



INAFSM 2017
ANNUAL CONFERENCE

**The MS4 Permit - A Holistic Approach
to Storm Water Management**

Concurrent Session A2 - Suite 3

3:25 p.m. Wednesday September 6, 2017

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**R.A. Smith
National**

*Beyond Surveying
and Engineering*

The MS4 Permit - A Holistic Approach to Storm Water Management



First, Let's Introduce Ourselves...

My Background -

- Consultant serving local government since 1978
- Have worked with MS4s in several states to implement permit management software applications

When you are not learning and networking at a conference, do you...

Administer an MS4 program?

Provide regulatory guidance and motivation?

Build great projects to manage runoff and improve water quality?

Provide equipment, materials and products for storm water management?

Serve MS4s as a consultant?



This Presentation -

- Is not a software commercial :-)
- Takes a broad look at how the MS4 permit addresses our impact on surface water quality
- Highlights sources, inputs, outputs and audiences that form a successful storm water management program
- Considers structure and process over content

...and uses the word "Holistic"





Definition of HOLISTIC

1: of or relating to holism

Definition of HOLISM

1: a theory that the universe and especially living nature is correctly seen in terms of interacting wholes (as of living organisms) that are more than the mere sum of elementary particles

2: a study or method of treatment that is concerned with wholes or with complete systems : a holistic study or method of treatment



CITY HALL

NEWS
We have a problem!

Over 20 million tons of trash are dumped in landfills each year. This is a major environmental problem. We need to find a way to reduce the amount of trash we produce and recycle more.



MS4 Permit Requirements

1. MS4 permit requirements

2. MS4 permit requirements

3. MS4 permit requirements

4. MS4 permit requirements

5. MS4 permit requirements

6. MS4 permit requirements

7. MS4 permit requirements

8. MS4 permit requirements

9. MS4 permit requirements

10. MS4 permit requirements

First, Let's introduce Condulets...

Condulets are a new type of stormwater management device. They are designed to capture and filter out debris and sediment from stormwater runoff. This helps to reduce the amount of trash and debris that ends up in our waterways.



MS4 Storm Water Management Team

Two stylized human figures, one male and one female, representing the MS4 Storm Water Management Team.

