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A Guide for Local Government:

# Stormwater Network Management

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When it rains or snows, the water that runs off city streets, parking lots, and construction sites often washes sediment, oil, grease, toxins, pathogens, and other pollutants into nearby storm drains. Once this pollution has entered the sewer system, it is discharged—untreated—into local streams and waterways. Known as storm water runoff, this pollution is a leading threat to public health and the environment today.


Storm Outlet


Storm Culvert

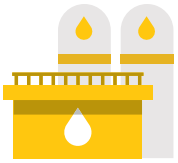

Storm Inlet


Storm Channel


Storm Manhole


Storm Pump


Storm Pipe


Storm Facility


Storm Basin

The purpose of this white paper is to help municipal organizations, big and small, understand:

1. **The responsibilities and regulations surrounding stormwater management.**
2. **How to inspect and assess the current condition of the assets that make-up an organization's stormwater management network.**
3. **How to formulate a long-term, sustainable plan for managing and maintaining those assets.**

# Regulatory Compliance for Stormwater Systems

According to the Environmental Protection Agency (EPA), the municipal agencies responsible for managing stormwater systems are bound by a stringent set of practical and moral responsibilities, which include any or all of the following:

- **Reducing flood damage, including damage to life and property.**
- **Minimizing stormwater pollutants in the runoff generated by new and existing land developments.**
- **Reducing soil erosion form land developments or construction projects.**
- **Ongoing maintenance and construction of culverts, bridges, and other in-stream structures.**
- **Promoting and maintaining groundwater recharge.**
- **Preventing, as much as possible, nonpoint source pollution such as:**
  - Excess fertilizers, herbicides, and insecticides from agricultural lands.
  - Oil, grease, and toxic chemicals from urban runoff and energy production.
  - Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks.
  - Salt from irrigation practices and acid drainage from abandoned mines.
  - Bacteria and nutrients from livestock, pet wastes, and faulty septic systems.
  - Atmospheric deposition and hydromodification.

- **Maintaining the integrity of stream channels for their biological functions, as well as for drainage.**
- **Restoring, enhancing, and maintaining the chemical, physical, and biological integrity of publicly accessible waters.**
- **Safeguarding fish and aquatic life, scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water.**
- **Protecting public safety through the proper design and operation of stormwater basins.**

Municipalities need to frame their stormwater system responsibilities within the compliance guidelines outlined by the Environmental Protection Agency. Each is required to obtain a National Pollutant Discharge Elimination System (NPDES) permit and develop a stormwater management program.

- **Storm Water Phase I requires medium and large cities or certain counties with populations of 100,000 or more to obtain NPDES permit coverage for their stormwater discharges.**
- **Storm Water Phase II requires municipal storm sewer systems serving populations under 100,000 and located in urbanized areas to obtain a NPDES permit under the Clean Water Act.**

On the surface, these regulations can be construed as relatively straightforward. Yet compliance can be challenging, especially for municipalities possessing aging stormwater infrastructures in need of upgrades and repairs. Complicating things further is the challenge of balancing national and regional water quality targets with population growth, regulatory requirements, limited budgets, and climate change.

In its 2013 Report Card for America's Infrastructure, the American Society of Civil Engineers (ASCE) graded the nation's wastewater infrastructure as "Poor." In order for them to remain viable, the ASCE estimates that America's wastewater and stormwater systems will require maintenance and upgrades totaling $298 billion over the next twenty years. Pipes represent the largest capital need, comprising three quarters of total needs. Fixing and expanding the pipes will address sanitary sewer overflows, combined sewer overflows, and other pipe-related issues. In recent years, capital needs for the treatment plants comprise about 15%-20% of total needs, but will likely increase due to new regulatory requirements. Stormwater needs, while growing, are still small compared with sanitary pipes and treatment plants.

*Regulatory Compliance for Stormwater Systems (continued)*

Since 2007, the federal government has required cities, counties, and other municipal organizations to invest more than $15 billion in new pipes, plants, and equipment to eliminate combined sewer overflows. However, even with these improvements made, organizations need modern, efficient tools to help them optimally manage and maintain their stormwater networks.

With the help of technology, an organization enables itself better meet regulatory compliance needs, as well as improve overall management of the entire stormwater system and the assets relating to it. At the very least, a modern stormwater asset management solution will be capable of:

- **Tracking individual inventory components of a drainage network.**
- **Managing inspection/condition data used to maintain the system components.**
- **Producing reports that can be submitted as part of required reports to a governing agency.**

A best practice approach to properly and efficiently managing and maintaining the average municipal stormwater network follows these four steps:

1. ## Collect

Collect data and create records for every asset and asset component in your stormwater network, including, but not limited to, intakes, pipes, channels, watersheds, pumps, and discharge points.

