Assessing Your Stormwater Infrastructure

Rutgers Cooperative Extension (RCE) Water Resources Program

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Water Resources Program

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NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Sea Grant
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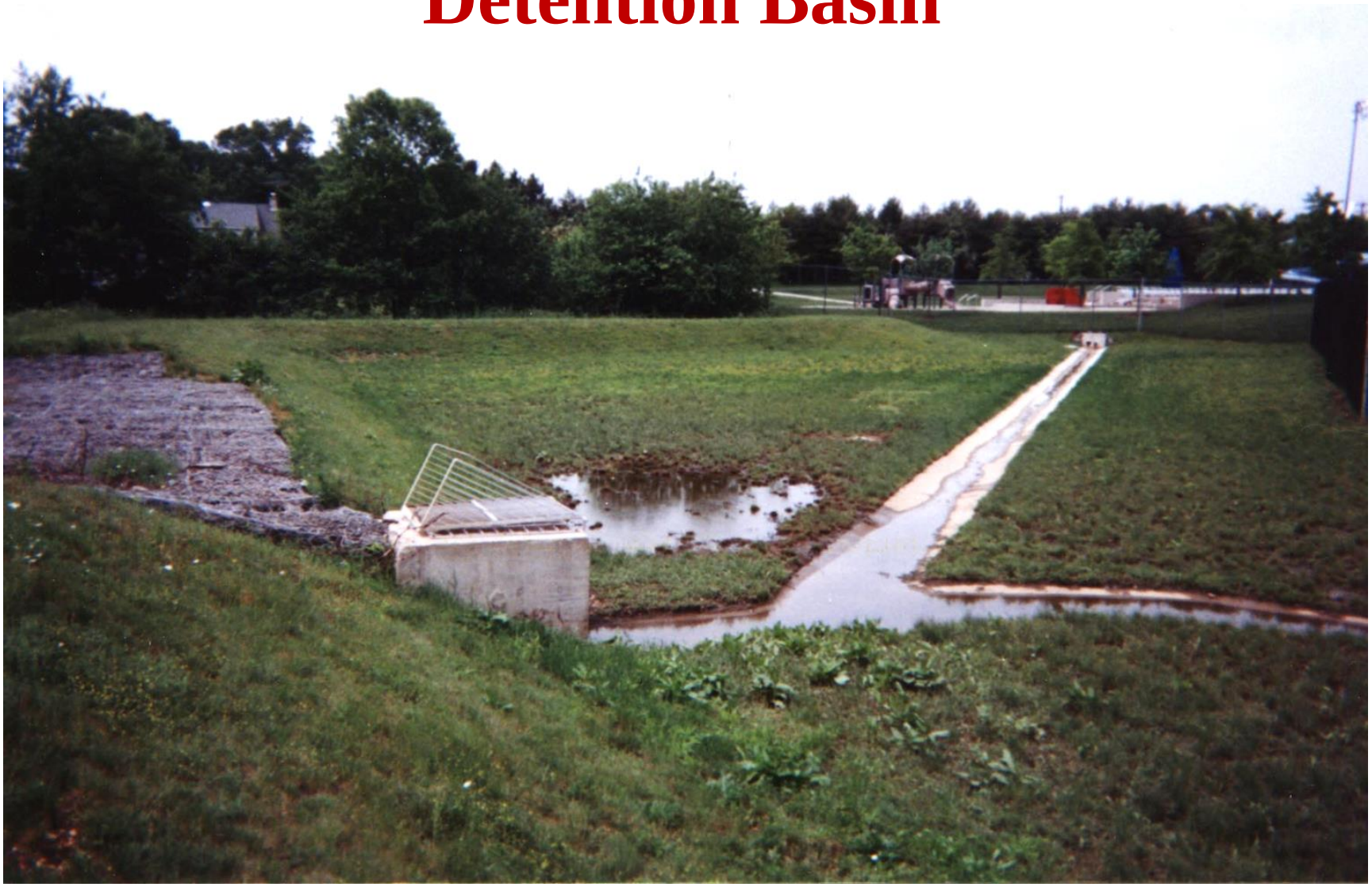
Identifying and Assessing Stormwater Infrastructure