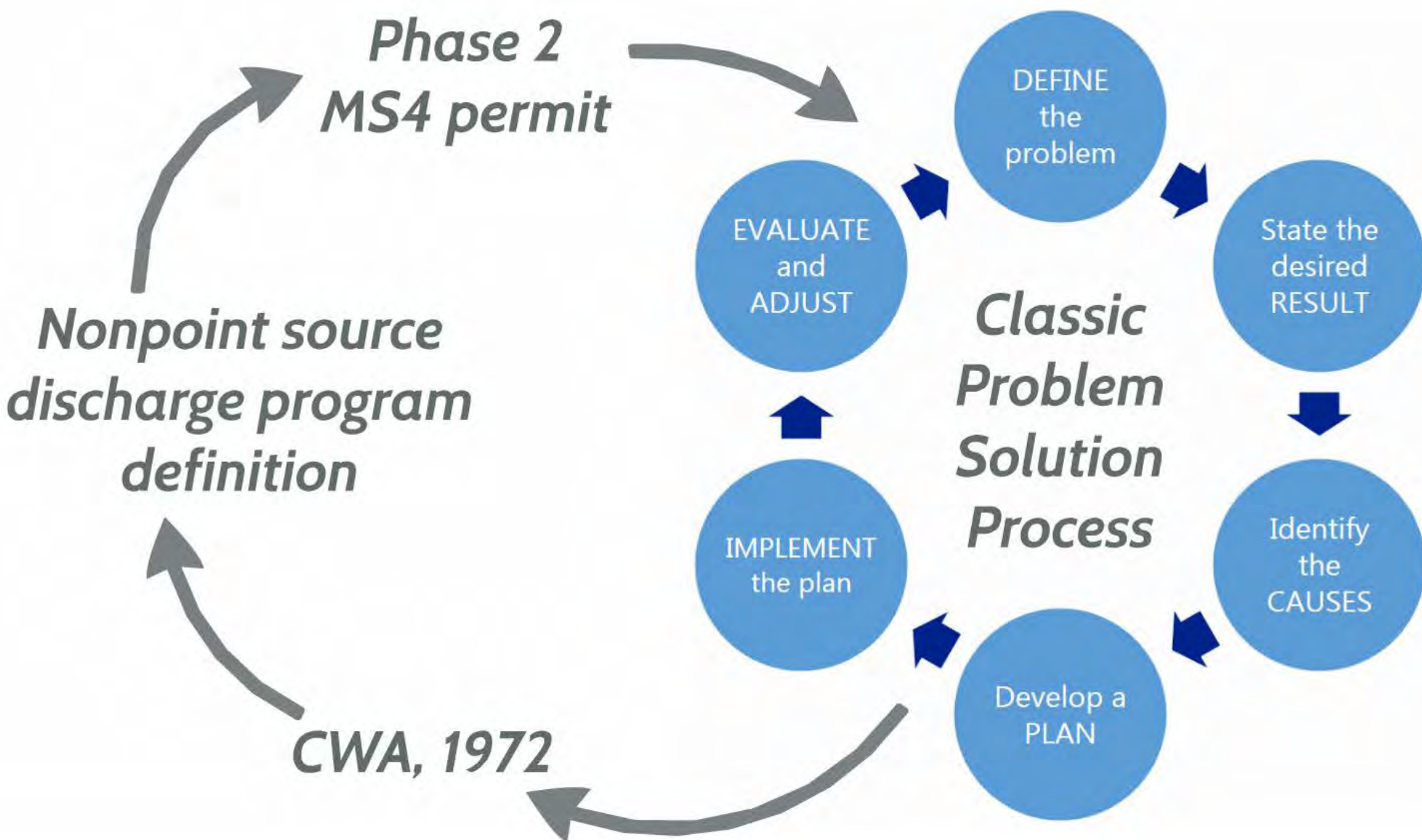
NEWS

Across the
U.S. c. 1970)

We have a problem!

Our actions and the impact of our expanding built environment are degrading the quality of our natural environment, killing our lakes and streams.

It is our duty to solve this problem!



The MS4 Permit - A Holistic Approach to Storm Water Management



Storm Water Management Plan

What is the *PURPOSE* of the SWMP?

- **GUIDE** your efforts to comply with your MS4 permit
- **TRACK** and **REPORT** your efforts and results
- **MEET EXPECTATIONS** of your constituents
- Demonstrate budget **STEWARDSHIP** and justify efforts
- **REDUCE ENVIRONMENTAL IMPACT** and pollution

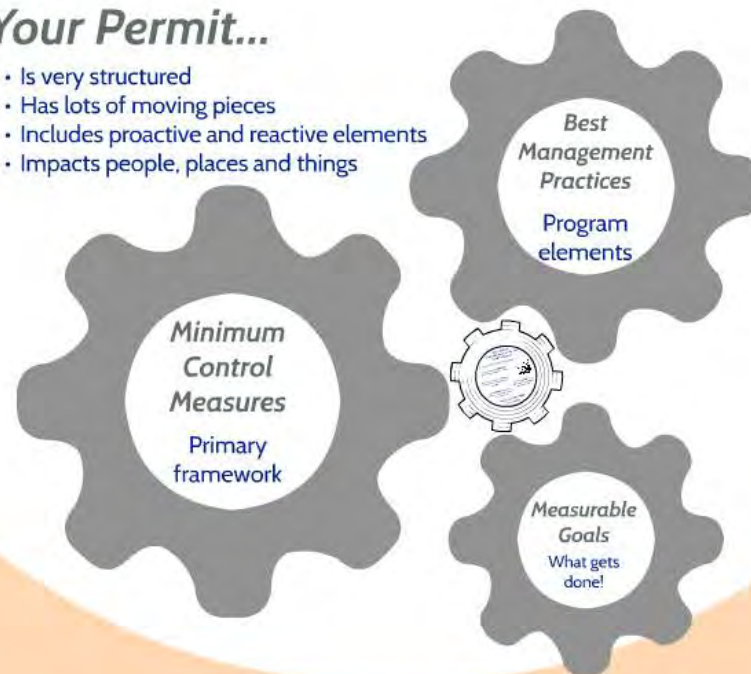
Who are the *PEOPLE* involved in your SWMP?

