

Inventory and Assessment of Stormwater Infrastructure

Rutgers Cooperative Extension Water Resources
Program and New Jersey Department of
Environmental Protection

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Stormwater Management

- ▶ Green Infrastructure in NJ
- ▶ Stormwater Management Rule
- ▶ Stormwater Management Rule FAQs
- ▶ NJ Stormwater BMP Manual
- ▶ **Maintenance Guidance**
- ▶ BMP Manual Chapters for Comment
- ▶ MTD Certifications and Guidance
- ▶ Additional Guidance Documents

Welcome to NJDEP's stormwater web site for stormwater management professionals and permittees. Here you'll find links to technical information, guidance materials, forms, and applications. General guidance and resources regarding stormwater runoff are also available at www.cleanwaternj.org.



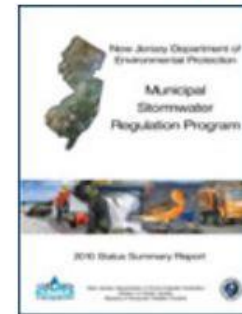
Stormwater Permitting

- ▶ Municipal Stormwater Regulation
- ▶ General Stormwater Permits
- ▶ Individual Stormwater Permits
- ▶ Permit Applications and Checklists

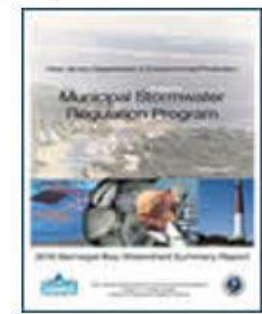
Program Links

- ▶ [NJ Stormwater.org Contacts](#)

Featured Topics



Municipal Stormwater Regulation Program 2010 Status Report Summary



Municipal Stormwater Regulation Program 2010 Barnegat Bay Watersehd Summary Report

Recent News

- ▶ [Maintenance Guidance](#)
- ▶ [Stormwater Training](#)
- ▶ [2 New and 5 Updated NJ Stormwater BMP Manual Chapters](#)
- ▶ [Green Infrastructure in NJ](#)
- ▶ [Snow Removal and Disposal Policy](#)

