

Summary Overview

Introduction

This report is to detail the quarterly progress of the efforts undertaken via **Project Groundwork** to improve the sewer system in Hamilton County, Ohio. The intent of this report is to provide a baseline level of information to a variety of audiences, describing the actions of the Metropolitan Sewer District of Greater Cincinnati in the advancement and completion of Project Groundwork's program to address and remedy the effects of wet weather on the Hamilton County, Ohio sewer system. *This report is not intended to fulfill or supplant the reporting requirements as outlined under federal consent decrees.*¹

Background

The Metropolitan Sewer District of Greater Cincinnati (MSD) is the publicly-operated wastewater utility serving 43 out of 49 Hamilton County, Ohio political subdivisions, as well as parts of the three adjacent counties of Butler, Clermont, and Warren. It has a ratepayer base of approximately 230,000 residential and commercial users. MSD provides sewerage collection and treatment services to an area covering approximately more than 290+ square miles, containing over 200,000 separate sewer connections which tie into approximately 3,000 miles of sanitary and combined sewers.

The Board of County Commissioners of Hamilton County, Ohio created the sewer district in 1968. They fund and set policy for the district's operations. On April 10, 1968, they established a 50-year contractual arrangement with the City of Cincinnati, for the management of MSD's daily operations and sustainability.

During Fiscal Year (FY) 2009, MSD operated seven major wastewater treatment plants, more than 120 pump stations, and three package treatment plants that resulted in treatment of approximately 184 million gallons daily of collected wastewater. It monitors about 200 industrial users who discharge pre-treated waste into the sewer system. MSD utilizes a five-year capital planning cycle for the repair, replacement, or improvement of its physical infrastructure assets, with estimated project legislations of \$165M for 2010 and \$908M for the five year cycle of 2010 - 2014.

1 *SSO Decree*, Section IX, "Reporting Requirements;"
Global Decree, Section XV, "Reporting Requirements."

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Consent Decrees

In February 2002, Hamilton County, the City of Cincinnati, and the U.S. and Ohio EPAs agreed to the Interim Partial Consent Decree on Sanitary Sewer Overflows (SSOs) (aka, *SSO Decree*). This decree focused on the overflows from the separated (or sanitary) sewer system and required the remediation of 17 highly active SSOs in MSD's separated system, the development of a comprehensive, system-wide sewer model, the development of interim and permanent solutions to the most active overflow (SSO 700), and the development of a sanitary system capacity study and capacity assurance plan, among other items. The Ohio River Valley Sanitation Commission (ORSANCO) joined this action in August 2002.

In June 2004, the City and County, federal and state EPAs, and ORSANCO agreed to the Consent Decree on Combined Sewer Overflows (CSOs), Wastewater Treatment Plants, and Implementation of the Capacity Assurance Plan for SSOs (aka *Global Decree*). This decree focused on MSD's combined sewer system and treatment plants and outlined the requirements to address wet weather overflows in the combined system (CSOs) and make capacity-based improvements to the 180 year-old sewer system.

The plan developed in 2006 to address the Global Decree's requirements and to implement capacity-based sanitary sewer and CSO issues of the Interim and Global decrees was known as MSD's *Wet Weather Improvement Plan*. In 2008, MSD branded this improvement effort as "Project Groundwork."

In June 2009, state and federal EPAs and ORSANCO conditionally approved the Project Groundwork improvement effort. As of January 2010, Project Groundwork is awaiting final acceptance by the U.S. District Court for Southern Ohio Western Division.

The Problem - Wet Weather Overflows

The heart of MSD's efforts to be undertaken with Project Groundwork will address the impacts of wet weather on our two types of sewers – combined and separated. Weather creates unique challenges for the sewer system as a whole.

Combined sewers were developed as the core of the MSD system when it was young, between 1870 - 1930. These sewers transport raw sewage and storm water in a single pipe. They comprise approximately 40% of the sewers in Hamilton County and are located chiefly within the City of Cincinnati and some of its "first-ring" and "bedroom" jurisdictions. Combined sewers are generally 12 - 15" or more in diameter.

Separate or sanitary sewers were developed as a predominant sewage transportation type outside the City of Cincinnati, in the unincorporated portions of Hamilton County, as well as its villages and smaller cities. They are designed to carry only raw sewage and not storm water flows in one pipe. Hence, they are typically smaller than combined sewers, being only 8" in diameter for local service. Since the 1970s, new development construction exclusively uses sanitary sewers.