- MS4 administration, office and operations staff
- Residents, Businesses, Visitors
- MS4 Elected officials
- Advocacy groups and stakeholders
- Regulators

*Virtually, Everybody!
But ultimately led by **ONE** key person (or a very small group!)*

Your Permit...

- Is very structured
- Has lots of moving pieces
- Includes proactive and reactive elements
- Impacts people, places and things



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mit



*What is the **PURPOSE** of the **SWMP**?*

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Who are the PEOPLE Involved in your SWMP?

- MS4 permittees, utility and sewer districts
- Residents, Businesses, Schools
- MS4 Permittees
- MS4 Permittees
- MS4 Permittees

Your Permit...

- Is very technical
- Has a lot of moving parts
- Includes permit fees and other requirements
- Impacts people, places and things



Construction Site Runoff Control



Keep it Clean!

Any new developments in the world of construction...
 • **MS4** permittees
 • **MS4** permittees
 • **MS4** permittees

Construction Site Runoff Control



Illicit Discharge Detection and Elimination (IDDE)



Find and plug the leaks!

Illicit Discharge Detection and Elimination (IDDE)



Post Construction Runoff Control



Post Construction Runoff Control



Post-construction runoff control projects that result from land disturbance
Minimize Ongoing Impact

Post Construction Runoff Control



Pollution Prevention/Good Housekeeping



Pollution Prevention/Good Housekeeping



Prevention of pollution from trucks and other vehicles
Prevent Runoff

Pollution Prevention/Good Housekeeping



Public Education/Outreach



Develop and implement an effective, targeted outreach program to educate the public on stormwater management and pollution prevention
Change People's Behavior!

Public Education/Outreach



Public Participation/Involvement



Involve the public in developing, implementing and reviewing MS4 programs
Get input and develop sense of ownership

Public Participation/Involvement



Public Participation/Involvement



Involve the public in developing, implementing and reviewing MS4 programs
Get input and develop sense of ownership

Public Participation/Involvement



Among the myriad of options, design, processes and practices that are being used to control runoff...
 • **MS4** permittees
 • **MS4** permittees
 • **MS4** permittees



Public Education/ Outreach

Develop and implement an effective watershed outreach program to provide the public with information to reduce storm water pollution

Change People's Behavior!



Collier Township, PA (MS4 Stormwater Education Program)
<http://www.colliertownship.net/wp-content/uploads/2015/07/runoff1.jpg>

Public Participation/ Involvement

Involve the public in developing, implementing
and reviewing MS4 programs

Get input and develop sense of ownership



2014 - Northeast Wisconsin Stormwater Consortium

Illicit Discharge Detection and Elimination (IDDE)

Develop, implement and enforce an illicit discharge detection and elimination program

Find and plug the leaks!



Illicit Discharge Detection and Elimination -
A Guidance Manual for Program Development and
Technical Assessments (2004)

Construction Site Runoff Control

Reduce pollutants in storm water runoff from construction activities that result in land disturbance

Keep it Clean!



Post Construction Runoff Control

Reduce pollutants in post-construction runoff from development and redevelopment projects that result from land disturbance

Minimize Ongoing Impact



Pond #1 - 8/14/2015
City of Rochester, MN

Pollution Prevention/ Good Housekeeping

Prevent or reduce pollutant runoff from municipal
operations into the storm sewer system

“Primum non nocere”



The MS4 Permit - A Holistic Approach to Storm Water Management



Public Education/ Outreach

Sources

- Permits/ Regulation
- Industry information
- MS4 staff
- Advocacy groups



Inputs

- Pollution prevention information
- **Local rules/ policies**
- Programs/ events
- Specific guidance



Outputs

- e-Information
- Flyers, Brochures
- Social media postings
- Events/ Presentations
- Print/ Broadcast PSAs
- K-12 Curriculum input

Audiences

- **Residents**
 - Businesses
 - Visitors
- and their Subsets

Timing Push scheduled messages and
Provide 365/24/ 7 resource access

What has the given MS4s the greatest boost in public outreach since the program began?

