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RISK CONTROL SOLUTIONS

A Service of the Michigan Municipal League Liability and Property Pool and
the Michigan Municipal League Workers' Compensation Fund

STORM WATER AND WASTEWATER MANAGEMENT: A BRIEF FOR MUNICIPAL MANAGERS

OVERVIEW

The operation and maintenance of an entity's storm water and wastewater management systems is an enormous responsibility. The failure to provide these services properly and cost effectively may affect a community's welfare and may result in penalties from federal and state regulatory agencies. It may also result in legal action against the municipality by its citizens even if sewer backups and flooding problems are not traceable to the entity's negligent operation of the systems.

Most municipalities have storm water and sewer systems that are adequate to meet their communities' needs during normal weather. However, the growth of residential and business areas has stripped the land of its natural means of absorbing rainwater by replacing trees and vegetation with concrete and asphalt. During extended or heavy rains, decreased absorption taxes the capacity of storm water systems and increases the risk for flooding and damage to property. The lack of absorption also contributes to degraded water quality. The loss of soil, gravel, and vegetation reduces the cleansing and filtering capacity of the remaining soil. As a result, storm water carries pollutants such as chemicals and oil from roadways and parking lots into groundwater, retention basins and other bodies of water.

Until recently, municipalities did not have clear-cut responsibility for managing storm drainage. The lack of a storm water system did not prevent the construction of homes or commercial buildings as the failure to provide drinking water would. Therefore, many communities did not take any significant steps to minimize the risk of flooding until a storm caused major damage and inconvenience. Today, however, influenced by public opinion, municipal managers are increasingly aware that if they are to preserve their communities' quality of life, they must assume responsibility for storm water management.

By contrast, wastewater management has traditionally been a municipality's responsibility. Systems for collecting and treating domestic and industrial waste have been in place in most communities for a long time. These systems have two purposes:

1. To protect the quality of natural waters and the environment by preserving plant and animal life. This allows the public to use lakes, rivers and streams safely for recreational activities such as fishing, swimming and boating.
2. To treat and remove substances that can harm the health and welfare of the people in the community cost-effectively.

To the public, the latter purpose is an "essential service," a basic obligation the municipality must fulfill. Additionally, technological advances in the treatment of water pollution and waste have decreased the public's tolerance for exposure to the avoidable health risks of waterborne illnesses. It is, therefore, important for municipalities that operate wastewater systems, or contract with other municipalities or private organizations for wastewater treatment, to make sure that the systems operate at the highest standards. To achieve this, municipalities should design a wastewater system or modify an existing one so that it adequately serves the normal needs of the community. The system should also allow for additions and receive ongoing maintenance to preserve its integrity.

FEDERAL AND STATE LAWS THAT IMPOSE RESPONSIBILITIES ON LOCAL GOVERNMENT

Municipalities that fail to manage storm water and wastewater properly also risk violating federal and state laws. These laws exist to protect the environment by eliminating the discharge of pollutants into lakes, rivers and streams. The following is a brief discussion of existing laws.

The **Clean Water Act** comprises the Federal Water Pollution Control Act (1972) and the Clean Water Act (1977). It empowers the Environmental Protection Agency (EPA) to protect federal bodies of water from pollution and to monitor the discharge from wastewater treatment plants into lakes, streams, and rivers. In Michigan, the Department of Environmental Quality (DEQ) is responsible for assuring compliance with the requirements of the Clean Water Act and with Michigan's **Natural Resources and Environmental Protection Act**, 1994, Public Act 451.

These laws require municipalities that might discharge pollutants, including storm water runoff and wastewater, into natural waters to comply with the National Permit Discharge Elimination System (NPDES) program. The permit requirement also extends to the effluent for reclaimed water from wastewater treatment plants. Under the program, municipalities must obtain discharge permits from the EPA or the approved state agency. Each discharge permit specifies both the general requirements as well as any specific conditions with which the storm water or wastewater system must comply. The NPDES program has two phases.