Wet weather severely impacts both combined and sanitary-only sewers in Hamilton County. Combined sewers were designed to reach pipe capacity and then overflow into local watercourses. At times, they can also back-

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up into the basements of residential and commercial buildings, depending on the elevation of the sewer pipe to the elevation of basements. In Hamilton County, approximately 14 billion gallons of sewage overflows from combined sewers during rain events. This is due, in part, to the combined system's capacity, to the volume of storm water reaching these sewers from impervious surfaces or direct connections, and to the encasement of local creeks and streams in the combined sewer network, a standard engineering practice for nearly 100 years.

The impact of wet weather and clean water connections on sanitary sewers is more significant. Sanitary sewer overflows are health and environmental hazards. Sometimes, buildings served by sanitary-only sewers were constructed with their storm water control structures – downspouts, driveway, stairwell, and window-well drains, area, and yard drains – improperly connected to them, creating the SSO during wet weather.

Wet weather overflows degrade water quality of local watercourses and can threaten public health. Wet weather also creates operational issues that impact MSD permit requirements under the Clean Water Act and the National Pollutant Discharge Elimination System (NPDES).

Solutions

Project Groundwork, the effort being made to address CSOs, SSOs, and sewer system capacity, is a multi-year initiative and is comprised of hundreds of sewer improvements and storm water control projects. It is one of the largest public works projects in the history of our community. This program is divided into two phases for purposes of implementation: Phase 1 (2010-2018) and Phase 2 (beyond 2018). Included in Phase 1 is the Lower Mill Creek Partial Remedy (LMCPR), a short, deep tunnel, and, an Enhanced High Rate Treatment Facility. This tunnel (including the EHRT, pumping station and near-surface facilities at specific CSO locations) is expected to cost approximately \$244 million (in 2006 dollars) and will reduce CSO discharges by 2 billion gallons per year.

Project Groundwork is designed around affordability based on a percentage of household income. Project Groundwork solutions are divided into the following major categories of construction:

- New Sewers
- Enhanced High-Rate Treatment
- Storage Facilities
- Pump Station Improvements
- Regulator Improvements
- Upgraded Treatment Plants

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Work components of Project Groundwork are organized as illustrated in the following table (based upon the June 2009 conditional approval from the U.S. and Ohio EPA's and ORSANCO):

Project Groundwork	
Wet Weather Improvements	Asset Management
Defined projects (those projects identified in the <i>Wet Weather Improvement Plan</i>) <ul style="list-style-type: none"> Valued at \$620M Does not include projects already completed valued at \$218M 	Projects funded by annual investment of capital funds for repair, replacement and renewal of MSD's facilities in order to maintain current levels of service. <ul style="list-style-type: none"> Valued at \$51M per year Totaling \$510M for years 2009 through 2018.
County-wide "allowances" <ul style="list-style-type: none"> Green Infrastructure Recreation Management/Studies RDI/I Evaluation, Rehabilitation and Repair Sewer Assessments Trenchless Technology Urgent Capacity Water-in-Basement (WIB) Valued at \$255M <ul style="list-style-type: none"> Does not include projects already completed valued at \$53M 	
Note 1: Completed project costs through 2009. Note 2: All costs shown are in 2006 dollars.	

Some of the Project Groundwork construction effort is better managed by executing projects in "bundles." Bundles are several projects grouped together based upon a number of factors, such as hydraulic dependency, geographic location, common sewer capacity, and/or water quality issues. Also, the bundle concept allows activities expected from "allowances" to be incorporated.

Allowances. Allowance projects arise due to newly discovered circumstances, opportunities, or information/analysis needs. They are typically not planned or designed years in advance; therefore, their budgets will vary from year to year. There are eight subject matter allowance programs to address, reduce, and/or eliminate overflows and improve water quality.

1. Water-in-Basement Program (WIB). Remedies and solves sewage backups into basements due to sewer capacity issues. The WIB program operates clean-ups, claims, and prevention activities, customer education and communication, property acquisition, and other activities related to the administration and management of this program.