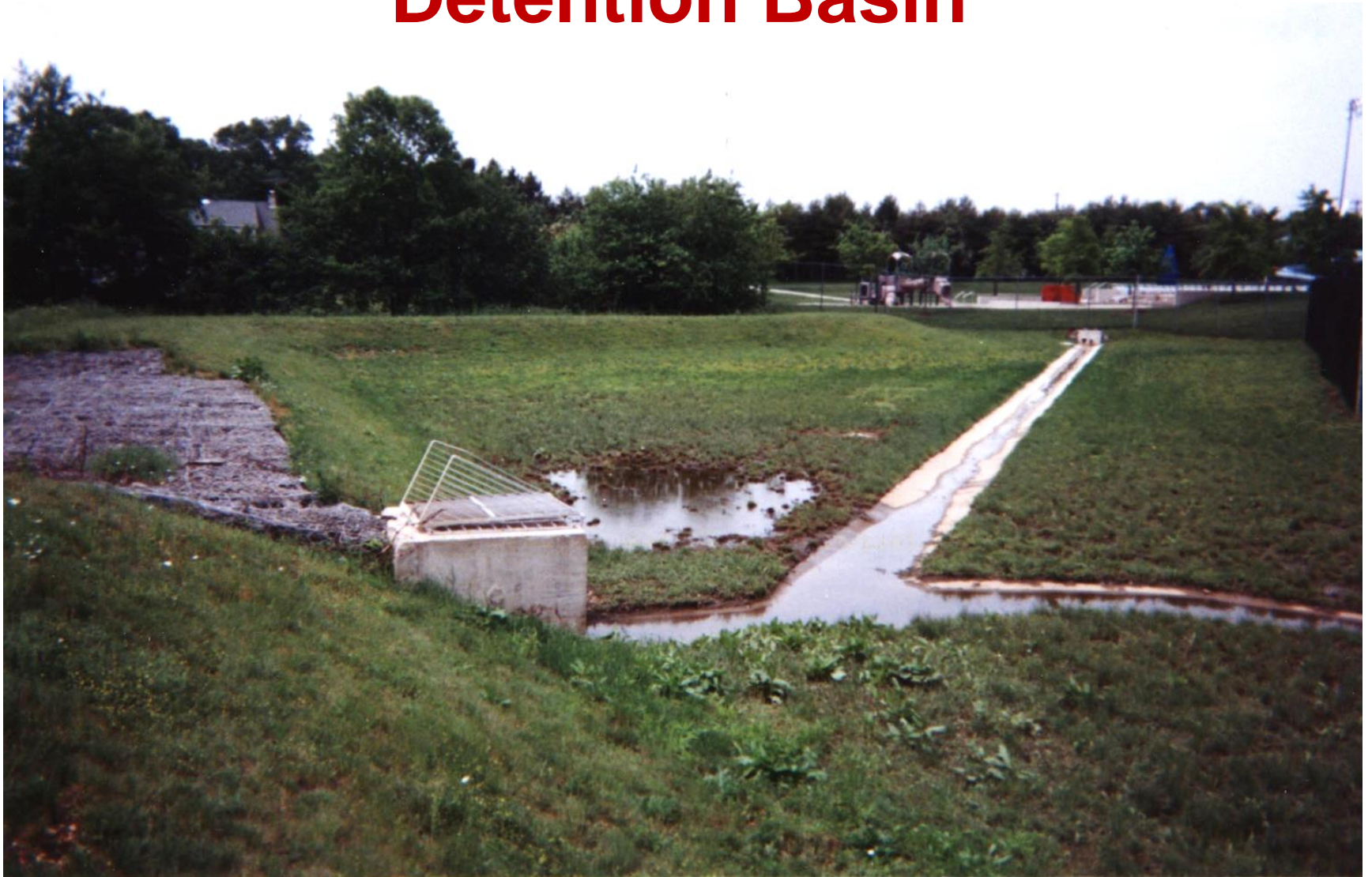


Identifying and Assessing Stormwater Infrastructure

Before an assessment can be completed, stormwater infrastructure must be located and identified such as:

- Detention Basins
- Retention Basins
- Other Stormwater Best Practices Management (BMPs)
- Manufactured Treatment Devices (MTDs)
- Catch Basins
- Stormwater Piping
- Outfalls

Detention Basin



Detention Basin



Traditional Retention Basin



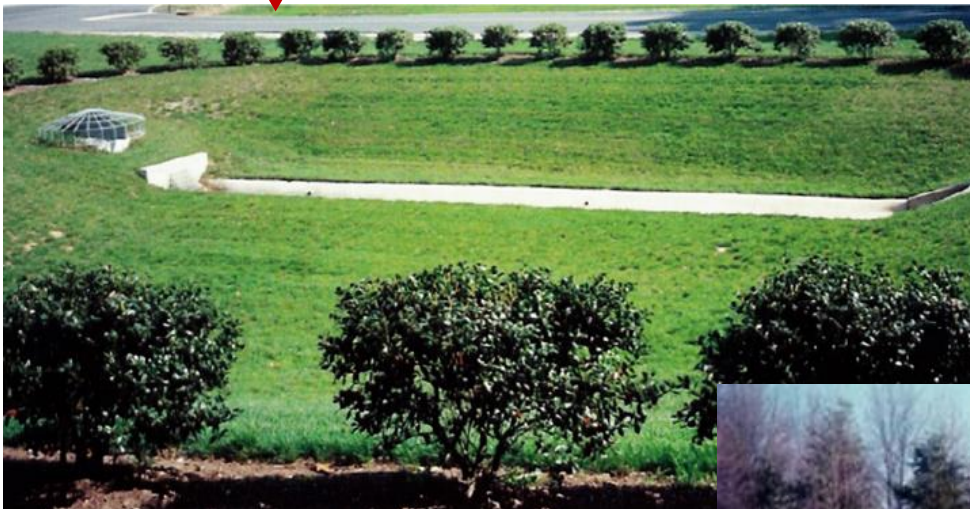
Traditional Retention Basin



Detention Basin vs. Retention Basin

Does the basin hold a permanent pool of water?