Phase I is currently in effect and applies to municipalities with separate storm water systems that serve populations of 100,000 or more, to specified industrial users, and to construction sites greater than five acres. To obtain permits, affected municipalities had to demonstrate that they were developing a storm water management program. The goal of the program is to limit and/or eliminate the discharge of pollutants via storm runoff into natural water.

Phase II extends permitting requirements to urbanized communities that have populations of 50,000 or more and to communities that are contiguous to urban areas and have a population of 1,000 people per square mile. The DEQ may designate other small municipal storm water systems as covered under Phase II. Phase II also applies to construction sites greater than one acre but less than five acres. Finalization of Phase II requirements is expected to take place by October 29, 1999. Requirements include the following components:

- Public education and outreach
- Public participation
- Control of construction site runoff
- Detection and elimination of illicit discharge
- Control of post-construction runoff
- Pollution prevention, including employee training, housekeeping, and reduced use of pesticides

Additionally, to achieve the goals of the Clean Water Act, the EPA promulgated a Combined Sewer Overflow (CSO) Control Policy in 1994. The purpose of this policy is to eliminate pollution to natural waters when combined sewer systems overflow during wet weather. By January 1, 1997, affected municipalities had to implement nine minimum controls and to begin the development of a long-term CSO plan. Phase II incorporates the nine minimum standards, requires the implementation of the long-term CSO plan, adds specific, measurable standards for water quality-based effluent limits, limits the maximum number of overflow events per year as well as institutes other requirements. Major requirements are:

- The assurance that if combined sewer overflows occur, they result only from wet weather. The Clean Water Act prohibits discharges from Combined Sewer Systems (CSSs) during dry weather.
- The assurance that all wet weather CSO discharge points comply with the technology-based and water quality-based requirements of the Clean Water Act.
- The assurance that the effects of CSOs on water quality, human health, and the environment are minimal.

The Nine Minimum Controls for CSOs

1. Proper operation and regular maintenance programs for the sewer system and CSOs.
2. Maximum use of the collection system for storage.
3. Review and modification of pretreatment requirements to minimize the effects of CSOs.
4. Maximization of flow to the publicly owned treatment plant.
5. Prevention of CSOs during dry weather.
6. Control of solid and floatable materials in CSOs.
7. Pollution prevention.
8. Public notification that assures the public receives adequate notification of CSO occurrences and their impacts.
9. Monitoring to characterize CSO impacts effectively and to determine the effectiveness of CSO controls.

Municipalities that discharge reclaimed water after treatment must also perform specific tasks to fulfill their obligations under the **Clean Water Act**. They must:

- Collect samples and test them to assess and document the quality of water discharges,
- Report this information at specified intervals to state and federal water quality management agencies, and
- Allow state and federal enforcement agents to inspect their operations to assure their compliance with regulatory requirements.

A community's failure to have an effective system for storm water management may also violate the requirements of the **Water Quality Act** (1987). This act empowers the EPA to conduct studies that:

1. identify pollutants that originally did not require discharge permits under the act, and
2. establish procedures and methods to control storm water discharges to the extent necessary to mitigate impacts on water quality. The second phase of the study is still underway.

Ignoring the need for flood control may also violate requirements of the Federal Emergency Management Agency. Communities that participate in the National Flood Insurance Program have an obligation to manage the use and development of land as well as storm water drainage in flood prone areas.

The pressure to comply with governmental regulations is extremely high. Non-compliant municipalities may be subject to administrative orders, monetary penalties, legal action, or all three, if they fail to comply with the regulations.

LIABILITIES

When developers want to build an industrial park or a residential community, they must seek approval from the municipality. During the approval process, a municipality reviews and approves drainage facilities. Consequently, the courts have sometimes held a municipality legally responsible and required it to compensate the plaintiff if a development's drainage facilities prove to be inadequate or faulty and overload the existing system causing damage to adjacent property.

