



Middlesex Township MS4 Update

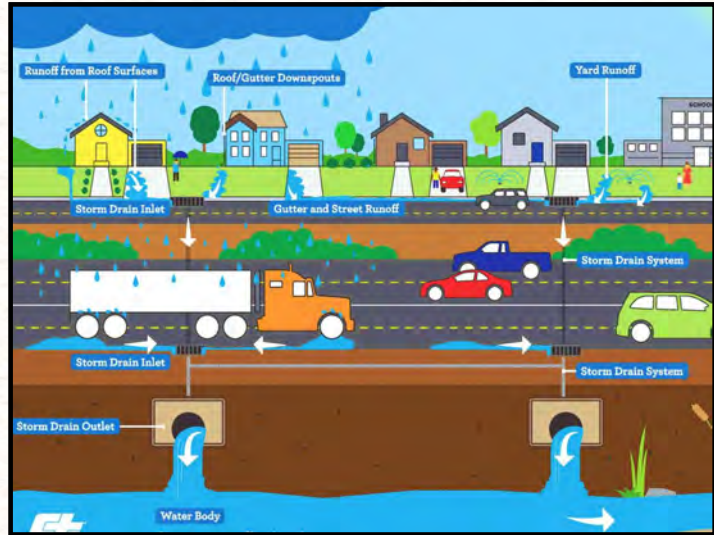
Board of Supervisors Meeting
August 07, 2019



What is MS4?

Municipal **S**eparate **S**torm
Sewer **S**ystem

Roadside inlets, pipes, retention basins, swales, and ditches are designed to collect stormwater and discharge it into streams and rivers



www.como.gov/utilities/stormwater/stormwater-education/outreach-videos/



Storm Sewer System is the interconnected conveyance path to rivers lakes and streams

MS4 is all about

CLEAN WATER

STORM WATER

URBAN WATER



<https://innovative-results.com/millions-in-u-s-drink-dirty-water/>



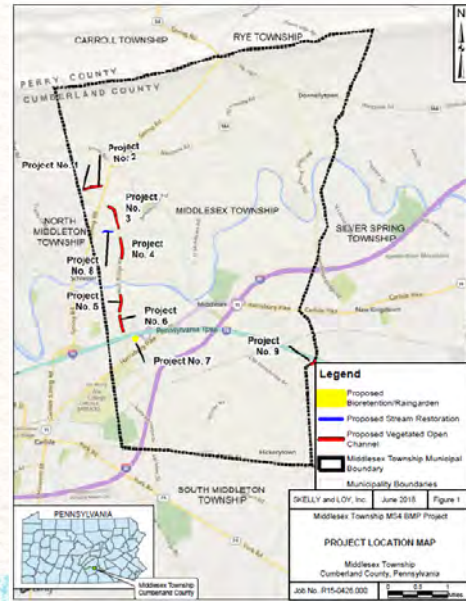
2018 to 2019 Achievements

Approved MS4 Permit

Began development of the Township Stormwater Management Program (SWMP)

Mariner Grant- \$631,600

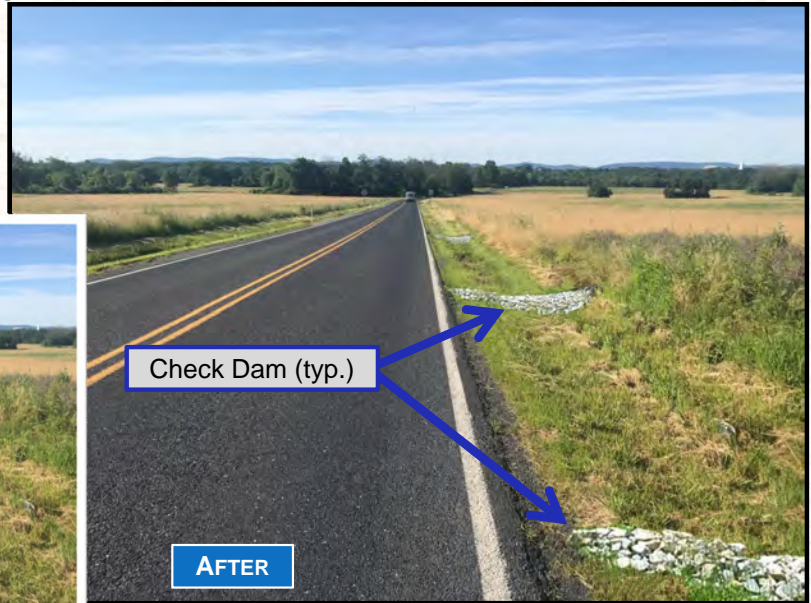
- Funded projects include:
 - Open Vegetated Roadside Channels (8,900 LF at 7 sites)
 - Rain Garden at Andersen Park
 - Stream Restoration for Unnamed Tributary to Wertz Run (1,100 LF)



Township is required to perform activities to prevent/reduce pollutants including more vigorous attention to maintenance, replacement of degrading infrastructure, plus new pollutant reducing projects...very expensive

Proposed PRP Projects

Proposed Restoration Strategy



Check dams is one option that will be considered for the roadside open vegetated swales.