NO – Detention



YES –
Retention



Other stormwater management practices



Bioretention Systems

Other stormwater management practices



Constructed Wetlands

Other stormwater management practices



Dry Wells

Other stormwater management practices



Infiltration Basin

Other stormwater management practices



Pervious Paving Systems

Other stormwater management practices



Parker Urban Greenscapes. 2009.

Rooftop Vegetated Cover

Other stormwater management practices



Vegetated Filter Strip

Other stormwater management practices



Sand Filters

Other stormwater management practices



Grass Swales

Manufactured Treatment Devices (MTDs)



The Benefits of Stormwater Infrastructure Inventory and Assessment

- ✓ Identify maintenance needs
- ✓ Reduce replacement and repair needs
- ✓ Reduce liability
- ✓ Support development of alternative maintenance programs
- ✓ Translate into reduced long-term costs

Improved maintenance results

- ✓ Reduced pollution of local waterways
- ✓ Reduced stream channel erosion
- ✓ Reduced flooding
- ✓ Enhanced climate resiliency

State Regulations – Outfall Mapping and Illicit Connections



State Regulations – Outfall Pipe Stream Scouring Remediation



What Other Stormwater Facilities to Inventory

- ✓ Stormwater management basins
- ✓ Outfalls pipes
- ✓ Subsurface retention/detention systems
- ✓ Manufactured treatment devices (MTDs)
- ✓ Green infrastructure

Beyond State Regulations – Mapping Catch Basins and Piping



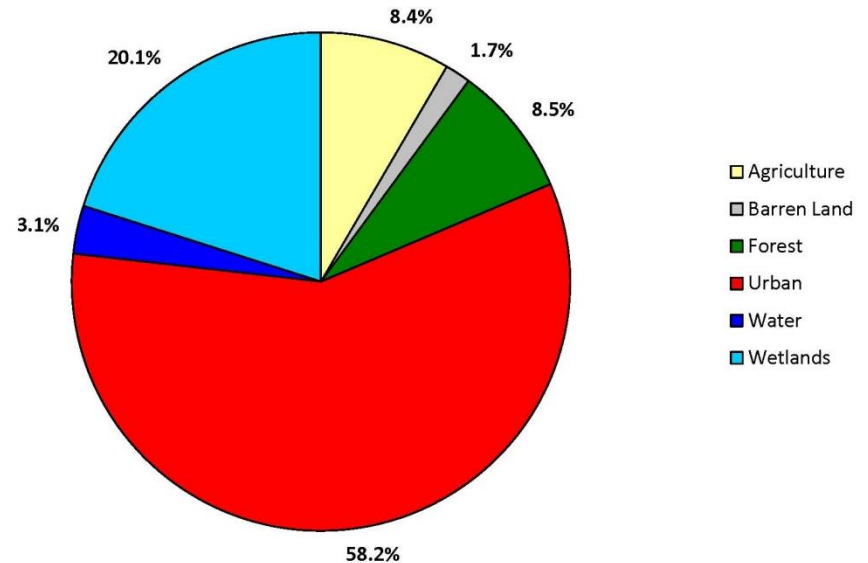
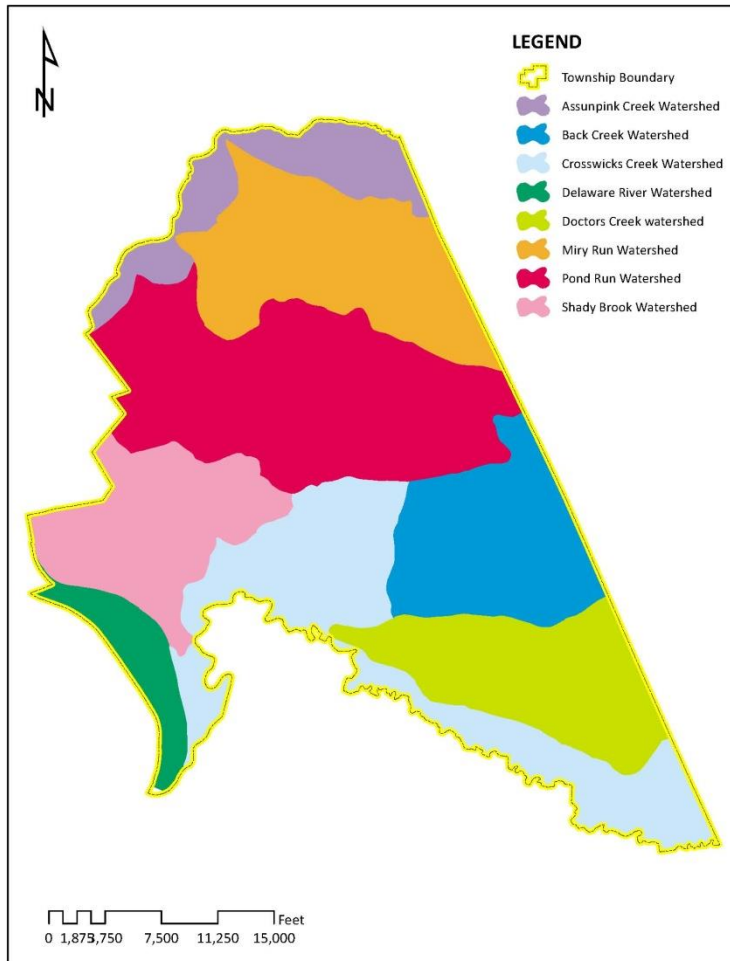
Information Needed To Begin An Inventory