Other situations or actions that may impose liability on local government are:

- The alteration of an existing storm water management system by a municipality that causes damage to property.
- An improperly undertaken or implemented decision to regulate drainage.
- Failure to maintain an existing storm water management system properly.
- Zoning or subdivision approvals that allow the development of property in a manner that infringe on downstream or adjacent property owners.
- Building a system, but doing so improperly.

Therefore, before building or altering a current system, municipalities should seek professional assistance from a qualified engineer knowledgeable in the construction of storm water management systems. Municipalities can also seek technical assistance from the EPA or the agency in their state that administers the NPDES program.

Many of the same liabilities apply in the area of wastewater collection and treatment:

- Improper construction of collection pipes and other system components,
- Poor maintenance, and
- Granting of building permits without sufficient attention to sewer connections.

Any of these can result in legal action against the entity if sewer backups that cause damage to private property occur.

To defend against such claims, it is important for municipalities to have documented plans in place for implementing both their storm water and wastewater systems.

DEVELOPING THE PROGRAMS

When implementing and maintaining a system for storm water or wastewater management, municipalities should address three major issues:

1. The current condition of the system and its financial requirements to determine whether to preserve the existing system or to replace all or part of it.
2. The need for repairing and/or expanding the collection system to avoid overflow and back up problems and to address demands on the system as population increases.

3. The specific requirements necessary to fulfill existing and projected quality needs for the area's natural waters as well as the needs of the public.

To be successful, municipalities should consider many elements during the development of the plan:

- Basin water planning,
- Flood plain administration,
- Drain systems,
- Transmission lines,
- Collection system capacity,
- Retention facilities, and
- Capital improvements and maintenance.

Municipalities should also consider any multi-jurisdictional aspects of storm water or wastewater management. Finally, they must obtain financing and develop a method of selling the importance of storm water or wastewater management to the public. Given the resistance of the public to increased taxes, local government has a formidable task in educating the public about the short and long-term costs and benefits of an up-to-date system.

The following are some steps necessary to developing a system for either storm water or wastewater management:

1. Map the System.

Having accurate, current and complete mapping of the system is essential. The mapping should show the community's topography and all known drainage, both private and public. If there are problems with sewer connections or drainage systems, they may cause flooding during heavy rains. Pinpointing and correcting these problem areas is essential to maintaining the system's effectiveness. Information should also be available on current water quality and water flow (hydrology).

It is often difficult to obtain older records, particularly those of private developers and homeowners. However, municipalities should get as complete a picture as possible. Experts recommend the use of computers to store the data. Mapping programs can streamline the task of diagramming the current system, of projecting future changes and enhancements, and of illustrating water flow. Databases or spreadsheet programs can make the task of tracking current and projected future costs easier to manage.

2. Develop a Master Plan.

A successful master plan should allow for modifications, explain facility needs, and provide comprehensive guidance for their implementation. The municipality should review the plan frequently so it knows about any problems with operations and/or maintenance before the expense of replacement or repairs become burdensome to the community.

The plan should include the following:

- Detailed maps of local topography (the shape of the land). Topography may dictate the ultimate size of the storm water or wastewater system. It may also dictate system energy needs and the rate of system deterioration resulting from chemical corrosion.
- Hydrology (the quality of the area's water) especially its movement in relation to the land, because it may affect construction. For wastewater treatment systems, hydrology can affect decisions about constructing pumping stations and pressure mains.
- Geology (the composition of the land) in which pipelines are set because it may influence the cost of facility construction.
- Identification and mapping of the existing system and its components.
- Basic design criteria for major improvements.
- Estimates of the costs for capital improvements, operations, and maintenance.
- Prioritized construction schedule.
- Documented schedule for routine maintenance.
- An educational component for the public.