The check dam will be shaped to impound the first flush of runoff while allowing more intense precipitation events to overtop the depressed center of the barrier. The first flush of rainwater carries with the highest concentrations of pollutants. The periodic interruption of flow promotes settlement of sediments and removes pollutants as runoff infiltrates into the ground and through the check dam. Plant materials will further clean the runoff as the plants utilize the nutrients to support their growth.

Proposed PRP Projects

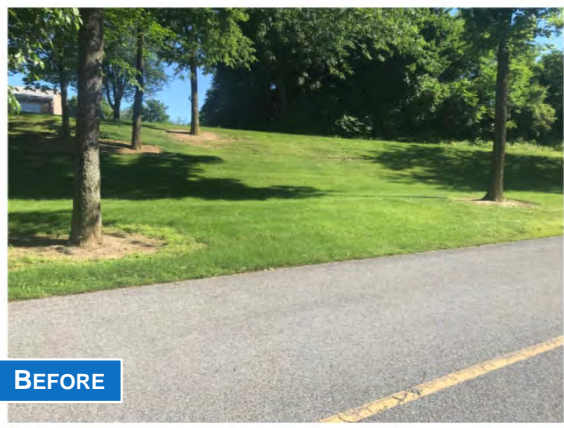
Proposed Restoration Strategy



An option planned will capitalize on the natural topography. Appalachian Drive in this area sheds runoff from a hillside to the east side of the road. There is limited road shoulder. The terrain drops steeply toward an adjacent agricultural field and the bank is eroded. The runoff then concentrates in a dip and continues across the field. The plan includes installation of an open vegetated channel with a plunge pool to dissipate the energy of the runoff. Like the previous description of the check dam, the slowing and temporary impoundment of runoff allows for infiltration to scrub pollutants and promotes settlement of sediment.

Proposed PRP Projects

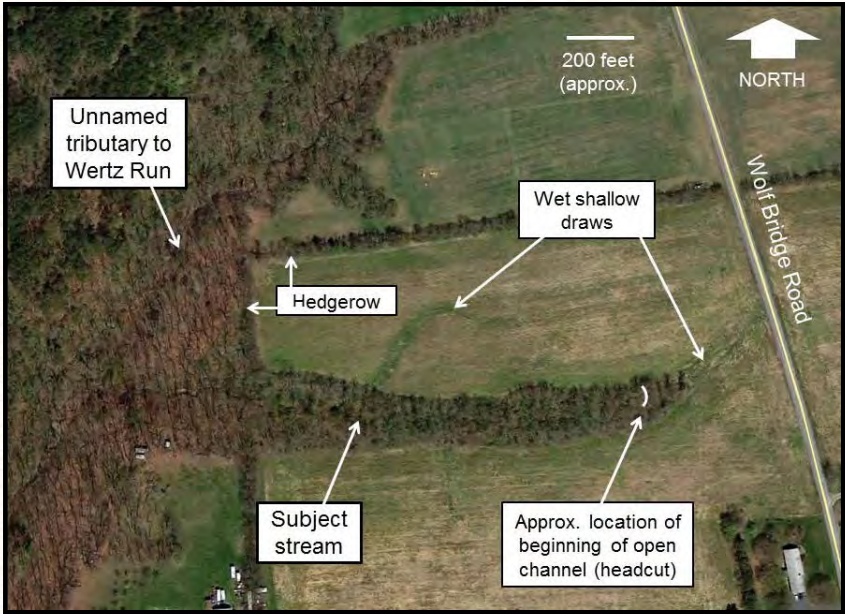
Proposed Rain Garden at
Anderson Park



The rain garden will add visual interest to the park, reduce stormwater runoff to the neighborhood roadways, and treat stormwater runoff by removing pollutants through infiltration. The garden will be an enclosed depression with amended soils and native plant materials. The landform will capture the first flush of runoff. The amended soil will act as a sponge to retain the runoff and promote infiltration of the urban runoff, and the plants will utilize the nutrients as part of their growth regimen. While the raingarden will treat runoff from only 1.6 acres of land, the project is valuable due to its high visibility and prominent position in the park that will make it attractive for promotion of the MS4 program and a natural education site.