- ✓ Type of Stormwater Facility
- ✓ Coordinates in accordance with NJDEP GIS Protocol
- ✓ Road Name
- ✓ Owner
- ✓ Tax Map Number
- ✓ Block and Lot
- ✓ Unique Identification Number

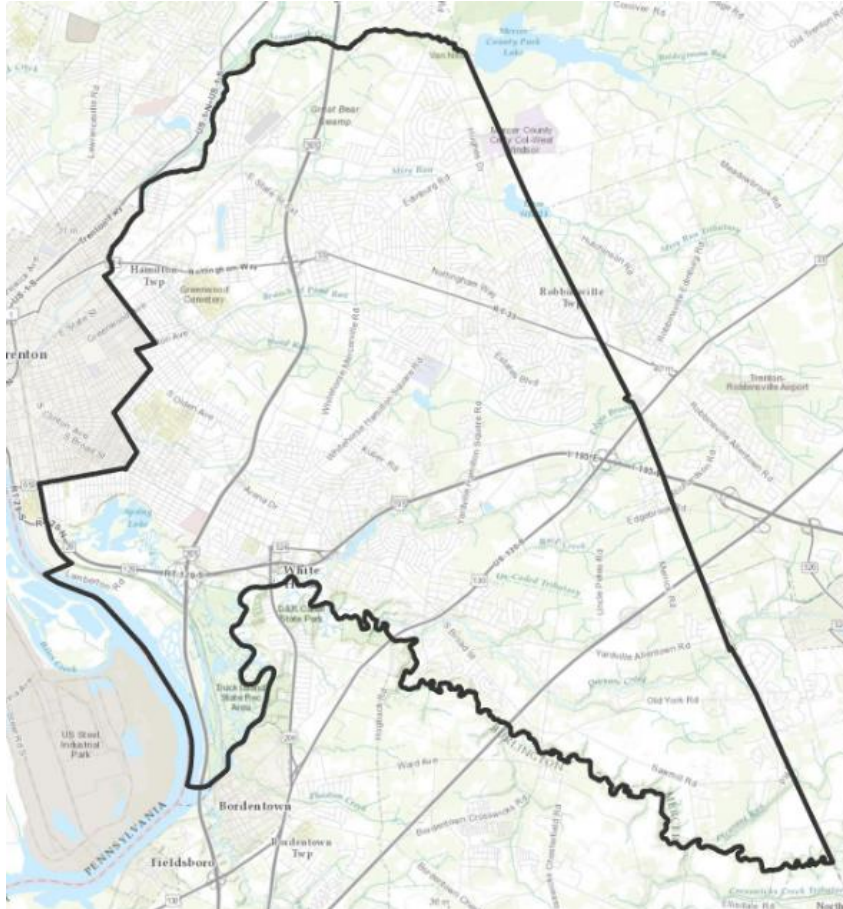
Mapping



Inventory and Assessment Example – Hamilton Township



Hamilton Township



Inventory Forms



Stormwater Infrastructure Assessment Program Stormwater Basin Inspection Checklist



GENERAL INFORMATION		Site ID:
Name(s) person inspecting the basin:		Date:
Location Address and Cross Streets:	Watershed:	
Name of Creek, Stream, or area into which the basin discharges:	Property Owner / Tax Parcel Block & Lot:	
Contact information:		
STRUCTURAL COMPONENTS		
Basin description, size and depth:	Is the basin accessible to maintain? Yes / No Is it maintained: Mowed, clear of woody plants, inlet/outlet blockages?	
Number of inlets:	Outlet diameter:	

GENERAL OBSERVATIONS	YES	NO	NOTES/REMARKS
1) Any reports on the basin not functioning?			
2) Are there any unauthorized or malfunctioning structures in the basin?			
3) Are there concrete low flow channels. Is the water entering the basin directly exiting the basin outlet without coming in contact with the basin bottom soil and vegetation?			
4) Is there standing water or evidence of standing water in the basin?			
INLET/S			
1) Signs of breakage, damage, corrosion or rusting of inlet structure/pipe?			
2) Debris or sediment accumulation in or around the inlet clogging the inlet opening/pipe?			
3) Signs of erosion, scour or gullies; rock or vegetation above or around the inlet structure?			
4) Tree roots, woody vegetation growing close to or through the inlet structure or a situation impacting the structure's integrity?			
5) If the inlet has a pretreatment structure (trash rack, forebay) is it filled w/ debris or sediment?			
BASIN			
1) Accumulation of debris or litter within basin?			
2) Exposed dirt or earth visible, are there areas without vegetation or where turf is damaged?			
3) Excess sediment accumulation in the basin?			
4) Basin walls/embankment eroded, slumping, caved or being undermined?			



Stormwater Infrastructure Assessment Program Stormwater Outfall Inspection Checklist



GENERAL INFORMATION		Site ID:
Name(s) person inspecting the outfall:		Date:
Location Address and Cross Streets:	Watershed:	
Name of Creek, Stream, or area into which the outfall discharges:	Property Owner / Tax Parcel Block & Lot:	
Contact information:		
STRUCTURAL COMPONENTS		
Outfall description:	Is the outfall accessible to maintain? Yes / No Is it maintained: Mowed, clear of woody plants, blockages?	
Outfall Material:		
Weather over past 24 Hours:	Outlet diameter:	

GENERAL OBSERVATIONS	YES	NO	NOTES/REMARKS
1) Any reports on the outlet not functioning?			
2) Are there any unauthorized or malfunctioning structures connected to the outfall?			



EPA Fact Sheet



United States Environmental Protection Agency Office of Water Washington, D.C. 832-F-99-046 September 1999

Storm Water Management Fact Sheet Visual Inspection

DESCRIPTION

Visual inspection is a Best Management Practice (BMP) in which members of a Storm Water Pollution Prevention Team visually examine material storage and outdoor processing areas, the storm water discharges from such areas, and the environment in the vicinity of the discharges, to identify contaminated runoff and its possible sources.

In a visual inspection, storm water runoff may be examined for the presence of floating and suspended materials, oil and grease, discoloration, turbidity, odor, or foam; and storage areas may be inspected for leaks from containers, discolorations on the storage area floor, or other indications of a potential for pollutants to contaminate storm water runoff.

