CITY OF Bloomington ILLINOIS

Compilation of Executive Summaries for 2014 City of Bloomington Stormwater and Sanitary Sewer Master Plans

January 2014

Foth No. 12B005

Foth | 75 YEARS

OHM Advancing Communities

Baker

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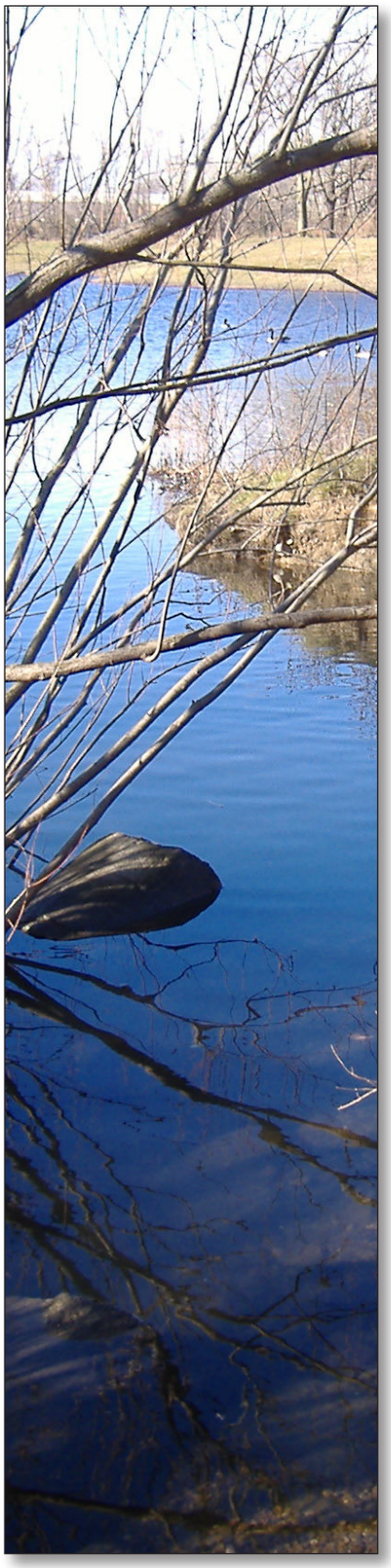

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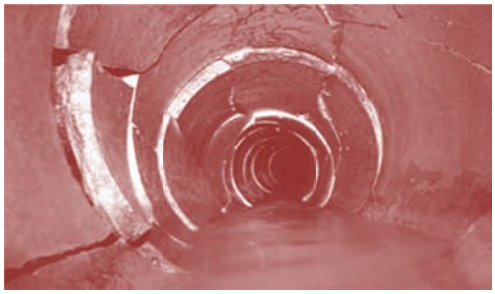
MASTER EXECUTIVE SUMMARY

INDIVIDUAL EXECUTIVE SUMMARIES

City of Bloomington



Stormwater and Sanitary Sewer Master Plans

Master Executive Summary

In the 21st century, the City of Bloomington will rely on dependable infrastructure to attract businesses and maintain a high quality of life for its residents. Implementing the recommendations in this document will be necessary to allow the City to meet those needs.

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What is the State of the City's Infrastructure?

The City of Bloomington's sanitary and storm sewer systems provide a critical service to its residents and business owners through the collection and conveyance of stormwater and wastewater. These systems satisfy the fundamental needs of public safety and public health.

As the City of Bloomington has grown and prospered during the last 60 years, the overall footprint of its infrastructure, which includes sewer pipes, detention ponds, manholes, curb inlets, pump stations, and open drainage channels, rapidly expanded. Much of that growth occurred from 1950-1980. **Some of the infrastructure installed as part of the expansion is deteriorating to a point where it is not providing an adequate Level of Service**. Some of the primary infrastructure problems identified by this study are:

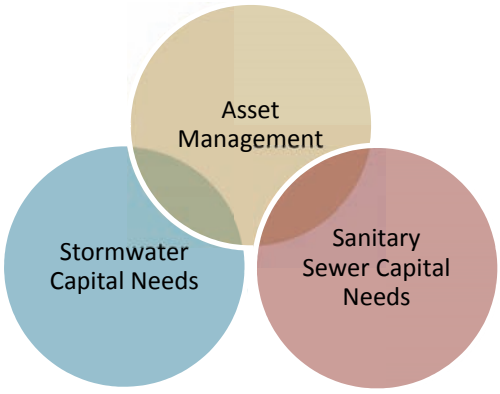
Stormwater Infrastructure

- Flooding
- Detention pond shoreline erosion
- Streambank erosion
- Outdated floodplain maps
- Undersized sewer pipes
- Deteriorating pipes/manholes

Sanitary Sewer Infrastructure

- Deteriorating pipes/manholes
- Unwanted inflow and infiltration
- Deteriorating pumps and pump control systems
- Basement flooding
- Combined Sewer Overflows

This Master Plan identifies specific components of the City's sanitary and storm sewer systems that will require investment in the next 20 years in order to maintain an adequate Level of Service. An Asset Management Plan, a critical part of this report, ties both systems together by providing recommendations to continuously track infrastructure condition and plan for adequate rehabilitation efforts. This will allow the City to set realistic goals for maintenance, rehabilitation, and eventual replacement of aging infrastructure.



How do we Define Level of Service?

Level of Service is broadly defined in this Master Plan as:

- Storm and sanitary sewers flowing freely and without placing a burden on property owners by way of frequent surface flooding or basement backups due to inadequate pipe size or structural failure.
- Drainage channels, culverts, bridges and detention ponds operating efficiently and without significant erosion and/or flooding that may threaten adjacent homes, businesses or public institutions.
- Maintaining sanitary sewer flows (dry and wet weather conditions) at a level that is manageable for cost-effective wastewater treatment and without hastening the need for treatment plant expansion, and reducing or eliminating Combined Sewer Overflows.

This Master Plan recommends a program of capital improvements and ongoing labor commitments to allow the City to address its existing infrastructure and manage urban growth in a way that controls future infrastructure costs while maintaining a desirable Level of Service. The Master Plan includes 15 Technical Memoranda (see Table A-2 for a complete list) that highlight the need for the following infrastructure enhancements:

Asset Management

- Develop condition rating system to inventory and prioritize storm / sanitary infrastructure
- Integrate field repair information with rating system
- Establish annual sewer televising and rehabilitation goals for sewers and manholes

Stormwater System

- Reduce frequency of flooding
- Establish inspection and repair program for streambanks and ponds
- Enhance land use policy along greenways
- Promote sustainable land development

Sanitary Sewer System

- Reduce inflow/infiltration in collection system
- Replace undersized sewers
- Avoid premature expansion of treatment plants
- Reduce potential for Combined Sewer Overflows
- Continue combined sewer separation program

Total Program Cost

The estimated cost of system improvements, over a 20-year period, is approximately $139 million. About 15% of this total represents additional City staff necessary to manage the capital improvement program and to provide the increased level of recommended infrastructure inspection and Asset Management.

Table 1 includes a summary of the project and program costs defined in this Master Plan. These costs were determined after a process that included a City-wide web-based survey, close coordination with City staff, consultation with key stakeholders, such as the Bloomington-Normal Water Reclamation District (BNWRD), and a detailed analysis of the City's infrastructure. A more detailed breakdown of costs is included in Table A-1 in the Executive Summary Appendix.

Table 1
Master Plan Cost Summary

	Years 1-5	Years 6-20	Total	Additional Staffing Required (FTEs)
Sanitary	$26 million	$58 million	$83 million	2.5
Storm	$9 million	$27 million	$36 million	1.55
Asset Management	$6 million	$11 million	$17 million	5.75
TOTALS	**$41 million**	**$95 million**	**$136 million**	**9.8 FTEs**

The largest single cost component of this Master Plan ($63 million) is represented by sanitary sewer system televising and rehabilitation (Items 9 and 26 in Table A-1). Municipalities that operate under a formal Asset Management Plan typically target approximately *one percent* of the sanitary sewer system for rehabilitation or replacement each year to address structural concerns related to pipe/manhole deterioration. This allows the City to replace the oldest and most vulnerable sewer components (Figure 1) to reduce the likelihood of system failure. For the City of Bloomington, this translates to rehabilitating or replacing about **four to five miles of sewer pipe per year.**

Figure 1 illustrates a deteriorated sewer pipe. Cracks along the pipes and separating joints allow for soil and water to enter the pipe, increasing the likelihood of flow blockage, which can result in basement flooding. This scenario is not uncommon in the City of Bloomington.