IMHU...Social Media



Public Participation/ Involvement

Sources

- Residents
- Businesses
- Advocacy groups



Inputs

- Constituent **perceptions**, concerns, and needs
- Volunteer labor



Outputs

- Policy influence
- SWMP refinement
- Project labor (river clean-ups, stenciling, etc.)



Audiences

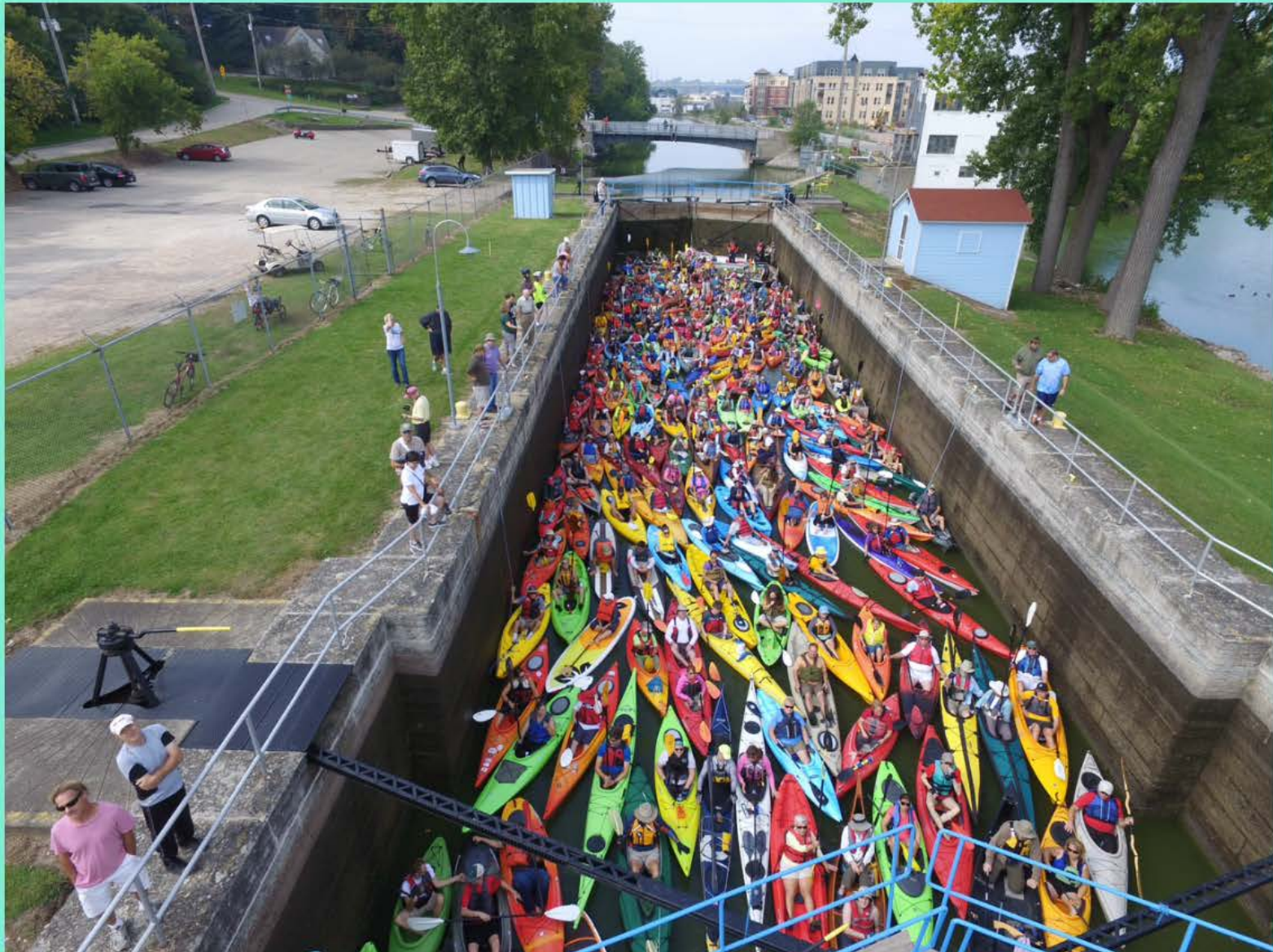
- Elected officials
- **MS4 staff**
- Advocacy groups