Municipalities should also consider the size and character of the community because these characteristics may affect the makeup of the system. An area with large or many manufacturing plants produces more flows that are difficult to treat than does a largely residential community. System planners should anticipate growth of the service area and any

changes in land use that might occur. A municipality that anticipates significant growth needs to plan for additions to its system. Therefore, the plan should address:

- Short and long-term goals for improvements to the system,
- Basins within the community's jurisdiction and basins that drain into the local watershed,
- Existing and potential drainage and flooding problems,
- Any multi-jurisdictional concerns -- that is, how the municipality's drainage may affect downstream and adjacent communities and vice versa. In addition, it should discuss how the communities can work together to solve flooding and storm water problems,
- Existing and projected land uses in the watershed and other areas where poor drainage or flooding occurs,
- Needs for open space,
- Goals for water quality,
- The protection and/or improvement of wildlife habitats and wetlands, and
- Community priorities and economics.

In addition to these shared elements, the plans for storm water and wastewater management should cover special areas of concern.

For storm water systems, the plan should include:

- A summary of existing basin and data reports,
- Identification of existing and potential flood areas, and
- Designs for alternative drainage systems that provide varying levels of protection.

Planning for a wastewater system, should include an evaluation of the following:

- The receiving water body and its water quality requirements. The distance between the receiving water body and the treatment plant affect the extent and expense of waste treatment,
- The existing wastewater service area, its limits, size, population, land use, and projected growth. The most cost-effective combination of system elements to produce continuous, high quality wastewater service throughout the service area, and
- The climate of an area since weather may influence system delivery and costs. For example, areas with heavy rainfall may require larger pipelines and plant facilities because of expected but unavoidable increased flows into the sewer.

3. Implement a System to Manage Storm Water Runoff and Prevent Sewer Backups.

To the public, efficiently managing runoff during storms proves the municipality's responsiveness to its concerns about property damage from storm water as well as sewer backups and overflows.

In most communities, the Department of Public Works is responsible for this important component of storm water and wastewater management. The department or utility assures proper drainage through monitoring, maintenance and related activities.

To reduce the risk of litigation, the municipality should develop a formal sewer cleaning and inspection program that documents planned inspection routes and completion dates. The program should include:

- A routine maintenance program. The program should address every area in your community and problem areas more frequently,
- The visual monitoring of lines with TV cameras on a regular, routine schedule,
- A process for documenting and tracking reported incidents to assure that problems receive prompt correction,
- A process for monitoring and gauging rainfall so pump stations and basins have adequate staffing and monitoring during periods of heavy rainfall,
- A requirement that all restaurants and laundromats install grease traps. This requirement should apply to all new or repaired connections,
- A requirement that repairs or improvements use cement pipe or other similar durable materials, and
- A requirement that wastewater employees meet all Michigan Department of Health qualifications for licensing and should receive regular updated training.

The greatest operational challenge of wastewater treatment is assuring that collection pipes carry wastewater to the treatment plant without allowing any flows into natural waters and without causing sewer backups on private property. A municipality that experiences complaints of sewer backups should investigate them promptly and fully to determine the cause. An overloaded sanitary sewer needs relief or another sewer to increase capacity and eliminate illegal and non-permitted discharges. If a sewer system leaks or accepts too much groundwater infiltration or too much storm water runoff, it may need extensive repairs or upgrades. If the system suffers from deterioration, the municipality may need to replace it. Ongoing maintenance is necessary to preserve the integrity of the sewer system. Maintenance includes:

- Cleaning;
- Testing connections and making repairs where necessary; and
- Preventing damage to the system from the roots of nearby trees and other vegetation

4. Determine Costs and Obtain Financing.

Costs include the following:

- Research and planning studies -- Includes salaries or time and expense costs for engineering studies,
- Developing and maintaining computerized planning models -- Includes initial outlays for equipment and software, staff salaries as well as ongoing costs for updating the data and modifying computer maps and images,
- Capital for drainage and other enhancement projects -- Includes the costs of structural controls such as detention and retention basins as well as infiltration devices that treat runoff pollution. May also include the costs of removing illegal sanitary sewer connections, and
- Ongoing operation and maintenance -- Includes salaries as well as the costs of cleaning and replacements.