2. ## Connect

Whenever possible, create links between co-dependent assets within your database. For example, when a pipe record is created, link it to the record of the inlet and/or outlet it connects to. This practice not only makes for more efficient management, it helps crews work more efficiently in the field.

3. ## Map

Use your GIS to your advantage. Map each individual stormwater asset and component. Verify asset condition and locations on a regular basis. And be sure to retire abandoned assets anytime they're discovered.

4. ## Inspect

Once each asset and component is captured, inventoried, and mapped, assess the condition of each one, detect and track illegal connections, or any other problems that may result in contamination of bodies of water, and schedule routine follow-up activities such as catch basin cleaning, street sweeping, routine maintenance and relining of pipes or channels, etc.

# The Minimum Measures of an NPDES Phase II Program

An effective stormwater network management solution can help an organization implement and follow many of the Best Management Practices (BMP) outlined by the EPA. Here's how:

## Public Education and Outreach

Agencies need to provide open outreach and communication with the public to comply with the National Menu of Best Management Practices for Stormwater Phase II. The following are the requirements and how the data managed in a modern stormwater network management solution helps.

- **Enables you to develop reports that demonstrate the timing and effectiveness of ongoing maintenance activities, upcoming improvements, and more.**
- **Provides insight about regional intakes/catch basins, reservoirs/detention ponds, and other key components of a network to educate local industry or neighborhoods, especially in problem areas identified by inspection results.**

## Illicit Discharge Detection and Elimination

Illicit discharges are any discharge into a storm drain system this is not composed entirely of stormwater. Illicit discharges are an environmental problem since they usually flow to waterways without any additional treatment and often include pathogens, nutrients, surfactants, and various toxic pollutants.

- **Integrate your stormwater management solution with your GIS to combine mapping data with your work and asset data.**
- **Use your stormwater asset management solution to track the ordinance governing certain intake or discharge locations.**
- **When conducting inspections and repairs, take time to identify and track illegal dumping and illegal connections of pipes, junctions, intakes/catch basins, and discharge points.**

## Construction Site Storm Water Runoff Control

Stormwater runoff from construction sites can significantly impact rivers, lakes, and estuaries. Municipalities are required to develop a program to reduce pollutants in stormwater runoff for construction sites disturbing one or more acres.

- **Use your solution to track site plans and schedule regular site inspections of work sites during construction.**
- **Track NPDES permit status for all construction sites and municipal projects where disturbance is over one acre.**
- **Establish penalties for noncompliance with ordinances.**
- **Provide a mechanism for public inquiries into on-going or planned construction projects.**

## Post Construction Storm Water Management in New Development and Redevelopment

For the past two decades the rate of land development across the country has been more than two times greater than the rate of population growth, according to the EPA. Because of this, the new surface development will increase stormwater volume and degrade water quality, which can harm lakes, rivers, streams, and coastal areas.

- **Develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects. Add new development to areas to existing inventories for future maintenance scheduling, inspections, and GIS mapping.**

## Pollution Prevention and Good Housekeeping for Municipal Operations

Municipalities need to ensure best practices and procedures and in place to minimize the threat of pollutants entering the environment. This can include winter road maintenance, minor road repairs, and other infrastructure work, automobile fleet maintenance, landscaping and park maintenance, and building maintenance.

- Develop and implement infrastructure and operations, and maintenance programs to prevent or reduce pollutant runoff from municipal operations. Schedule activities, both general and BMP-related, for numerous tasks like pipe inspections, cleaning intakes and catch basins, and testing storm water runoff at intakes and discharge points.
- Proactively schedule inspections, pipe relining, and reconstruction and new construction projects.
- Assess water quality and perform periodic inspections of facilities.
- Schedule and track inspection data and test data for pipes, channels, intakes, discharge points, junctions, etc. Compare current data with past inspection and testing data.

# Now You Know

Effectively managing a stormwater system is no easy task. Municipalities must track and report on the progress of numerous regulatory compliance tasks. They must lessen the environmental footprint of new and existing development and help ensure they preserve the environment as much as possible.

Technology is more affordable and accessible than ever before.  Taking advantage of its benefits will help any-sized organization effectively manage the numerous stormwater system assets, including inlets, manholes, pipes, waterways, etc. In doing so, an organization stands to optimize asset life, focus maintenance efforts on the most critical assets, achieve efficient workflow, optimize data management, and improve the efficiency and productivity of its day-to-day operations.

Learn More Now

# About Cartegraph

Cartegraph technology is designed and built to help public sector organizations save time and money. With its emphasis on adoptability, user experience, and return on investment, Cartegraph helps local governments effectively manage the work, requests, resources, and enterprise assets at the center of their day-to-day operations.