Timing

Host or support events and Receive input at any time

Any new or unique ideas for generating a sense of ownership and care for community waterways?



Illicit Discharge Detection and Elimination (IDDE)

Sources

- Permits, ordinances and policies
- MS4 field staff
- General public

Inputs

- Regulations, policies and procedures
- Inspections and observations

Timing

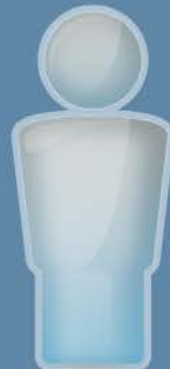
Controlled inspections and guidance;
spill or occurrence driven response

Outputs

- Inspection reports
- Illicit discharge identification
- Discharge cleanup and source elimination
- Enforcement

Audiences

- Residents/ Business owners
- Permitted/ Illicit dischargers



Any new developments in IDDE methods or practices?

Couple thoughts

- GIS mapping capabilities have greatly advanced since the first permit period, along with GPS support for finding things



- 2016 Indiana Annual MS4 Conference - presentation on UAV-mounted thermal imaging of storm water ponds for illicit inflows

Construction Site Runoff Control

Sources

- Permits and regulations
- Industry **guidance**
- Designers and contractors

Outputs

- Permits, policies & procedures
- Inspections
- Construction ESC BMPs
- **Cleanup** and Enforcement

Inputs

- Erosion control **plans**
- Construction site **inspections**
- Public observations

Audiences

- Developers
- Designers
- **Contractors**

Timing

Controlled reviews and inspections;
occurrence driven response



Any new developments in the world of construction site runoff control?

Yes!

- Many expanding programs for training and certification of ESC inspectors, or "trained individuals"



- Improving products and material technology

Post Construction Runoff Control

Sources

- Permits and regulations
- MS4 staff
- Designers
- Industry **guidance**

Outputs

- Private facility SWPPPs
- Regional storm water quality **facilities**
- Inspections
- BMP/ facility O&M

Inputs

- Sustainable practices
- Green/ LID **design**
- Quality/ flow/ volume control BMPs
- Local policies/ procedures

Audiences

- **Developers and Designers**
- BMP/ Infrastructure owners, **operators** and inspectors

Timing

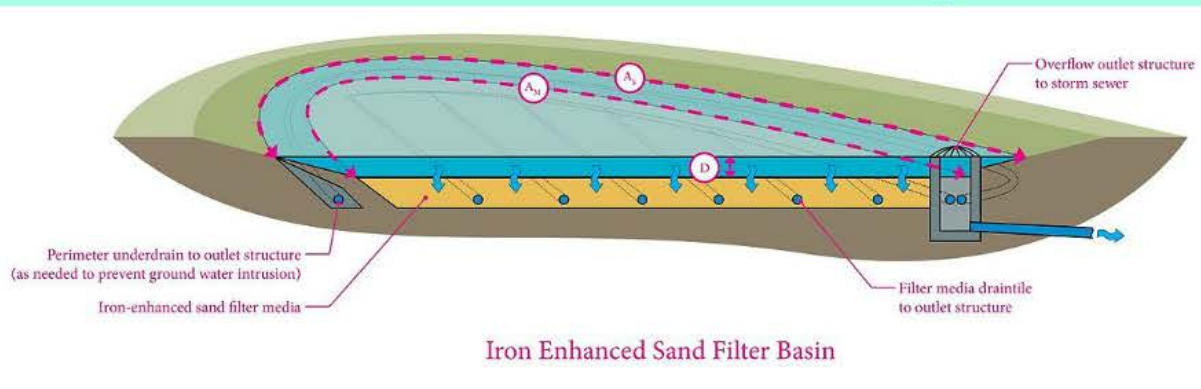
Controlled reviews, inspections and maintenance