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2. Sewer Lining (Trenchless Technology) Program. This program conducts internal lining of sewers and external lining of aerial sewers as a cost effective method of rehabilitating structurally deteriorated sewers. The program will include, but not limit itself to, spiral-wound pipe, pipe bursting, directional drilling, carbon filament wrapping, and jack and boring. These projects are identified through investigations of the sewer lines and are prioritized based on a standardized condition assessment.
3. Manhole Rehabilitation (Trenchless Technology) Program. This program provides a cost effective method of rehabilitating structurally deteriorated manholes. Manhole rehab projects are also identified through investigations and are prioritized based on a standardized condition assessment.
4. Rainfall Derived Infiltration and Inflow (RDI/I) Program. This program assists in the elimination of SSOs. RDI/I projects are identified through investigations which may use intrusive methods. Remedial projects are funded through this program or either or both of the Sewer Relining and Manhole Rehabilitation Allowance Programs, depending on the choice of construction methods.
5. Home Sewage Treatment System (HSTS) Elimination Program. This program conducts the design, property acquisition, and construction of new sanitary sewers to connect properties in built up areas of the MSD service area to eliminate home sewage treatment systems. These projects improve the water quality of some MSD watersheds by replacing failing or inadequate home systems. These systems are identified and prioritized based on the public health risk.
6. Urgent Capacity Response Program. This program funds measures that restore sewer capacity in existing CSO communities by identifying Project Groundwork construction needed to address urgent CSO community capacity needs, WIB issues, or unpermitted flows. These projects are either accelerated from existing Wet Weather Improvement Plan schedules or were not identified as wet weather projects.
7. WWIP Progress Studies and Recreation Management. This allowance funds ongoing evaluation of Project Groundwork wet weather improvements and the various measures to address wet weather issues in CSO areas. Evaluations involve systematic review of the wet weather effect within watersheds, the sensitivity of various remedial projects on the system hydraulic grade lines, etc. Findings of these studies will provide clear and strategic direction to the watershed planning group. This allowance also funds recreation management notice, reporting and information needs.
8. MSD Sustainable Infrastructure (Green) Program. This program will use Low Impact Development Best Management Practices (LID BMP), storm water offloading through stream separation and promotion of sustainable best practices to remove storm water from sewers in both CSO and SSO areas. Program activities will initially include LID Demonstration Projects (to evaluate technologies and reduce storm water impacts to CSOs), Pilot Projects (to evaluate multiple methods in a set of multiple projects), Regional BMP Projects (larger sewershed projects expected to capture over 10 million gallons) and Large Scale Projects (long-term projects in major CSO sewersheds). These projects will be evaluated and, in some cases, prioritized on volumetric reduction of storm water from the system, and unit cost per gallon of water removed from the system. The larger, more expensive green projects will focus on

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projects capable of removing a minimum of 10 million gallons of storm water from the combined sewer system, at equal or lower cost than comparable “grey” infrastructure projects

Asset Management. The term “asset management” generally refers to a comprehensive and structured approach to the long-term management of assets as tools for the efficient and effective delivery of services. Asset Management (AM) for MSD involves capital expenditures that are not formally considered WWIP projects or Allowance expenditures.

A Note on Dollar Values. Project Groundwork’s wet weather plan was guided by an EPA requirement to reflect costs “in current dollars, excluding inflation.” The guidance requires MSD to convert actual expenditures to a 2006 dollar base to compare to the initial plan budget. The following table lists the conversion factors for dollars expended in the Phase 1 years to make the required calculation.

Actual Cost Conversions to 2006 Dollars			
1998	1.046541	2008	0.911841
1999	1.043471	2009	0.898416
2000	1.039663	2010	0.868035
2001	1.036100	2011*	0.838681
2002	1.033901	2012*	0.810320
2003	1.031550	2013*	0.782917
2004	1.015723	2014*	0.756442
2005	1.008155	2015*	0.730861
2006	1.000000	2016*	0.706145
2007	0.942310	2017*	0.682264
		2018*	0.659191

* Based on MSD Forecast

The factors listed for the years 1998 through 2009 were derived from a cost index developed by MSD. Research found that published indices seldom offer a perfect relationship with local conditions. In consultation with the University of Cincinnati, Department of Economics, MSD created an index that is consistent with MSD’s business model goal of remaining a leader in its industry. The benefits of this customized approach include the following:

- Functional in providing a context for estimating data.
- Capable of guiding special studies aimed at future cost reduction.
- Transparent when documenting capital costs.
- Illustrates reasons for construction price fluctuations over time.
- Provides accurate escalation factors for project commodity price projections.
- Provides known capital expenditure factors for use in de-escalating dollars expended to compare with original and/or current approved baselines budgets.
- Flexible in the frequency of the publication and update, especially during rapid economic change.