Proposed PRP Projects

Stream Restoration/
Stabilization Project



Frey Phillips Property

Proposed PRP Projects

Stream Restoration/
Stabilization Project



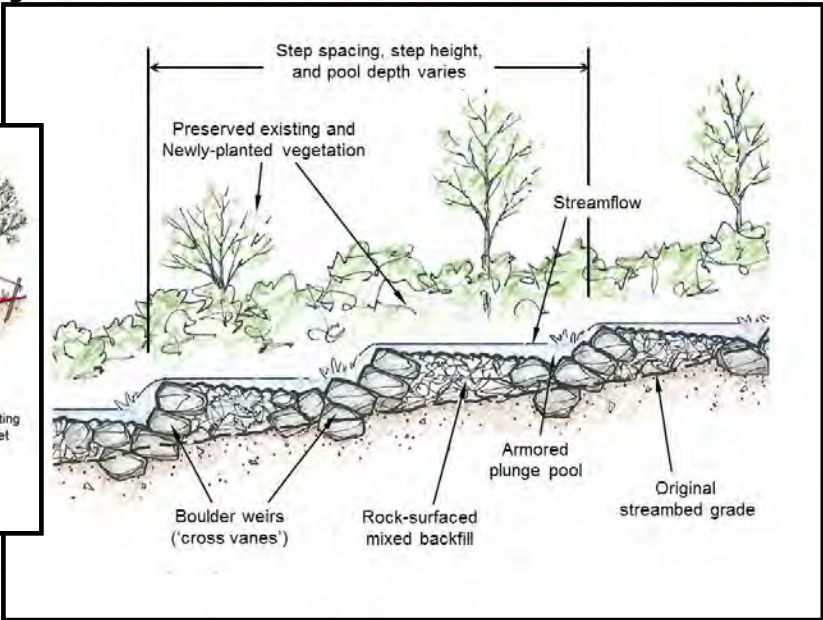
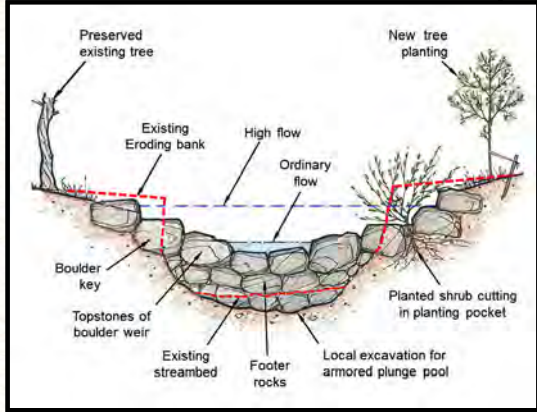
Current conditions 4->8-feet deep...Highly eroded

Left: An old glass bottle (arrow) freshly exhumed by erosion from the legacy sediment veneering the floor of this little valley. Note the plant roots with the soil still attached to them, a sure sign of active bank erosion

Right: Debris dams retaining large quantities of fine sediment are ubiquitous along the stream. The little debris dam at the arrow is retaining more than one-half cubic yard of freshly eroded sediment.

Proposed PRP Projects

Stream Restoration/ Stabilization Project



Left: concept channel cross section view of a boulder weir

Right: Concept profile view of a constructed step-pool stream channel

Energy dissipation and stabilization

Proposed PRP Projects

Stream Restoration/
Stabilization Project



Photo 1: Similar sized project in Philadelphia before

Photo 2: After Construction

Photo 3: A stream in northwestern PA shortly after the project completion...Larger than the tributary that will be restored...flow in the channel will likely be visible in wet years and during significant rain events

MS4 Permit Components



- #1 – Public Education and Outreach
- #2 – Public Involvement and Participation
- #3 – Illicit Discharge Detection and Elimination
- #4 – Construction Site Stormwater Runoff Control
- #5 – Post-Construction Stormwater Management
- #6 – Pollution Prevention and Good Housekeeping Practices
- #7 - Pollution Reduction Planning

Program elements #1 through #6 are often referred to as Minimum Control Measures – MCMs. Item #7 is a more recent addition to the permit program and has not been designated as an MCM.