Figure 1
Deteriorated Sanitary Sewer Pipe

Managing Infrastructure as a "Business"

This Master Plan establishes a strategy to run the City's storm and sanitary sewer infrastructure as a business. Effectively running a business (or infrastructure) requires, at a minimum, a thorough understanding of the costs necessary to provide a sustainable level of service to customers while meeting regulatory obligations. This also requires an earnest and continuous investment to replace aging components so as to prevent an overall degradation in the level of service and a resulting decrease in customer satisfaction.

For a municipality, short-term needs include assessment, repair and rehabilitation of storm and sanitary sewer collection networks to reduce the likelihood of flooding, erosion, and property damage (i.e. meeting the customer's basic needs). Long-term needs include ongoing investments to prevent infrastructure degradation and to address wastewater treatment limitations. Running a complex system of storm and sanitary infrastructure also requires an investment in information systems capable of tracking infrastructure conditions on a dynamic basis and alerting City staff of pending repair needs (i.e. Asset Management).

The key components of this Master Plan establish a "business plan" to meet the needs of the City's current residents and property owners while creating a foundation on which the City can build a growing and thriving economy.

In the 21st century, the City of Bloomington will rely on dependable infrastructure to attract businesses and maintain a high quality of life for its residents. Implementing the recommendations in this document will be necessary to allow the City to meet those needs.

Determining Existing Problems

A drainage questionnaire was used to generate citywide feedback on the location and severity of storm and sanitary problems, such as street flooding and basement sewer backups. The response was excellent, and it revealed that residents experience problems throughout the system, especially in the City's older areas (Figure 2 includes an example based on flooding complaints).

- Hydrologic/hydraulic analysis of storm and sanitary sewer system components to identify flow bottlenecks
- Sewer televising data (interior pipe inspection reports in select locations)
- Sanitary sewer manhole inspections and smoke testing in select locations
- Sanitary sewer pump station inspections
- Streambank assessment