Visual inspections may indicate the need to modify a facility to reduce the risk of contaminating runoff.

APPLICABILITY

The U.S. EPA has recognized visual inspection as a baseline BMP for over 10 years. Its implementation, however, has been sporadic. Implementation may increase as more facilities develop Storm Water Pollution Prevention Plans. Implementation may also increase as facility management recognizes visual inspection to be effective both in protecting water quality and in reducing costs.

ADVANTAGES AND DISADVANTAGES

Visual inspections are an effective way to identify a variety of problems. Correcting these problems can improve the water quality of the receiving water.

Limitations associated with visual inspections include the following:

- Visual inspections are effective only for those areas clearly visible to the human eye.
- The inspections need to be performed by qualified personnel.
- To be effective, inspections must be carried out routinely. This requires a corporate commitment to implementing them.
- Inspectors need to be properly motivated to perform a thorough visual inspection.

KEY PROGRAM COMPONENTS

Visual inspections for signs of storm water contamination should be performed routinely. Flows should be observed during dry periods to determine the presence of any stains, sludge, odors, and other abnormal conditions.

Visual inspections should also be made at all storm water discharge outlet locations during the first hour of a storm event, once runoff has reached its maximum flow rate. Inspectors should examine the discharge for the presence of floating and suspended materials, oil and grease, discoloration, turbidity, foam, or odor.

Outfall # _____	Photograph # _____	Date: _____
Location: _____		
Weather: air temp.: _____ °C	rain: Y N	sunny cloudy
Outfall flow rate estimate: _____ L/sec		
Known industrial or commercial uses in drainage area? Y N		
Describe: _____		
PHYSICAL OBSERVATIONS		
Odor:	none sewage sulfide oil gas rancid-sour	other: _____
Color:	none yellow brown green gray	other: _____
Turbidity:	none cloudy opaque	
Floatables:	none petroleum sheen sewage	other: _____ (collect sample)
Deposits/stains:	none sediment oily	describe: _____ (collect sample)
Vegetation conditions:	normal excessive growth	inhibited growth
extent: _____		
Damage to outfall structures:		
identify structure: _____		
damage: none / concrete cracking / concrete spalling / peeling paint / corrosion		
other damage: _____		
extent: _____		

Source: Pitt, et. al, 1992.

FIGURE 1 VISUAL INSPECTION WORKSHEET

REFERENCES

1. California Environmental Protection Agency, 1992. Staff Proposal for Modification to Water Quality Order No. 91-13 DWQ Waste Discharge Requirements for Dischargers of Storm Water Associated with Industrial Activities, Draft Wording, Monitoring Program and Reporting Requirements.
2. Pitt R., D. Barbe, D. Adrian, and R. Field, 1992. *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems-A Users Guide*. U.S. EPA, Edison, NJ.
3. U.S. EPA, 1981. *NPDES BMP Guidance Document*.
4. U.S. EPA. Pre-print, 1992. *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices*. EPA 832-R-92-006.

ADDITIONAL INFORMATION

Center for Watershed Protection
Tom Schueler
8391 Main Street
Ellicott City, MD 21043



Assessment Tool

Esri Collector Application

- Free mobile application
- No equipment to purchase
- Android and Apple Compatible
- Easy to use
- Easy to upload and share
- Available offline



