not functional. Pipe is collapsed. Bottom of pipe is rusted out and/or missing. 2 – Inlet pipe is in poor condition. Moderate to severe signs of wear and damage, i.e., severe corrosion observed, pipe is severely misshapen, severe cracking observed. Pipe is still functional. 3 – Inlet pipe is in fair condition. Minor signs of wear and damage, i.e., minor corrosion observed, pipe is oval-shaped, minor cracking observed. Pipe is still functional. 4 – Inlet pipe is in good condition. Minor signs of wear; no signs of damage, i.e., cracking. 5 – Inlet pipe is in excellent condition. No signs of wear or damage.
Debris (i.e., tree branches, leaves, grass clippings, trash) present?	1 – Inlet structure is inaccessible and completely blocked by debris. 2 – Debris around inlet structure is severe (50-100%). 3 – Debris around inlet structure is moderate (25-50%). 4 – Debris around inlet structure is minor (<25%). 5 – Area around inlet structure is completely free of debris.

FAP BMP Rating Guide Examples	
Maintenance Item	**Condition Rating Explanation**
General Inspection	
Condition of area around site access point (i.e., trash, debris, grass clippings).	 1 – Area is completely inaccessible. 100% of access point is overgrown or blocked.  5 – Area is completely free of vegetation and debris.

Field Inspection Components

- Access
- Inlet Structure(s)
- Forebay
- Main Treatment Area
- Embankment
- Emergency Overflow
- Outlet Structure

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Photo Management

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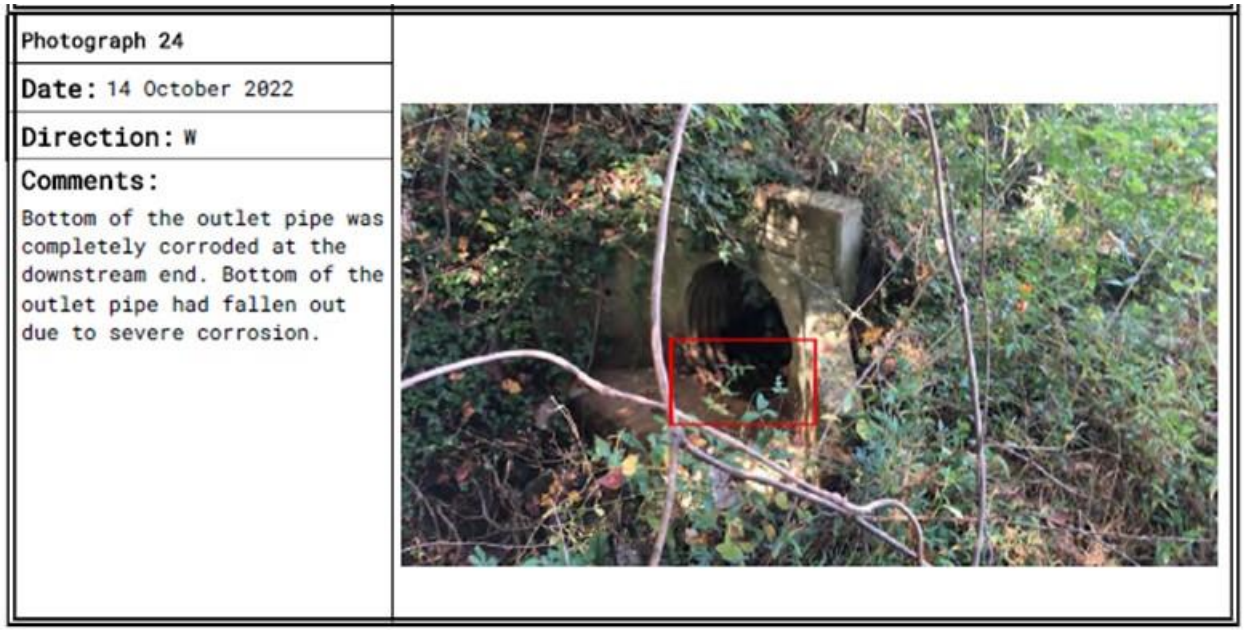
Photographic Record

Client: GCDWR | Project Number: GK9163

Site Name: SWU-CTY-00002 (Roses Bluff) | Site Location: Lawrenceville, GA

- Software named Filio
- Photo date, location, orientation, ID number
- Photo comments on observations
- Web Interface for viewers
- Creates overall maps and photo logs



Photograph 24

Date: 14 October 2022

Direction: W

Comments:

Bottom of the outlet pipe was completely corroded at the downstream end. Bottom of the outlet pipe had fallen out due to severe corrosion.