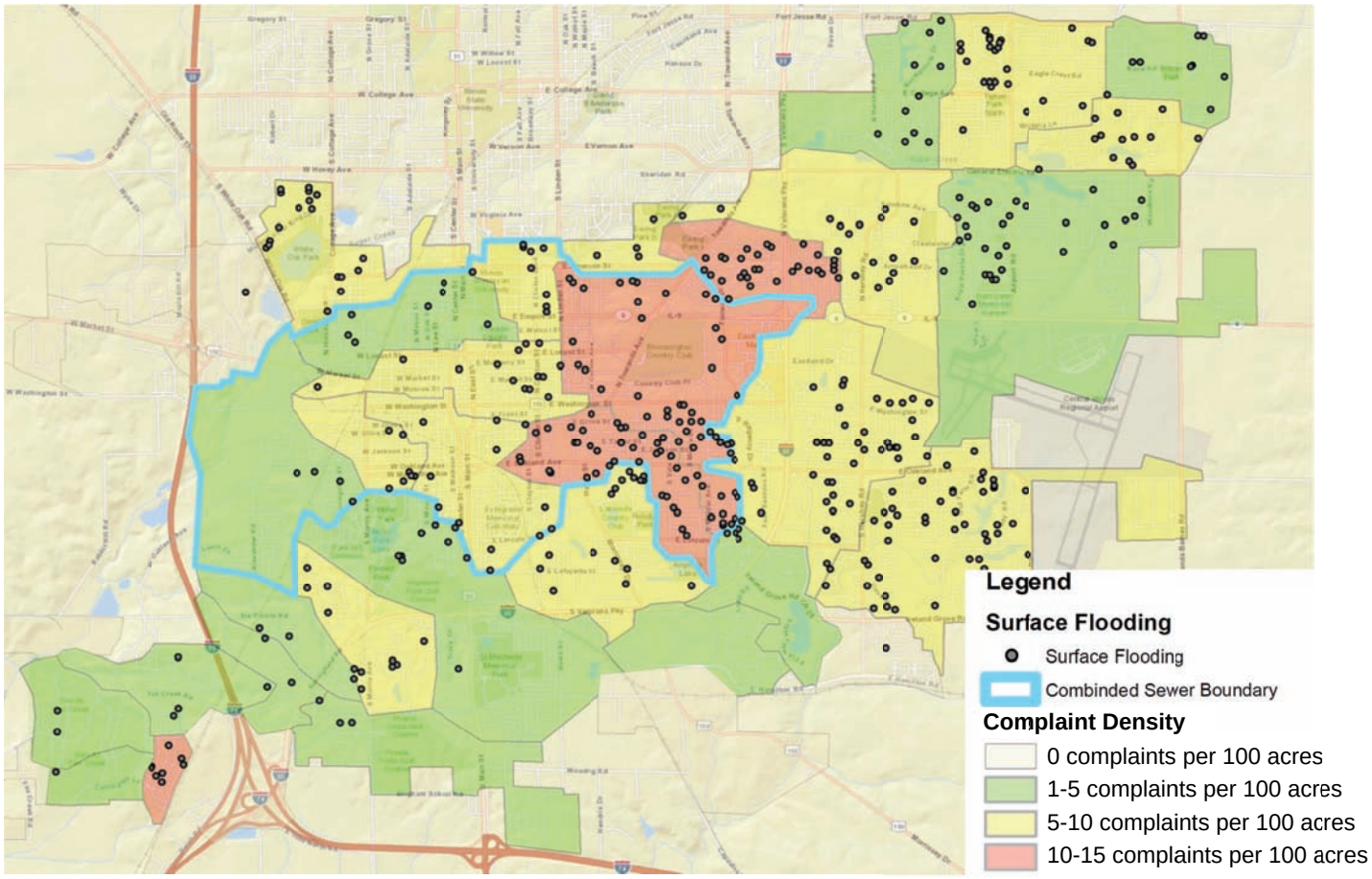


Figure 2 – Surface Flooding Complaints (2012 Drainage & Flooding Survey)

In addition to the questionnaire, multiple sources of information were used to identify and confirm the location and severity of system deficiencies:

- Flow meter and rainfall data for the sanitary sewer system (East Side Interceptor)
- Feedback from BNWRD staff regarding known system deficiencies and wet weather flow concerns in the sanitary sewer system
- Photos and personal accounts of known problems from City Public Works staff

Regulatory Considerations

Significant changes are occurring at the US EPA and IEPA that will impact both wastewater and stormwater, and these changes will increase the role that communities will play in controlling wet weather flows, reducing surface water pollution, and investing in aging infrastructure. **Most importantly, these rules have incentivized communities throughout the United States to increase infrastructure investment by enforcing financial penalties for non-compliance.**

Stormwater Regulations: The City of Bloomington is regulated by a Municipal Separate Storm Sewer System (MS4) Permit administered by the IEPA. Currently, this permit requires the City to take specific steps to reduce stormwater pollution. Proposed rules by the US EPA would require the City to update land development ordinances and increase inspection/enforcement. This Master Plan includes projects and programs to address the likelihood of these changes.

Wastewater Regulations: The City's wastewater collection system flows into interceptor sewers and two wastewater treatment plants operated by BNWRD. BNWRD is regulated through an IEPA permit for its treated wastewater discharge. This permit obliges BNWRD to control wet weather flows and avoid any untreated or partially-treated discharge. Existing regulations also prohibit the bypass of flows from a separate sanitary sewer system (East Side Interceptor) to a combined sewer system. The US EPA is also considering new rules that would require the City of Bloomington to have their own permit for its collection system. This Master Plan includes projects that anticipate the wastewater regulatory environment through a Capacity, Management, Operation and Maintenance (CMOM) program.

Combined Sewer Regulations: The City has an IEPA permit for Combined Sewer Overflows (CSOs). Part of this permit requires a Long Term Control Plan (LTCP), which was drafted in 2003. The LTCP sets specific goals for CSO reduction or elimination. Many of the projects in this document are directly related to these regulatory commitments.