Collector for ArcGIS

Collect and update data in the field

esri

Collector for ArcGIS

Esri

UNINSTALL UPDATE

50 THOUSAND Downloads

4.0 638

Productivity

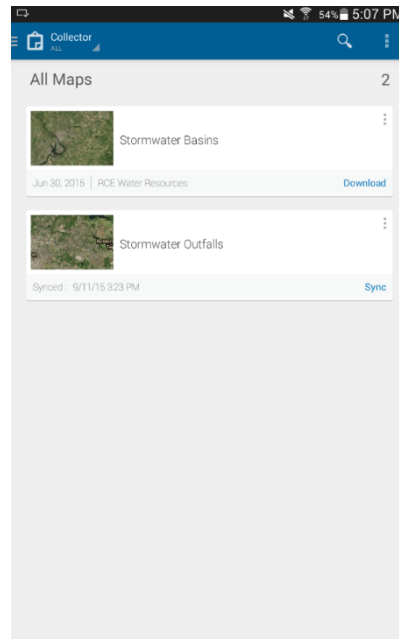
Similar

Using the Collector Application in four simple steps

1) Launch Collector



2) Choose Application



3) Tag Location



4) Answer Questions

A form for entering collector information. The title is 'Stormwater Basins: No valid location'. The form includes fields for 'COLLECTOR'S FIRST NAME', 'COLLECTOR'S LAST NAME', 'SITE IDENTIFICATION', 'DATE' (with a dropdown menu showing 'September 15, 2015' and a 'Use current' option), 'ADDRESS', 'WATERSHED', 'NAME OF CREEK, STREAM, OR AREA INTO WHICH THE BASIN DISCHARGES', 'BLOCK NUMBER', 'LOT NUMBER', 'CONTACT INFORMATION', 'LAND USE THAT DRAINS TO BASIN', and 'PROXIMITY TO RESIDENTIAL HOUSING'.

The Result



A webmap that combines the geographic information with the answered question.