Among the myriad improved systems, designs, processes and practices, does anything truly stand out?

Different for everybody, but...

- Rapid acceptance of underground storage and underground treatment systems
- Advance of active treatment systems



Pollution Prevention/ Good Housekeeping

Sources

- Pollution prevention information
- Local policies and practices
- Industry guidance

Inputs

- Permits and regulations
- Trade organizations
- MS4 SOPs



Outputs

- Pollution prevention and reduction practices
- Municipal facility, BMP & equipment inspection, O&M
- Staff training

Audiences

- MS4 field staff
- Facility operators
- Contractors for MS4 operations

Timing Planned activity and reactive to unplanned events

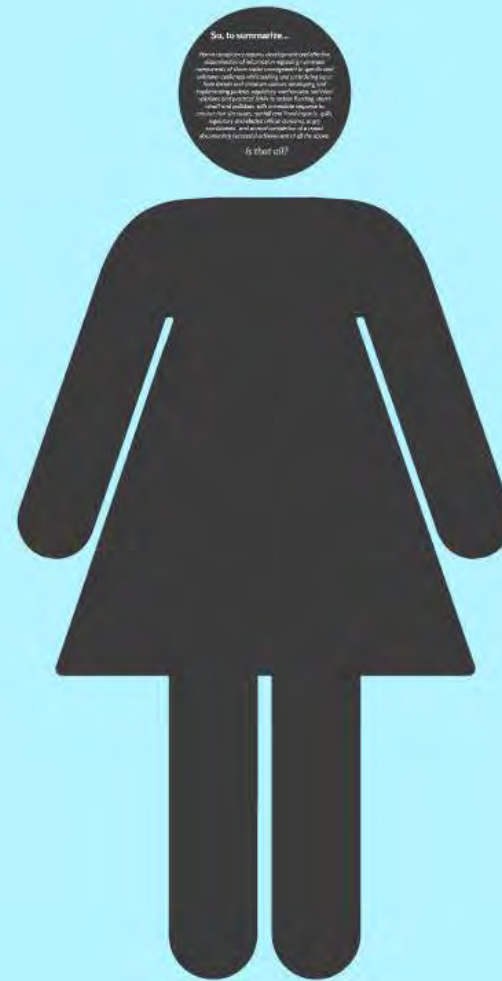
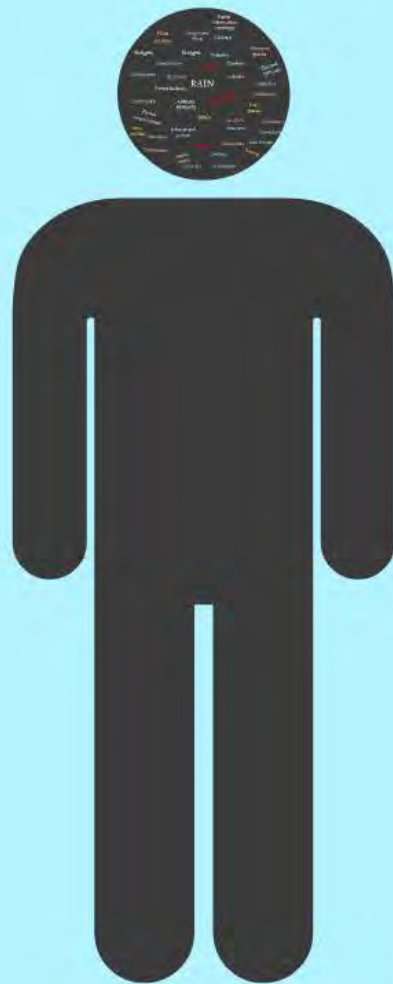
New developments on the pollution prevention and good housekeeping front?