MS4 Permit Components

MCM#1 – Public Education and Outreach

- Understand

MCM#2 – Public Involvement and Participation

- Join/Support

MCM#3 – Illicit Discharge Detection and Elimination

- Pollution

MCM#4 – Construction Site Runoff Control

- Escaping Mud

MCM#5 – Post-Construction Stormwater Management

- Functionality

MCM#6 – Pollution Prevention and Good Housekeeping

- Maintenance

Pollutant Reduction Plan

- Mitigation



#1 – Public Education and Outreach

#2 – Public Involvement and Participation

#3 – Illicit Discharge Detection and Elimination

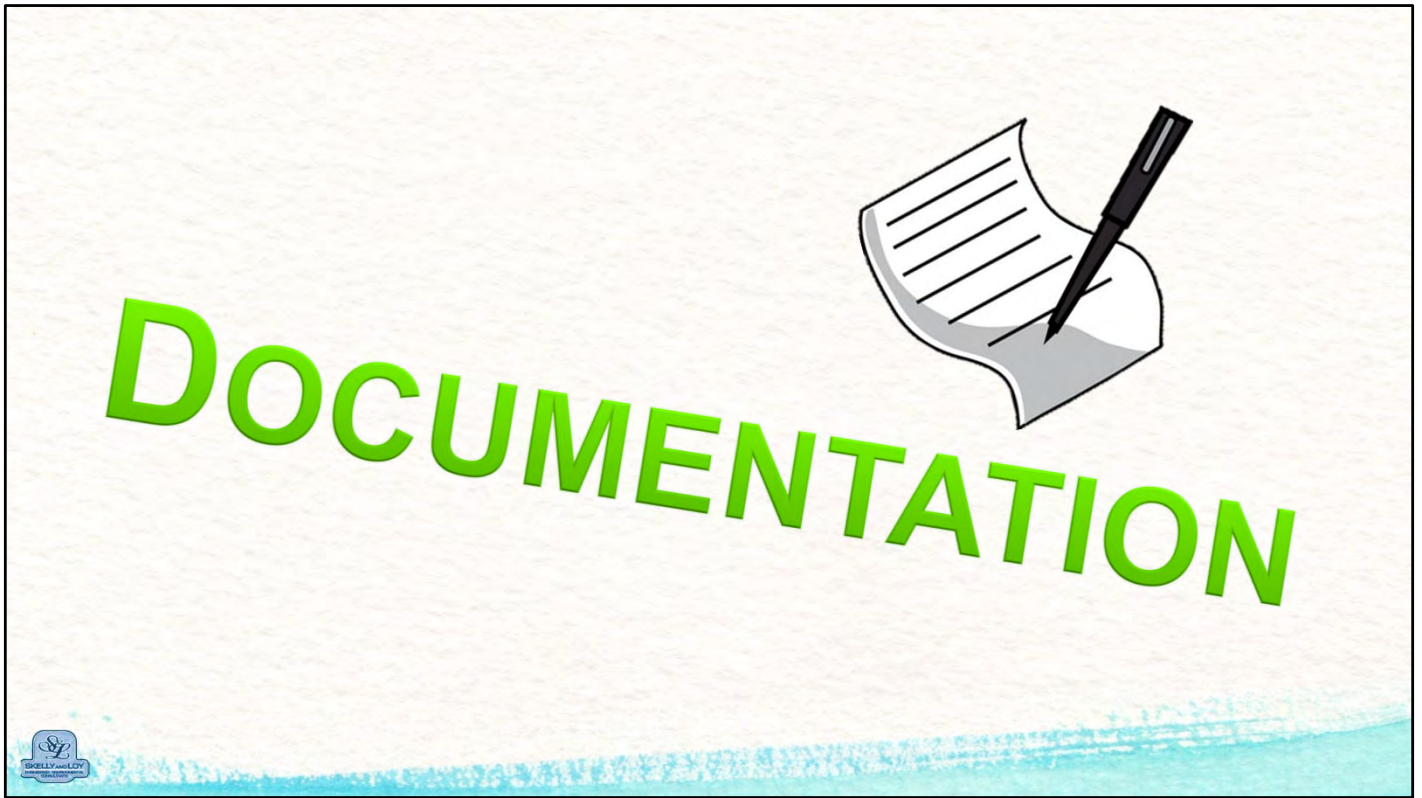
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And if it isn't documented it doesn't count when regulatory agencies audit.

MS4 Permit Component Focus

MCM#1 – Public Education and Outreach

MCM#2 – Public Involvement and Participation

MCM#3 – Illicit Discharge Detection and Elimination

MCM#4 – Construction Site Runoff Control

MCM#5 – Post-Construction Stormwater Management

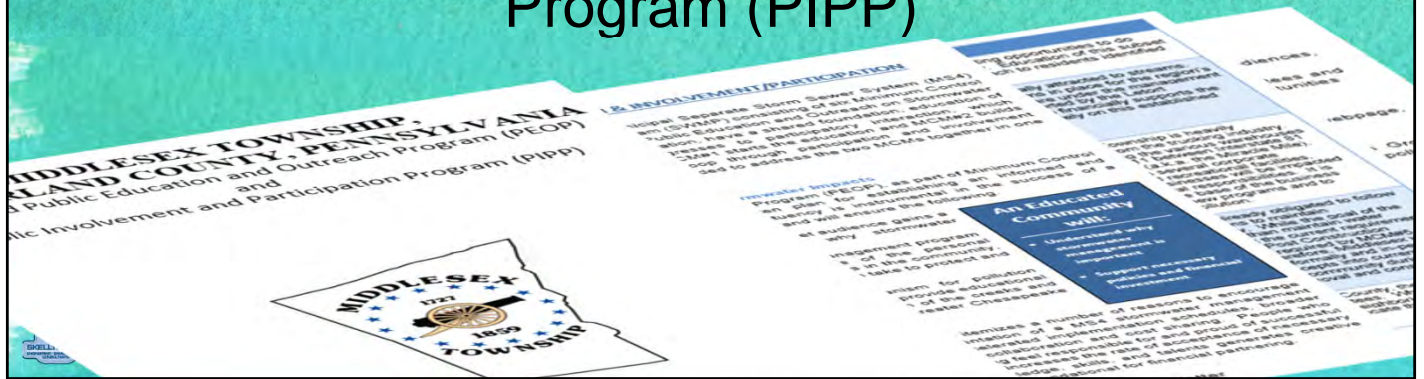
MCM#6 – Pollution Prevention and Good Housekeeping

Pollutant Reduction Plan



Focus for this meeting is MCM1,2,and 3

MCM 1 & 2- Combined Public Education and Outreach Program (PEOP) and Public Involvement and Participation Program (PIPP)



Combined PEOP & PIPP Highlights

- Target Audience- municipal employees, residents, and businesses
- Goals- Education and Participation



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Requires education. Target audience focus is Township staff, because they have perform activities, maintain facilities, and document. Residents and businesses, because an informed constituency becomes supportive of the efforts

Combined PEOP & PIPP Initiatives

Add Stormwater as a standing item on Planning Commission and Board of Supervisor meetings

Select and invite representatives to form a Township MS4/Stormwater Stakeholders' Group