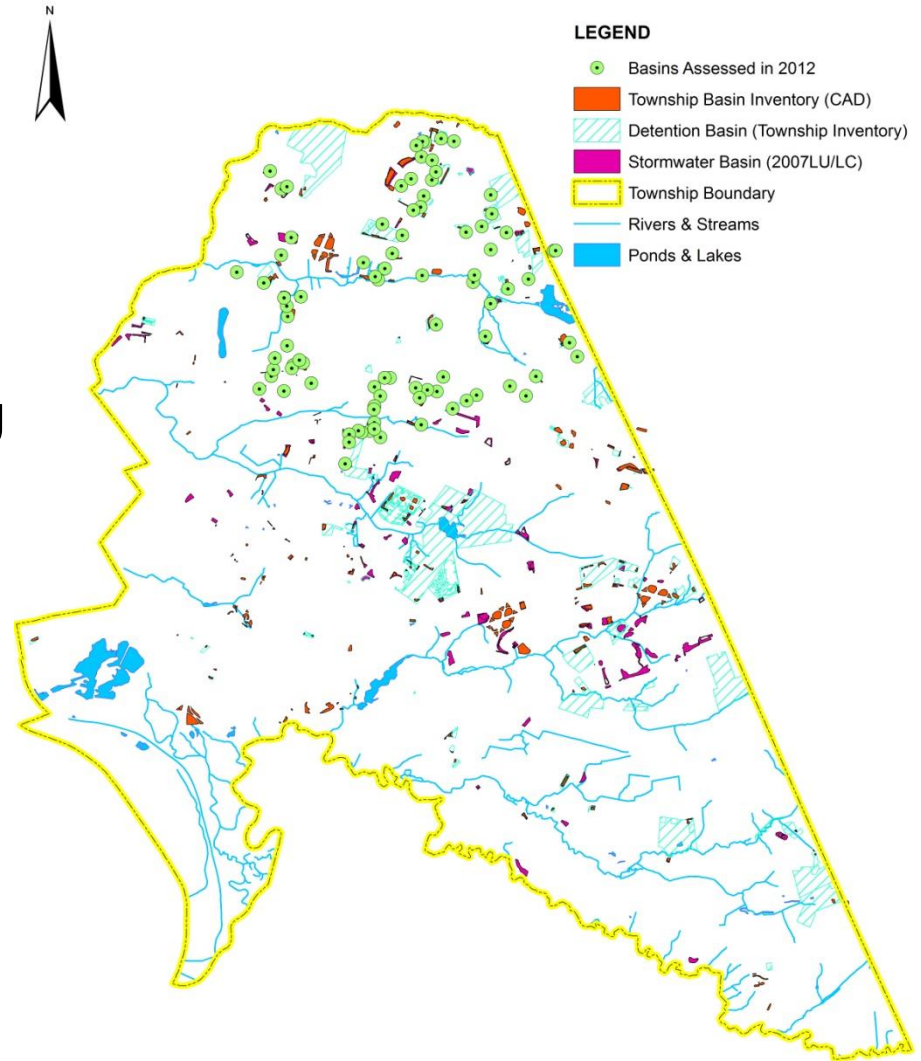
Hamilton Township, Mercer County

- Conduct complete inventory and assessment of stormwater management basins in Hamilton Township
- Prepare a comprehensive GIS database of stormwater infrastructure
- Implement detention basin maintenance training, inspection, and monitoring program
- Execute detention basin repair, rehabilitation, and enhancement projects



Hamilton Township

- The locations of the basins were compiled into a GIS.
- Five maps were created based on the assessment results:
 1. Basins that require cleaning
 2. Basins that require maintenance
 3. Basins that require inlet & outlet repair
 4. Basins with standing water
 5. Priority basins (immediate attention needed)



Hamilton Township

- Mapped 312 detention basins
- 142 require cleaning
- 153 require maintenance
- 116 require repair on inlets or outlets
- 80 were found to have standing water.
- Mapped **Priority Basins** needing cleaning, maintenance, or repair needs.
- 111 basins were found to be in good condition.



QUESTIONS?



Common Concerns for Wet Ponds

- ✓ Embankment and outlet stabilization
- ✓ Outlet blockages
- ✓ Sedimentation
- ✓ Floatables and Debris
- ✓ Lack of shoreline buffer
- ✓ Excessive algal growth

Shoreline Buffer



Excessive Algal Growth



Wet Pond – Good Condition



Common Concerns with Stormwater Infrastructure

1. Embankment and outlet stabilization
2. Sedimentation
3. Outlet blockages
4. Broken or clogged low-flow channels
5. Standing water or wet soils
6. Floatables and debris
7. Weeds or woody vegetation

Embankment and Outlet Stabilization



Embankment
Destabilization



Outlet Destabilization

Sedimentation



Accumulation of sediment in basin

Outlet Blockage



Outlet blockage by
debris



Outlet blockage by
sediment

Broken or Clogged Low-Flow Channels



Broken low-flow
channel



Clogged low-flow
channel