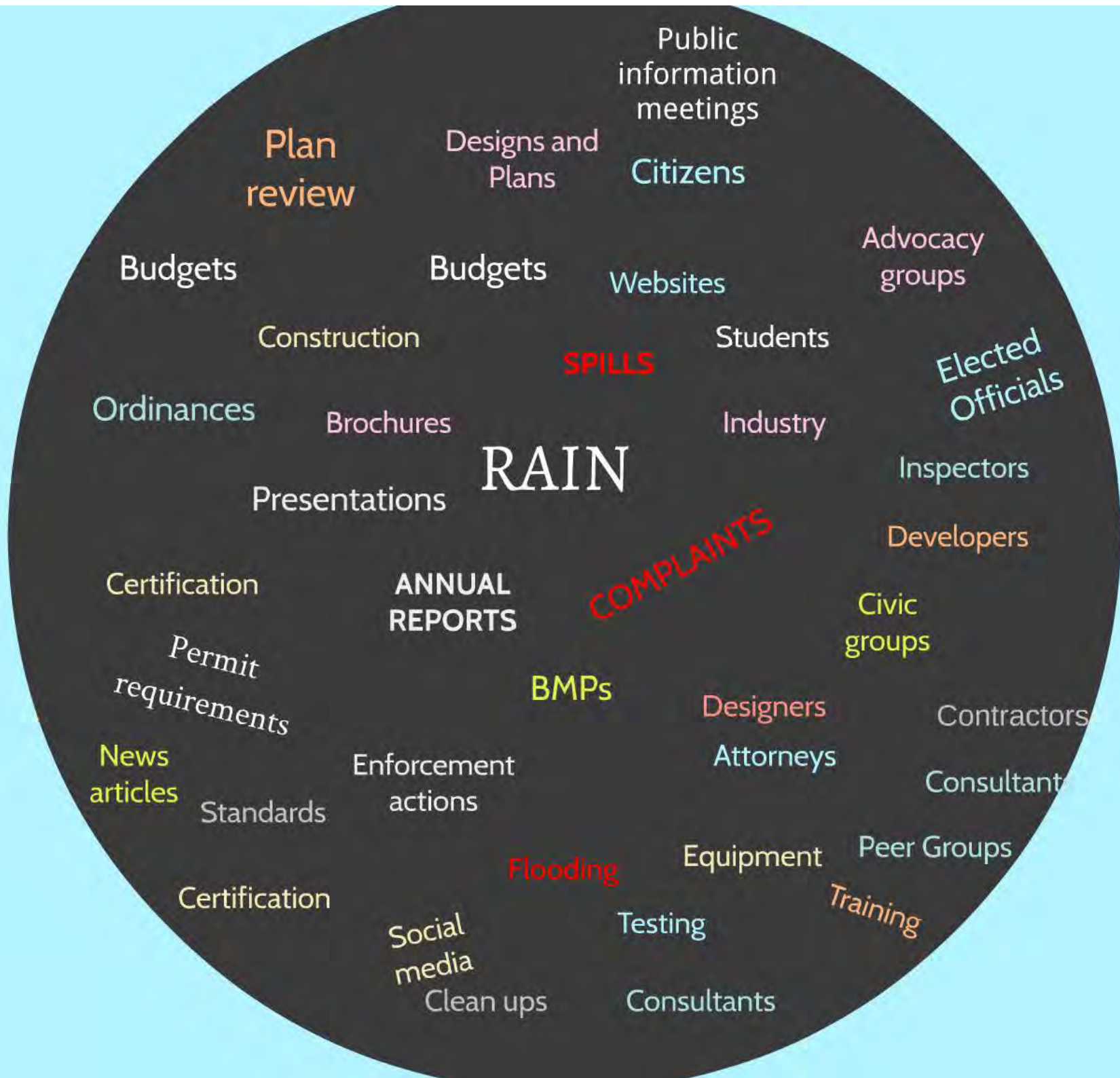
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- In some areas, increased attention on road salt use and its impact.