Develop Employee Trainings

- General training
- Specialized training for Office Staff
- Specialized training for Field Personnel

Schedule lunch-and-learns

Update website

Develop two articles for newsletter



These are the initiatives that we'll examine a little closer

Combined PEOP & PIPP: Education

Employees:

- Staff Lunch-and-learns
 - General
 - Specialized



Residents and Businesses:

- Township newsletter stormwater articles
- Stand at the annual Middlesex Fall Festival (optional)



Employees

A general training will be first. That training is tentatively scheduled for September 9 and will cover many of the same information as we're sharing with you...just a little slower and with more background that you already have

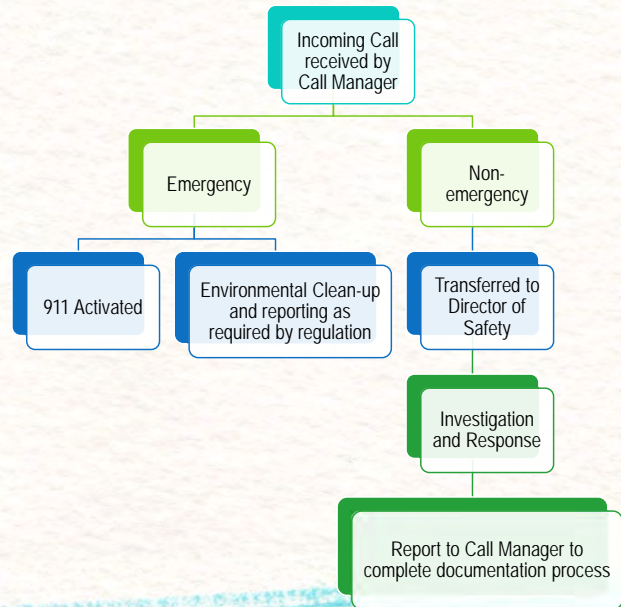
More specifics will be directed to the employees to match their roles. For example office staff will focus on receiving and directing complaints. Management, Codes and Maintenance will focus on recognizing problems in the field and correcting them.

The Township newsletters will feature stormwater (2x year minimum)

The Township might also provide displays, handouts or interactively participate in events like the Fall Festival

Combined PEOP & PIPP: Participation

- Stormwater: Standing Agenda Item
- Township MS4/Stormwater Stakeholders' Group
- Stormwater Complaint Process & Chain of Command



You will add stormwater as a standing agenda item. It will be a time that staff can update you on progress on the Stormwater Management Program (interacting with the “public official audience), and a time when constituents can bring issues to your attention

We’ll spend a slide or two on the Stakeholders group in a moment.

A stormwater complaint process and chain of command will be developed. Dody will be talking to you about the IDDE Manual. You will see that there is overlap in all the MCMs. An initial process for reporting is included in the IDDE manual , but it will be refined to consider future changes in staffing, and distribution of responsibilities

Stormwater Stakeholder Group

- **Guidance** for Township Stormwater Management Program
- **Barometers** of community viewpoints



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Formation of a Stakeholders group

1. Increases the likelihood of understanding the concerns and opinions of the community...a small group is more interactive and forthcoming with opinion
2. Fulfills the permit for participation

Their response to the Township's Stormwater Management Program can reveal weaknesses in the Township's plan as well as provide insights and suggestions to resolve shortcomings. Once involved, the stakeholders group will likely be advocates clean stormwater because they have invested time and will have the satisfaction of having their concerns heard.

Suggested Participants

CATEGORY	INVITED REPRESENTATIVE
RESIDENT REPRESENTATIVES	<ul style="list-style-type: none"> • 4 Representative Home/Farm Owners per Voting Precinct <ul style="list-style-type: none"> ○ 2 Single-Family Homeowners ○ 2 Farm Owners (owner occupied) • 2 Representative Landlords per Voting Precinct
BUSINESS OWNERS	<ul style="list-style-type: none"> • 1 Representative Owner/Administrator (minimum) from the following major employers/land owners: <ul style="list-style-type: none"> ○ Truck Service Plazas ○ Giant Food Corp; AHOLD USA ○ Amazon Warehouse ○ Toigo Orchards ○ Carlisle County Club • 2-3 Representative Small Business Owners • 1 Representative form the Developer Community <ul style="list-style-type: none"> ○ Claypool Building ○ Beracah Builders ○ Charter Home
SCHOOLS	<ul style="list-style-type: none"> • 1 Representative Business Administrators from the Middlesex School District



The list of type of stakeholder representative

MCM 3- Illicit Discharge Detection and Elimination Program (IDD&E)

Figure 2: IDD&E Program Elements

A. BASIS FOR THE

Middlesex Township (Township) Program for the Municipal Illicit Discharge Elimination (MIDE) is a program designed to identify and eliminate sources of illicit discharges within the Unincorporated Area of the Township. The program is based on the regular portion of the Township's municipal water and sewer systems, including catch basins, manholes, and stormwater from residential and commercial areas. The Township is a 20-square mile borough of Centre County, Pennsylvania, located in the north of the county. Middlesex Township includes a 4 square mile of the Unincorporated Area.