Standing Water or Wet Soils



Standing water in detention basin

Floatables and Debris



Accumulation of floatables in basin



Basin is a dumping ground

Weeds and Woody Vegetation



Woody vegetation in
basin

Invasive species
have overtaken the
basin

Stormwater Outfalls



Common Concerns with Stormwater Outfalls

- ✓ Stream erosion or scouring resulting from discharge
- ✓ Poor pipe condition
- ✓ Discharge of floatables
- ✓ Discharge of excessive sediment
- ✓ Color of the water discharging
- ✓ Discharging during dry weather conditions
- ✓ Outfall overgrown with vegetation
- ✓ Structural integrity of headwall or other supporting structure

Stream erosion or scouring resulting from discharge



Outfall is causing erosion



Outfall is causing scouring

Poor Pipe Condition



Crumbling concrete outfall pipe or pipe sections falling into stream

Discharge of Floatables



Accumulation of floatables from outfall



Garbage in the stream

Discharge of excessive sediment



Outfall pipes can discharge excessive sediment into the local
waterway

Color of the water discharging



Stormwater seems very cloudy – could be a cross connection with sanitary sewer pipe

Discharging during dry weather



Could be an illicit connection – water quality testing should be done

Outfall overgrown with vegetation



Outfall capacity is limited due to overgrowth of vegetation

Structural integrity of headwall



Concrete headwall is crumbling

E-learning Tool Coming Soon!

- An interactive E-learning tool was developed for municipal officials as part of a grant awarded by the New Jersey Department of Environmental Protection (NJDEP).
- The tool uses workshop material to showcase how municipalities can comply with the new MS4 permits when mapping their stormwater infrastructure.
- <http://water.rutgers.edu/E-learning.html>



Questions?

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