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

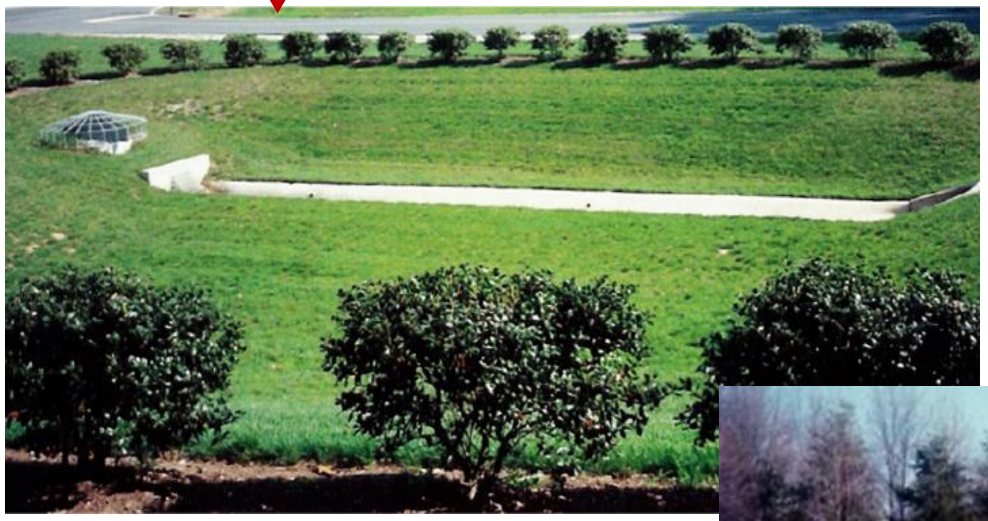
Traditional Retention Basin

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

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)

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

1. Stream erosion or scouring resulting from discharge
2. Poor pipe condition
3. Discharge of floatables
4. Discharge of excessive sediment
5. Color of the water discharging
6. Discharging during dry weather conditions
7. Outfall overgrown with vegetation
8. 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

Inventory Forms

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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 Outfall Inspection Checklist

Name(s) of Person Inspection the Outfall: _____

Outfall _____

Date of Inspection: _____

Weather over past 24 hours: Rainy Sunny Cloudy

Pipe Material: Concrete Metal Plastic Clay

Diameter in Inches: _____

Known Industrial or Commercial Uses in Drainage Area: No known discharges Known Discharges

Odor: None Sewage Sulfide Oil Gas Rancid or Sour
Other_____

Color: None Yellow Brown Green Gray Other_____

Turbidity: Clear Cloudy Opaque

Floatables: None Petroleum Slick Raw Sewage Trash
Other_____

Deposits: None Sediment Oil Other_____

Vegetation: Normal Growth Excessive Growth Inhibited Growth

Outfall Pipe Condition: No Damages Cracking Spalling Corrosion Peeling Paint

Has Erosion Undermined the stability of the outfall: Yes No

Extent of Erosion Damage in Square Feet: None Under 100 Between 100 and 500 Over 500

Notes:

_____
_____
_____
_____
_____

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EPA Fact Sheet

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

EPA

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

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Assessment Tool

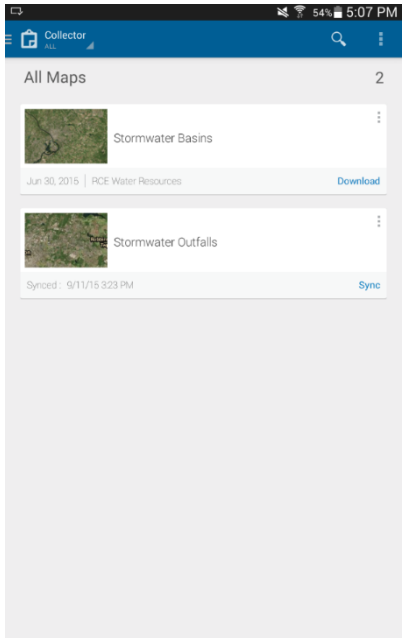
Esri Collector Application

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

Using the Collector Application in four simple steps

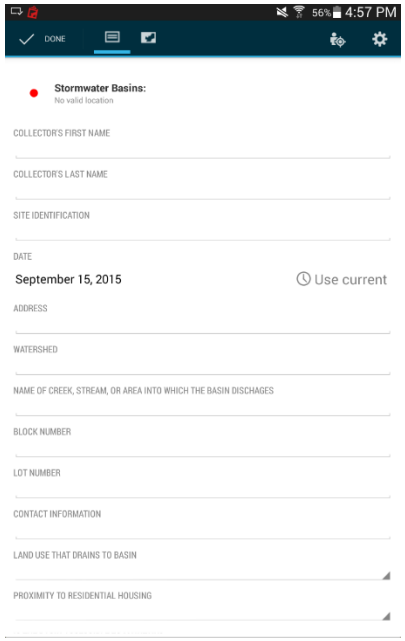
1) Launch Collector

2) Choose Application



3) Tag Location

4) Answer Questions



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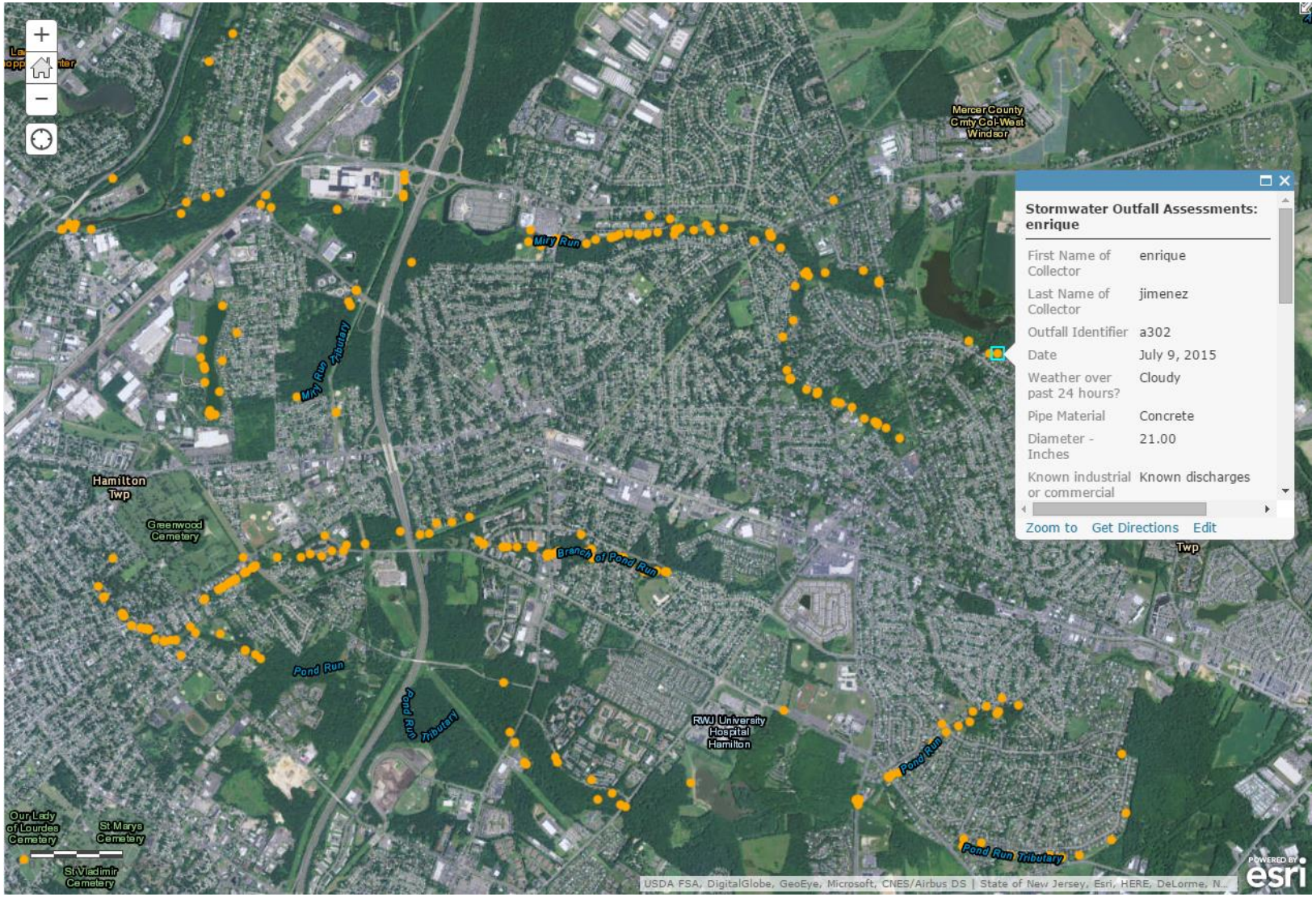
The Result