The Township IDD&E Program utilizes the CISEE (CIVIL Illicit Discharge Elimination) Guidance to identify and eliminate sources of illicit discharges. The CISEE Guidance is a primary program and is also included as a reference in the Township's Water Conservation and Stormwater Management Plan. <http://www.epa.gov/waters/cisee> <http://www.epa.gov/waters/cisee>

B. PROCEDURE'S FOR PROTECTING AND ASSESSMENT

Reporting shall be performed based on a reporting procedure that will be actively reviewed and approved by the Township's public utilities and the DEP. The Township will then determine the appropriate response and the responsibility for the removal of the illicit discharge as that is determined by the DEP.

C. PROCEDURE'S FOR ADDRESSING INQUIRIES AND COMPLAINTS RECEIVED FROM THE PUBLIC

The Middlesex Township Public Education and Outreach Program (PEOP) is a way for municipal residents and businesses to report any of the Township's public utilities during or weather conditions. The role of Township staff is to investigate and pursue remedies for illicit discharges and to provide information to the public. The Township's public utilities and businesses are encouraged to report any of the Township's public utilities during or weather conditions. The Township's public utilities and businesses are encouraged to report any of the Township's public utilities during or weather conditions. The Township's public utilities and businesses are encouraged to report any of the Township's public utilities during or weather conditions.

D. MIDDLESEX TOWNSHIP, BERLEND COUNTY, PENNSYLVANIA

MAY 2019

Identifying an Illicit Discharge



<https://www.codot.gov/programs/environmental/water-quality/assets/sudsy-outfall.jpg>



- Normal stormwater vs illicit discharge
 - Has it rained in the past 3 days
 - Yes → stormwater
 - No → might be an illicit discharge

Illicit discharge is anything going into or out of a storm sewer system that is not entirely stormwater

Identifying an Illicit Discharge

- Dry weather flow
 - Does it have a distinct odor?
 - Is the water cloudy or dirty?
 - Is there soaps/oils floating?
 - Is it an abnormal color?
 - Is there a lot of vegetation around the outfall pipe?
- If yes, **REPORT** and **DOCUMENT**



<http://www.richmondgov.com/PublicUtilities/Pretreatment.aspx>



The water may look or smell strange. Potential illicit discharges should be reported and documented.

MCM3- IDD&E Overview

- Develop, implement and enforce a program to detect and eliminate illicit discharges
- Includes MS4 permitting area only
- Middlesex Township program:
 - outfall inspections
 - illicit discharge reporting
 - illicit discharge elimination
 - documentation



MS4 permit requirements include the development of an IDD&E Program.

IDD&E Inspection Frequency


Outfall Type	Frequency
Outfalls- Urban area (64 total)	2x during the 5-year permit term
Priority Outfalls- 'Miracle Mile' area	1x per year
Priority Outfalls- outfalls with previously-confirmed ID	every 6 months



Typically, outfalls are inspected twice per permit term. Priority outfalls (outfalls that have a more likelihood of having ID) are inspected more frequently.

IDD&E Inspection Methodology

- Dry-weather Screening (48 consecutive hours of less than 0.1” of rainfall)
- Complete standard field form
- Take pictures

3800-FM-BCW0521 12/2015 MS4 Outfall Field Screening Report		COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF CLEAN WATER	
			
MS4 OUTFALL FIELD SCREENING REPORT			
BACKGROUND INFORMATION			
Permittee Name:	NPDES Permit No.: PA		
Date of Inspection:	Outfall ID No.:		
Land Uses in Outfall Drainage Area (Select All):		Latitude: _____	
<input type="checkbox"/> Industrial	<input type="checkbox"/> Urban Residential	Longitude: _____	
<input type="checkbox"/> Commercial	<input type="checkbox"/> Suburban Residential	Dry Weather Inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> Open Space	<input type="checkbox"/> Other:	Date of Previous Precipitation: _____	
Inspector Name(s):		Amount of Previous Precipitation: _____ in	
		Were Photographs Taken? <input type="checkbox"/> Yes <input type="checkbox"/> No	



IDD&E inspections take place during dry weather and consist of completing a form and taking pictures.

If a discharge is observed during IDD&E Inspection:

- Initial water testing (pH, temperature, conductivity, dissolved oxygen)
- Discharge examined- color, odor, floating solids, scum, sheen, substances
- Investigate source (permissible or non-permissible)

Potential illicit discharge → Report for further investigation



In-depth investigation is completed if a potential illicit discharge is discovered.

Inspections on Private Property

- Checked with Township Solicitor
- Article VIII allows the Township to enter a property and to inspect any aspect regulated by the Stormwater Ordinance.
- If a suspected illicit discharge is found
 - the Township can investigate for the source of pollution on private property.
 - To be able to gain access to a private property, the township needs to have proper documentation. This could include but not limited to land easements, consent agreements, and search warrants



Solicitor Keith Brenneman. IDD&E inspections can enter property to perform the initial outfall screening. If an illicit discharge is discovered, then the Township needs to have proper documentation to access private property in order to investigate the source of the pollution.