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Summary Report

- Summarized key findings and recommendations for each BMP
  - Evaluation Checklists with ratings
  - Figures prepared in ArcGIS with locations of observations
  - Inspection Photolog

Table 16: Ratings for SWU-CTY-00014

Maintenance Item	Overall Rating (1 [lowest] – 5 [highest])
Inlet Structure (Inspection Form Sections 2.5-2.8 and 2.10-2.11)	3.9
Forebay (Inspection Form Sections 3.1-3.4)	N/A
Main Treatment Area (Inspection Form Sections 4.1-4.4, 4.8, and 4.11)	2.8
Embankment (Inspection Form Sections 5.2-5.6, 5.8, and 5.9)	2.7
Outlet Structure (Inspection Form Sections 6.6, 6.8-6.11, and 6.13-6.15)	3.1
BMP OVERALL RATING	3.2

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Typical BMP Deficiencies - Erosion

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Typical BMP Deficiencies - Erosion

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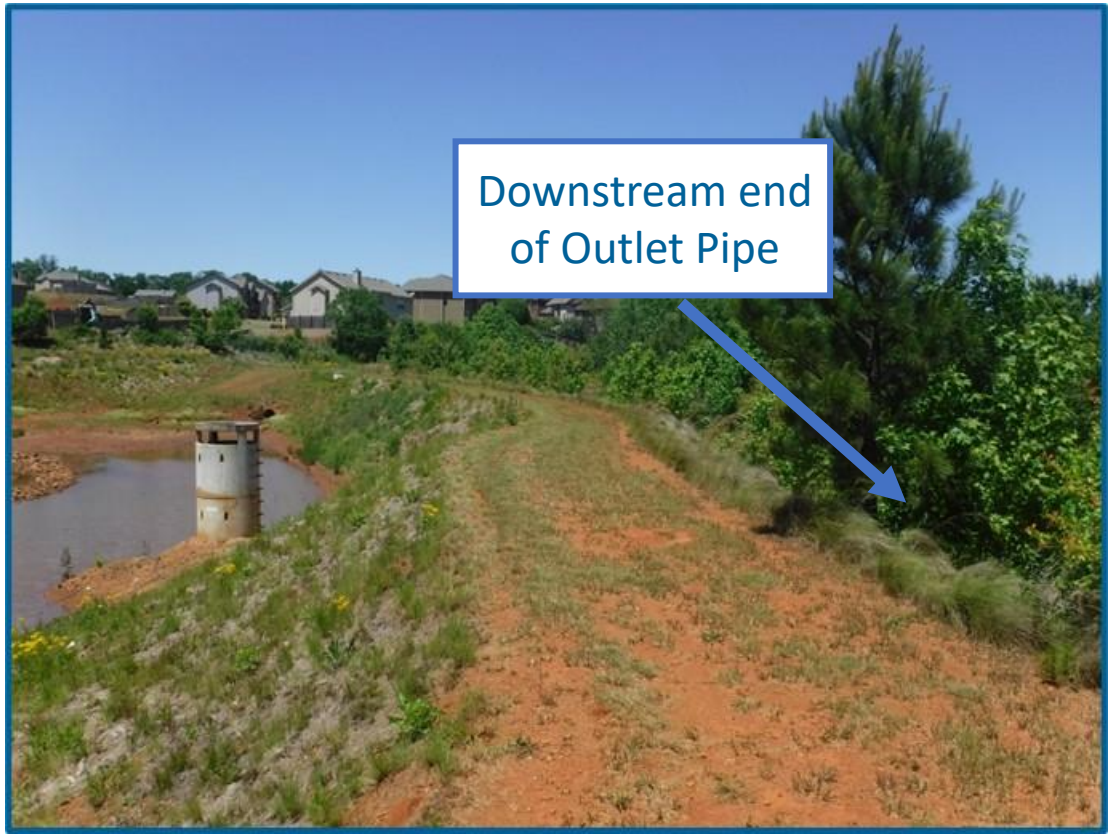
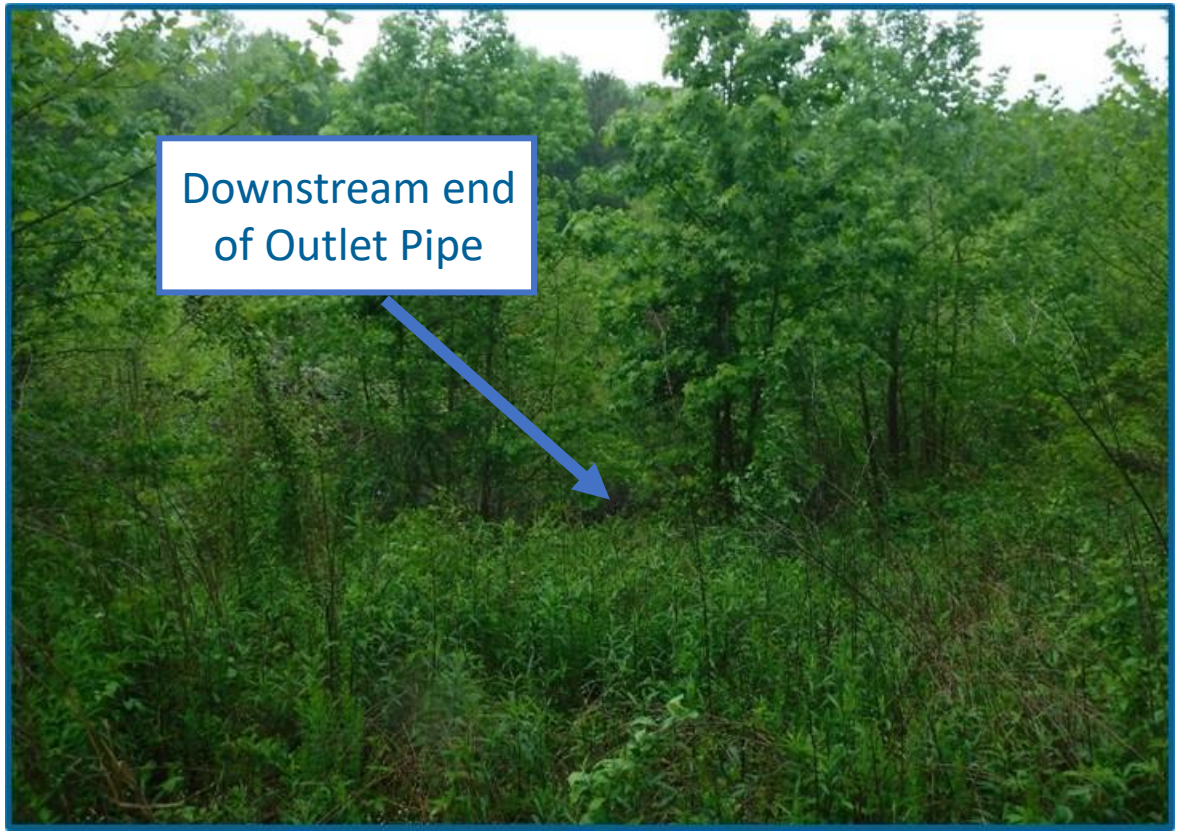
Typical BMP Deficiencies - Vegetation