Municipal planners should also examine and evaluate:

- Construction,
- Operating and maintenance costs,
- Technical alternatives to the efficiency and cost-effectiveness of service, and
- How projected costs will affect tax rates and service changes.

Finally, a policy statement is an important element of both the storm water and wastewater management programs. For storm water, the policy statement should cover how the municipality will deal with storms of varying magnitudes, the levels of protection it will provide, and how it will address storm water quality. For wastewater, it should express the municipality's commitment to protecting the community's health as well to preventing avoidable sewer backups. For both wastewater and storm water management programs, the policy should state the municipality's commitment to reducing potential environmental problems through measures that control pollution, erosion, and other problems produced when no management exists.

DIRECTION AND CONTROL

Managers of both wastewater and storm water systems should motivate and direct employees so that they deliver quality service. They should establish and communicate expected standards and performance measurements that are the basis for evaluating employee performance and meeting legal obligations under various environmental regulations. The following are some suggestions:

1. Regulations: Does the facility meet state and federal standards? Failure to meet discharge standards through appropriate management action may result in administrative orders, fines and penalties.
2. Discharges: Do they meet the standards established in the permit?
3. Operations: Does the facility monitor, sample, conduct laboratory tests, prepare reports and conduct evaluations as required?
4. Performance: How many complaints does the facility receive from citizens? How quickly does the facility respond to complaints or service requests? How many gallons of water does the facility reclaim weekly, monthly, annually? How frequently does the facility respond to complaints of sewer backups, clogged gutters or of storm run-off problems?

In addition, the same service objectives, management principles, and tools that apply to other areas of public service apply to both wastewater and storm water facilities.

There are however, some differences inherent in the very nature of the wastewater service delivery system. Wastewater systems operate continuously, twenty-four hours a day, 365 days a year and require around-the-clock staffing. Additionally, state and federal agencies exercise a high degree of regulation and control on wastewater systems.

The success of wastewater and storm water systems depends on the value the community places on their effective management as well as on the community's view of its responsibilities to water quality and the environment.

CHALLENGES

Municipalities face numerous challenges as they fulfill their obligations to the community as well as to governmental agencies. To assure a community's prosperity and growth, municipalities must meet the demand for commercial and residential development. At the same time, they must maintain water quality and control the potential for storm water floods as well as sewer backup damage. Failing to do so can result in the deterioration of the infrastructure, can lead to damage to public and private property, and can cause harm to the environment. It may also reduce the public's trust in its local government. Municipalities must also balance the public's expectations about wastewater and storm water management at what the public believes is a reasonable cost with the need for upgrading and maintaining the system as well as complying with governmental regulations.

These demands can create conflicting objectives. For example, most citizens recognize the need for a reliable and abundant source of clean water. However, once they learn the costs of assuring it, they are likely to balk against additional taxes or assessments. When such conflicts arise, municipal management should work with the responsible manager and the public to reach consensus. Regardless of cost, the public relies on the community's wastewater system to protect its health and on its ability to prevent flooding through effective storm water management.

SYSTEM FINANCING

Despite the availability of funding, most municipalities must find a means of raising revenue themselves to pay the cost either of implementing storm water systems and wastewater treatment projects or of maintaining and repairing existing systems.

To obtain adequate financing for the development, implementation and maintenance of the master plan, municipalities may consider several alternatives:

1. Property or other local taxes.
2. Contractual arrangements with other public entities to provide service and receive reimbursement based on usage.
3. Cost-sharing arrangements with two or more agencies sharing several aspects of wastewater service as public agencies.
4. User fees or charges for a storm water or wastewater utility. In this system, the utility determines user fees by establishing the amount of runoff or collected wastewater from homes and businesses. The pricing is usually not specific to each home or business. Instead, the community groups home, businesses, and industries of similar size on similar size lots together and establishes charges accordingly.