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

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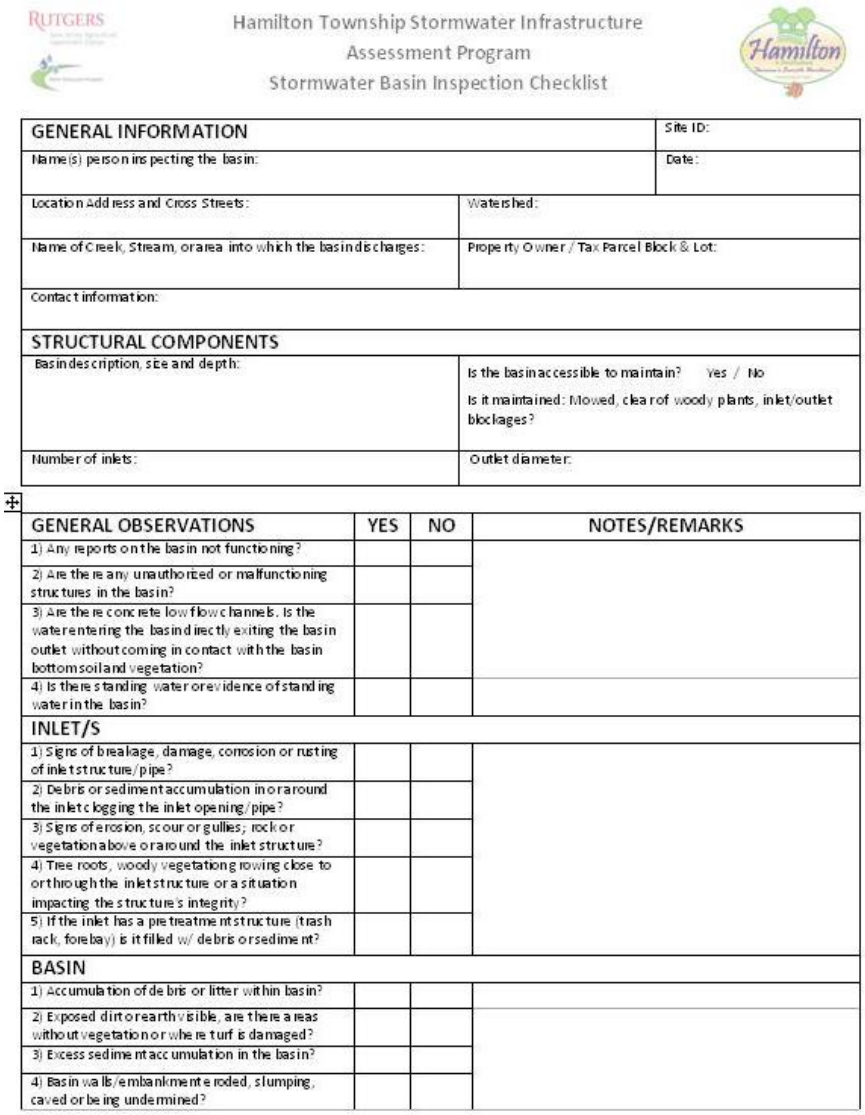
Water Resources Program