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Typical BMP Deficiencies – Sediment & Debris

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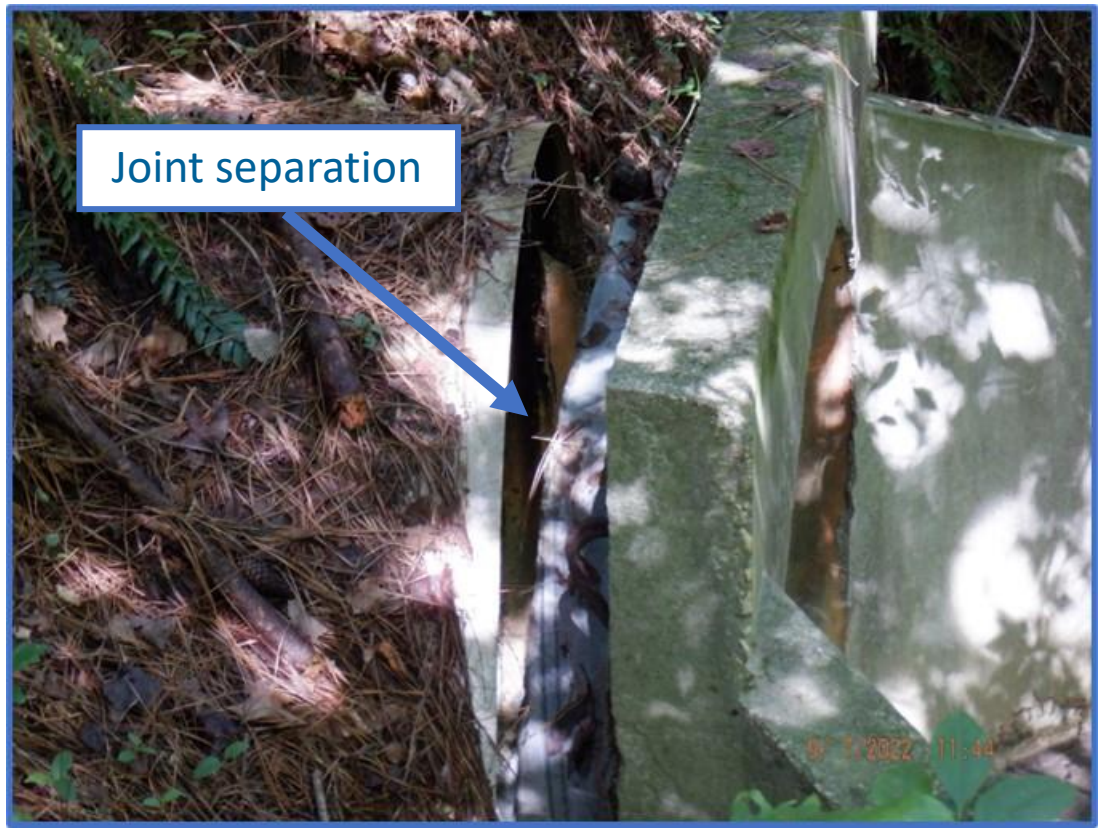
Typical Deficiencies - Structures