MS4 Storm Water Management Team





So, to summarize...

Permit compliance requires development and effective dissemination of information regarding numerous components of storm water management to specific and unknown audiences while seeking and considering input from known and unknown sources; developing and implementing policies, regulatory mechanisms, technical solutions and practical BMPs to reduce flooding, storm runoff and pollution, with immediate response to construction site issues, rainfall and flood impacts, spills, regulatory and elected official concerns, angry constituents...and annual completion of a report documenting successful achievement of all the above.

Is that all?

Your Permit...

- Is very structured
- Has lots of moving pieces
- Includes proactive and reactive elements
- Impacts people, places and things



**Well-defined
measurable goals are the key
to SWMP success!**

A well defined measurable goal -

Describes a specific **OUTCOME**.
What are you going to do or achieve?

Specifies an appropriate **METRIC**.
*How will you measure success or
completion?*

States **REPORT** requirements.
*What do you need to document,
and in what form?*

**Clearly identifies WHO
is responsible.**



Identifies **WHEN** these
tasks must be completed.
Are they recurring?

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- MS4 permittees, MS4P permittees
- MS4 permittees, MS4P permittees
- MS4 permittees, MS4P permittees
- MS4 permittees, MS4P permittees

Your Permit...

- It is a legal requirement
- It is a legal requirement
- It is a legal requirement
- It is a legal requirement

MS4 Storm Water Management Team

Pollution Prevention/ Good Housekeeping

Sources: Pollution prevention, Good Housekeeping, Pollution Prevention, Good Housekeeping

Inputs: Training, Materials, Equipment, Supplies

Outputs: Pollution prevention, Good Housekeeping, Pollution Prevention, Good Housekeeping

Audiences: MS4 permittees, MS4P permittees, MS4 permittees, MS4P permittees

Timing: Ongoing, Regular, Ongoing, Regular

Public Education/ Outreach

Sources: MS4 permittees, MS4P permittees, MS4 permittees, MS4P permittees

Inputs: Materials, Equipment, Supplies, Training

Outputs: Pollution prevention, Good Housekeeping, Pollution Prevention, Good Housekeeping

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Timing: Ongoing, Regular, Ongoing, Regular

Public Education/ Outreach

Change People's Behavior!

Develop and implement an effective, targeted, community program to make the public more responsible in reducing storm water pollution.

Public Participation/ Involvement

Get input and develop sense of ownership

Involve the public in developing, implementing and reviewing MS4 programs.

Public Participation/ Involvement

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Timing: Ongoing, Regular, Ongoing, Regular

Post Construction Runoff Control

Sources: MS4 permittees, MS4P permittees, MS4 permittees, MS4P permittees

Inputs: Materials, Equipment, Supplies, Training

Outputs: Pollution prevention, Good Housekeeping, Pollution Prevention, Good Housekeeping

Audiences: MS4 permittees, MS4P permittees, MS4 permittees, MS4P permittees

Timing: Ongoing, Regular, Ongoing, Regular

Post Construction Runoff Control

Minimize Ongoing Impact

Reduce pollutants in post-construction runoff from development and redevelopment projects that would harm and obstruct waterways.

Construction Site Runoff Control

Keep it Clean!

Reduce pollutants in runoff from construction sites that would harm and obstruct waterways.

Illicit Discharge Detection and Elimination (IDDE)

Find and plug the leaks!

Develop and implement an effective, targeted, community program to make the public more responsible in reducing storm water pollution.

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Timing: Ongoing, Regular, Ongoing, Regular



Holistic? Is the whole greater than the sum of its parts?

With respect to the interaction and impact of an MS4 on storm water runoff?

What's falling through the cracks of the permit?



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