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

- A checklist was created to assess stormwater basins
  - General Observations
  - Inlets
  - Basin
  - Outlets
  - Overflow Spillway
  - Outfall
- *100* Basins were assessed (2012)
- *75* Basins were assessed (2013)
- *125* Basins were assessed (2014)
- *200+* Outfalls assessed (2015)



Hamilton Township Stormwater Infrastructure Assessment Program
Stormwater Basin Inspection Checklist

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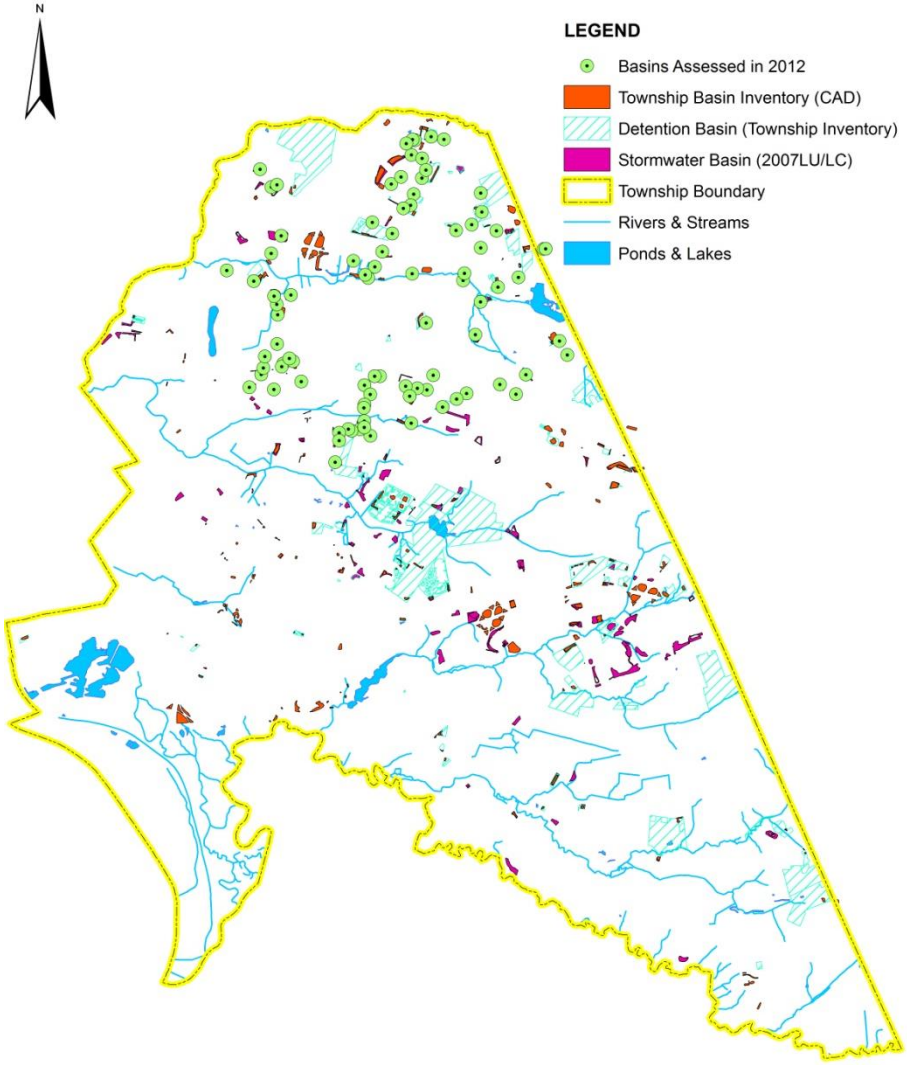
Hamilton Township

- 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.

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If you have any questions, please feel free to contact:

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