Whatever method municipalities seek to use, they should proceed cautiously and make certain that the revenue-raising method is legal and fair. In particular, municipalities should pay attention to the requirements and strictures of the Headlee Amendment. It is advisable to seek legal counsel when reaching a decision and to allow public comment on the proposed method for revenue raising.

INVOLVE THE PUBLIC

Educating the public is important to managing storm water and maintaining its quality as well as to effective wastewater management.

If a municipality can increase awareness about storm water quality needs, the public might willingly implement non-structural measures to reduce pollutants, generated by housekeeping practices, which contaminate storm water. For example, companies might change to cleaning agents that have less potential for polluting water. Increased public awareness can also improve the public's willingness to support the costs of the master plan. As simple a measure as posting signs at construction sites -- "Your Storm Water Dollars at Work" -- allows citizens to see where utility fees or increased taxes are going.

A municipality also needs to inform the public about the importance of effective wastewater collection and treatment. In particular, the public needs to know the costs of separating CSSs or of redirecting overflows to avoid violating discharge requirements and to prevent sewer backups. As with storm water management, educational brochures distributed to businesses and homes as well as informational signs at construction sites can be effective.

The municipality should also provide the public with information about the systems and their costs. The information should inform the public of federal and state requirements that affect the costs of implementing existing systems or of upgrading them. The municipality should also allow public comment on changes or additions before the city council or other governing body approves and adopts them.

Finally, the municipality should make property owners part of the solution by encouraging them to maintain laterals from their homes and buildings to the main sewer line.

CONCLUSION

Assessing the need for implementing a storm water or wastewater management system or for upgrading an existing one is necessary if municipalities wish to maintain the quality of life in their communities. Frequent nuisance flooding or intermittent floods of significant size can diminish the public's confidence in its local government, lead to allegations of negligence, and to costly legal action. Flooding can also threaten public health by causing sewer back ups in residences and businesses and damage the environment through erosion and the discharge of pollutants into recreational and other bodies of water. A major flood can cause enormous property and economic damage and threaten the existence of the community.

RESOURCES

A wealth of information is available to assist municipalities in developing an effective program for storm water management.

NPDES Support and Technical Assistance Branch, WN-16J
Water Division
US EPA, Region 5
77 W. Jackson Blvd.
Chicago Illinois 60604-3590

Visit the EPA website at www.epa.gov. At the website, you can find the complete catalog of EPA publications, abstracts of articles, and information on free training and funding. You can also access the Office of Wastewater Management at www.epa.gov/owm.

American Public Works Association, Urban Storm Water Management (Special Report No. 49) provides a discussion of the subject by public works managers from over forty municipal agencies. The report includes technical assistance.

American Public Works Association, Public Works Management Practices Manual (3rd Edition, 1998) provides guidance on developing effective policies for the public works department.

Both books are available from the American Public Works Association, 1313 East Sixtieth Street, Chicago, IL or at the association's website: www.apwa.org.

Cristafano, ed., Management of Local Public Works (A joint publication of the International City Management Association (ICMA) and the American Public Works Association, 1986). The book is available from ICMA in Washington DC or you can visit the organization's website at www.icma.org.

For information specific to Michigan, visit the Department of Environmental Quality's website at www.deq.state.mi.us.

Visit www.michiganlegislature.org/law to obtain a copy of the Natural Resources and Environmental Protection Act, 1994, Public Act 451.

The Michigan Municipal League's Michigan Municipal Review (Vol. 72, Number 7, August 1999) is devoted to water quality issues and storm water permitting concerns.

If you have any questions or if we can assist you in other areas of risk management, please contact us.



Important Telephone Numbers

MML Risk Management Services	734/662-3246 or 800/653-2483
Loss Control Services	800/482-0626

Note: This document is not intended to be legal advice. It does not identify all the issues surrounding the particular topic. Public agencies are encouraged to review their procedures with an expert or an attorney who is knowledgeable about the topic.