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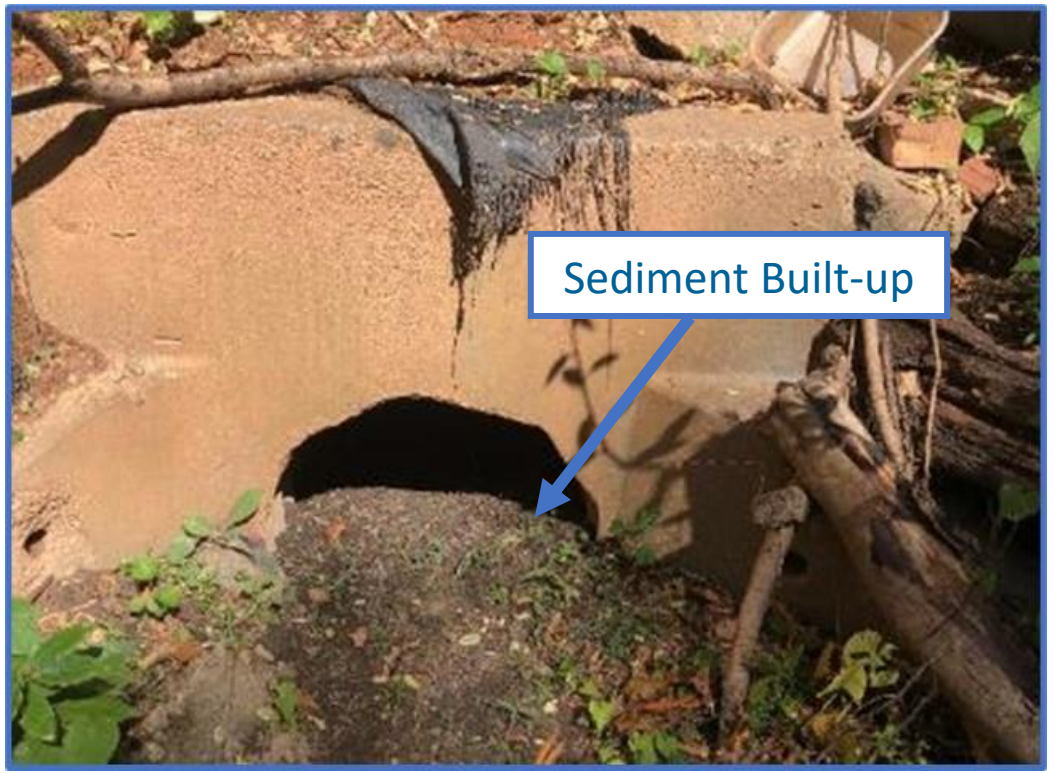
Typical Deficiencies – Pipe Aging and Loss of Capacity



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Maintenance Cost Estimate

- Annual contractor rates
- Supplementary RS Means data
- Two different cost estimate scenarios:

Scenario 1: Maintenance with Cured in-place Piping (CIPP)