Confirmed Illicit Discharge

- PA DEP notification
- Within Township Boundary- identify source and eliminate
- Outside Township Boundary- notify adjacent Township
- Add outfall to list of Priority Areas (once issue resolved)



If an illicit discharge is confirmed, then PA DEP is notified, along with the adjacent township, if applicable. The Illicit Discharge is eliminated and the outfall is added to the Priority Area list.

IDD&E- Public Involvement

- Public can report potential illicit discharges by calling Township phone number
- Director of Public Safety coordinates response- investigation, notification, resolution, and reporting
- Public complaints are recorded, tracked, and stored at the Township Office

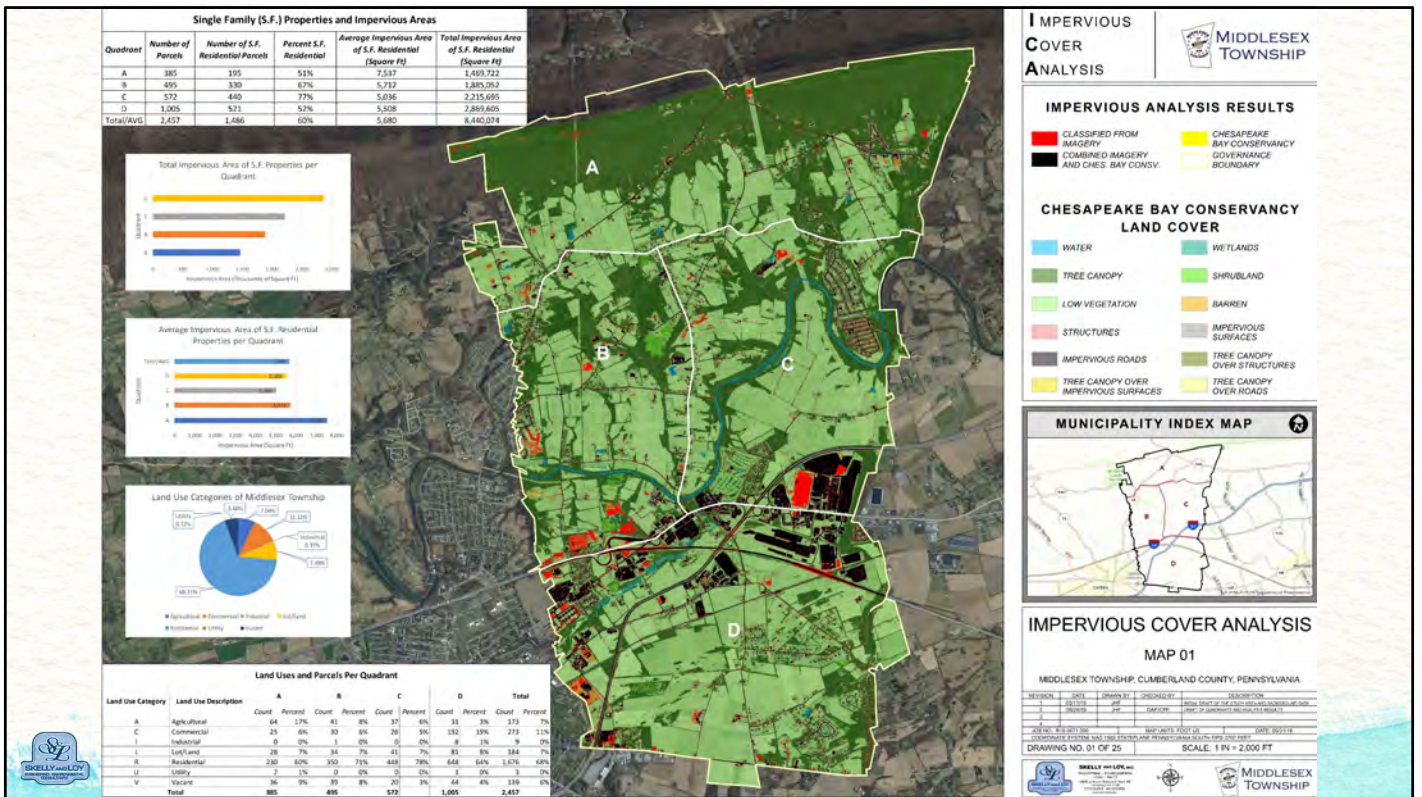


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Public can report potential illicit discharges. The Director of Public Safety coordinates the investigation, reporting and resolution of the illicit discharge. Documentation is stored at the Township office.

GIS Impervious Analysis



Impervious is the most significant predictor of pollution. It also directly contributes to flood elevation increases.