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The factors listed for the years 2010 through 2018 assume the historic 3.5% inflationary increase. As data becomes available from the index, these future year factors will be replaced by the calculated values.

Through 2009, MSD has invested approximately \$270M (in 2006 dollars) in Project Groundwork solutions.

Risks

Project Groundwork, like any massive, multi-year, and high-investment public works project has some significant risk issues. The most significant risks identified by MSD are:

- Affordability for the community
- Portfolio of Investments
- Quality of Life

Affordability for the Community. MSD acknowledges that federal mandates to implement Project Groundwork will be costly; hence, maintaining affordability for the communities we serve is the most important risk of this massive program. Although expectations are that sewer rates will continue to rise over the life of Project Groundwork, MSD will work to limit increases as much as possible.

To keep the program affordable to ratepayers, MSD is committed to finding sustainable, integrated solutions that are cost-effective and meet the environmental, social, and economic needs of affected communities.

Sustainable solutions in the wet weather plan include a thorough consideration of innovative and alternative approaches and technologies to achieve the objectives of the Consent Decrees, CSO Policy and the Clean Water Act. These solutions also incorporate alternative funding sources, a phased schedule of implementation directly tied to local ratepayer financial capability, and a thorough review of the community's financial capability.

Other impacts and issues relating to affordability include:

- Declining usage per account
- Competing infrastructure needs
- Local and regional contractor issues
- Economic variabilities (e.g., current downturn)

But the implementation of Project Groundwork also presents opportunities for progressive enhancements:

- Expanding capacity within the system according to future city, county and neighborhood plans
- Enabling others to expand customer base through policy guidelines
- Enhanced economic possibilities through SBE utilization
- Infrastructure investments can spur economic growth
- Establishing an integrated approach to infrastructure needs

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Portfolio of Investments. The choices for Project Groundwork solutions need to be both cost-effective and impactful to the communities they serve. Project Groundwork's solutions are investments for both the utility and the public. To assist in prioritizing these investments and being environmentally focused, each project is thoroughly reviewed through a business case evaluation process based upon "triple-bottom-line" methodology (social, environmental, and economic filters).

Quality of Life. Project Groundwork will make quality of life improvements. The construction is designed to be all-encompassing for communities. But, MSD efforts are only as good as the dialogues and engagements between government and citizen. MSD is committed to listen to the communities of Hamilton County and work with residents to minimize any Project Groundwork issues that detract from quality of life enhancements.

Benefits

MSD envisions the benefits of Project Groundwork outweighing its risks. As noted, the majority of these benefits are enhancements to our quality of life. Some of the benefits accrued to Greater Cincinnati communities from Project Groundwork are:

Environmental and Public Health:

- Reduces combined sewer overflows (CSOs) into local rivers and streams;
- Eliminates sanitary sewer overflows (SSOs) in a typical year;
- Eliminates sewage backups into basements caused by MSD's public sewer system;
- Reduces sewage debris and sewage odors in local waterways; and
- Decreases human exposure to pathogens and pollutants, such as *E. Coli* bacteria.



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Economic:

- Creates jobs and business revenues for local contractors and tradesmen working on sewer improvement projects;
- Promotes the use of small, woman-owned, and minority businesses on sewer improvement projects;
- Increases property values in homes that previously experienced chronic sewage backups requiring disclosure to prospective buyers;
- Increases property values in areas that previously experienced chronic overflows resulting in poor water quality after rains, odors, and sewer debris; and
- Promotes business growth - new business development or existing business expansions - in the MSD service area through the creation of sewer connection credits.

Social:

- Encourages more recreational use of waterways;
- Enhances natural habitats for people, plants, and wildlife;
- Improves aesthetic appeal of creeks and streams;
- Creates more green space or effective use of green space through development of green infrastructure (e.g., pervious paving, rain gardens, green roofs, bioswales, daylighting creeks, controlling hillside runoff) to control storm water; and
- Helps facilitate urban renewal and community development through the integration of sewer improvement projects with environmental, social, and economic benefits such as creek restorations, creation of urban waterways, parks or gardens, and the renovation or reuse of buildings, etc.