Scenario 2: Maintenance with full replacement of pipes

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Maintenance Cost Estimate

Approximately
$1,350,000 in total

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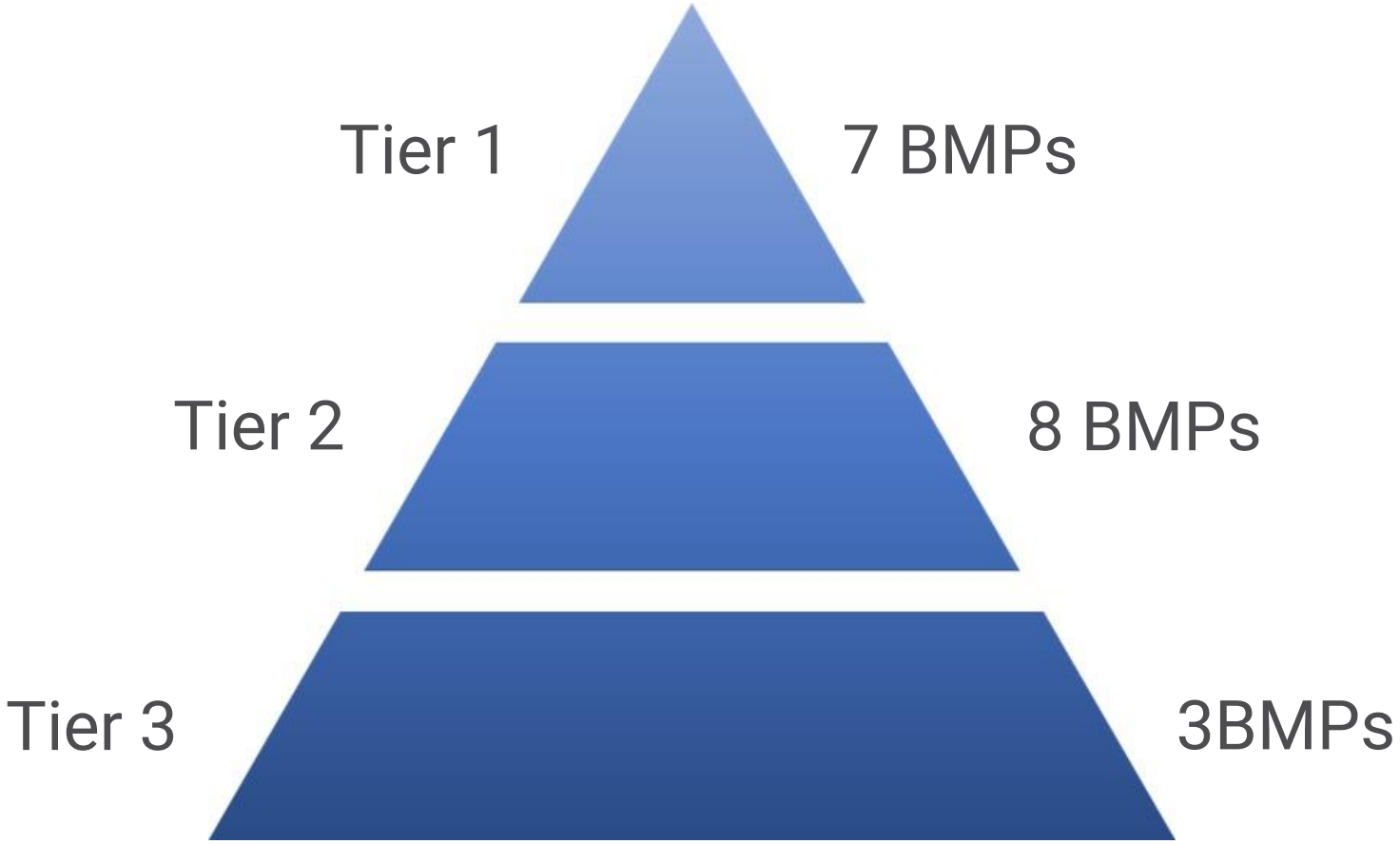
Prioritization Plan



Project Accomplishments

- Desktop Study, Field Inspections, BMP Evaluations, Cost Estimating, and Prioritization Plan have been completed.
- Maintenance costs estimated to be approximately $1,350,000 total ($75k per BMP) ranging from $10k to $200k.

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Next Steps

- **2023** - Communication with homeowners & HOA
- **2024** - Maintenance of Tier 1 (7 BMPs)
- **2025 & 2026** - Maintenance of Tier 2 (8 BMPs) and Tier 3 (3 BMPs)

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Conclusion

- Asset and data management are critical
- Ordinances and stormwater BMP Maintenance agreements recorded with property deed enable compliance
- Use interactions with BMP owners as education opportunities
- Look for opportunities to improve

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Questions?

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