Imperviousness another word for hard surfaces like paving and roofs, prevents stormwater from soaking into the ground. Soil provides natural filtration of pollutants. What doesn't soak in runs off...Stormwater runoff. Dirt and pollutants are loosened from the surface and suspended. Paved surface also heat and speed water that subsequently causes erosion when the high-velocity water returns to non-paved surfaces. The fast water has even more impact on stream banks that crumble especially when focused by a pipe or channel...just like getting hit by water from a fire hose



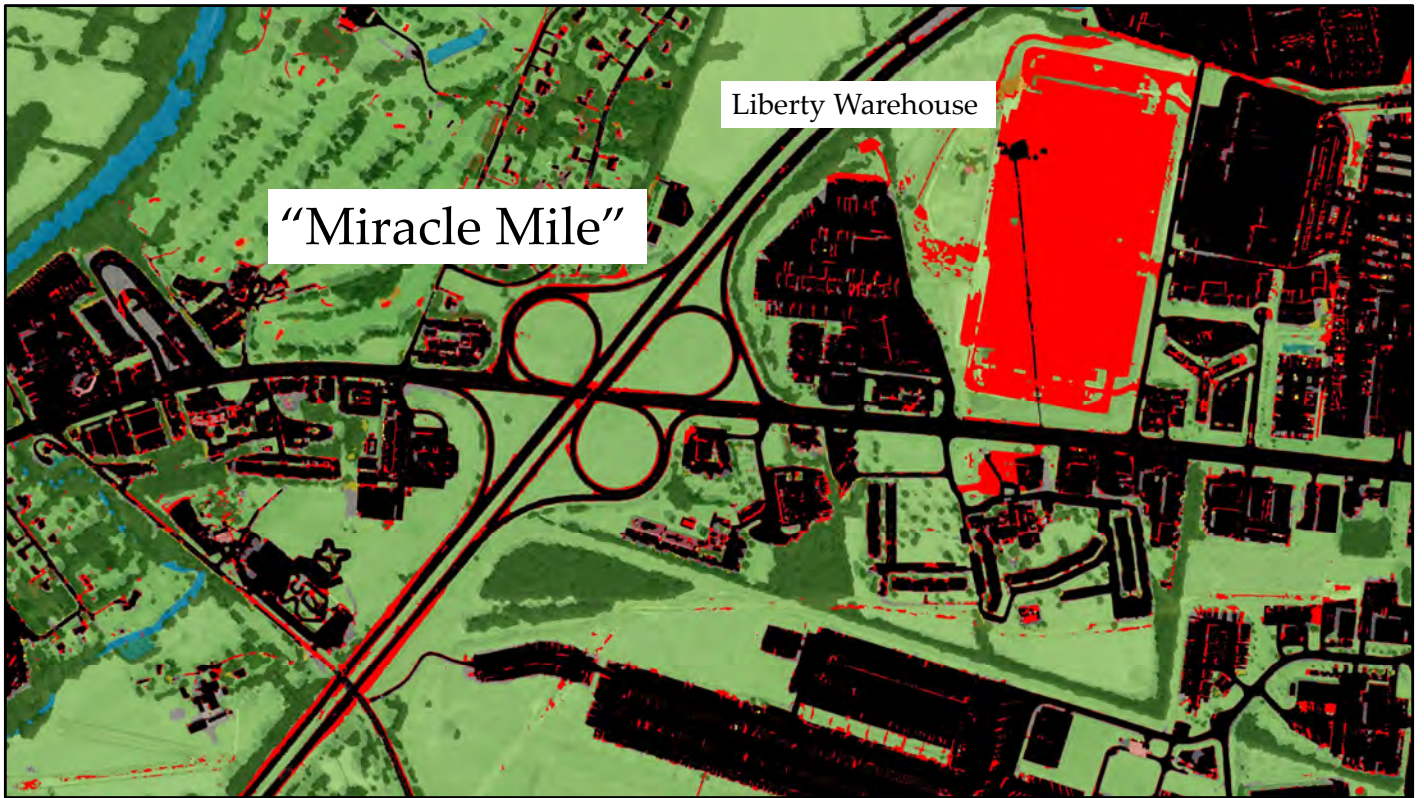
This is the Key. It shows the various land surface covers. The Top part shows impervious surface and the source of the data. There was a data base created by the Chesapeake Bay Conservancy (Based on 2003-2008 imagery) that is very detailed but did not capture recent changes in Middlesex. Our GIS team analyzed 2018 PEMA imagery and classified the “red” areas. Where the two coincide, the map is black. The exercise produced the areas of imperviousness with a very high degree of confidence that the analysis reflects actual land cover.

Single Family Residential Property supports 5,680 SF Impervious

Single Family (S.F.) Properties and Impervious Areas					
Quadrant	Number of Parcels	Number of S.F. Residential Parcels	Percent S.F. Residential	Average Impervious Area of S.F. Residential (Square Ft)	Total Impervious Area of S.F. Residential (Square Ft)
A	385	195	51%	7,537	1,469,722
B	495	330	67%	5,712	1,885,052
C	572	440	77%	5,036	2,215,695
D	1,005	521	52%	5,508	2,869,605
Total/AVG	2,457	1,486	60%	5,680	8,440,074



Results. We concentrated on Single family Residents so we could establish and apples to apples comparison regarding the extent of impervious regardless of land use. The average single family property in Middlesex has 5,680 Square feet of imperious surface



Heavily Impervious...The equivalent impact to hundreds of single-family residences



The Meadows
(medium-density single family residential)

Individual homes
(low-density single family residential)

Country Manor West
(high-density residential)
Not considered single-family
in analysis...
One lot, many homes

Heavily Impervious...The equivalent impact to hundreds of single-family residences

Questions and Direction

1. Agree...Implement the Combine PEOP/PIPP and IDD&E Manual as presented
2. Suggest changes
3. Review and suggest changes at next meeting