Impact of this Master Plan on City and BNWRD Facilities

Although BNWRD is responsible for the system of interceptor sewers and two wastewater treatment plants serving the City of Bloomington, they are also directly impacted by the condition of the City's wastewater collection system. Deteriorating sewers allow more inflow/infiltration (wet weather flow) to enter the system, which creates an operational burden at both treatment plants. The recommendations in this Master Plan are focused on identifying the most cost-efficient solutions to meet the needs of both the City and BNWRD while extending the useful lives of both treatment plants.

Capital improvements will be focused on sewer system rehabilitation, wet weather storage, and meeting the needs of state/federal regulatory agencies.

The projects recommended in this Master Plan will:

- Maximize the use of both treatment plants, thereby avoiding more expensive capital investments to increase treatment capacity.
- Reduce the potential for Combined Sewer Overflows or other illegal untreated sewage discharges.
- Eliminate the bypass of wet weather flows from the East Side Interceptor system to the City's combined sewer system.
- Reduce operating costs at both treatment plants through reduced annual flow volumes.

Educating and Involving the Public

Storm and sanitary infrastructure includes many components that are often not completely understood by the general public. Unfortunately, degradation of underground utilities remains unseen by the public until a system failure occurs, which explains the lack of public support for investment in something that is needed but cannot be observed. This Master Plan provides an opportunity for City staff and elected officials to reach out to the general public and educate them on the following issues:

- State of the City's infrastructure
- Importance of adequate investment for the benefit of the economy and future generations
- Need to comply with state and federal regulations
- Need to rehabilitate and replace infrastructure in order to prevent major disruption to the City's residents, businesses, and public institutions

The Executive Summary Appendix includes a set of questions and answers (Q&A) that can be used as a platform to communicate the overall intent of this Master Plan and achieve public buy-in to the goals established herein.

City of Bloomington

Stormwater and Sanitary Sewer Master Plans

Master Executive Summary APPENDIX

Q&A Summary
Cost Summary (Detailed)
List of Technical Memoranda

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Q&A – Bloomington Stormwater and Sanitary Sewer Master Plan

Q: What are the benefits to residents through the implementation of this Master Plan?

A: The implementation of this Master Plan includes a rollout of a strategic asset management plan which will lower the overall life-cycle costs of the storm and sanitary sewer infrastructure through prioritizing expenditures on the most critical infrastructure, while identifying and fixing problems before they cause catastrophic problems to businesses and residents.

Q: Are the costs in this Master Plan redundant to work the City is already doing?

A: No. The costs identified in this document represent additional projects and programs necessary to manage existing infrastructure, meet Level of Service expectations, inspect/repair/rehabilitate aging infrastructure, and meet the City's obligations to state/federal regulatory agencies and BNWRD.

Q: Must the City of Bloomington spend the entire amount of money defined in this Master Plan?

A: These estimates are planning-level and intended to be comprehensive. The City should determine which recommendations are most critical. It may be possible to delay some projects to save money in early years, but the programs and projects identified in this document are important to meet the City's long-term needs.

Q: Why has the management of our infrastructure suddenly become so expensive?

A: Much of the City's current infrastructure was subsidized by federal programs (most of which are no longer available) and developers who financed the construction of sewers for new subdivisions. As those subsidized facilities (sewers, manholes, pump stations, treatment plants, etc.) are nearing the end of their service lives, it now becomes the City's (and its ratepayers') responsibility to maintain, rehabilitate, and replace this infrastructure.

Q: Are these infrastructure problems unique to the City of Bloomington?

A: No. Most cities like Bloomington have an increasing backlog of sewer infrastructure needs. Only recently have these issues manifested themselves in widespread problems as much of the explosive growth in the 1950s – 1990s has started to "catch up" with cities as this infrastructure begins to fail.

Q: Have state/federal regulations impacted the City's infrastructure costs?

A: Yes. Stricter wastewater regulations place more pressure on BNWRD to control wet weather flows and provide wastewater treatment under dry ***and*** wet conditions. New stormwater regulations require the City to maintain a program to reduce stormwater pollution. Emerging federal stormwater regulations will require additional attention to stormwater infrastructure and at a higher cost.

Q: Will storm and sanitary infrastructure costs go down after this Master Plan is fully-implemented?

A: The increased level of investment in sanitary and storm infrastructure will likely need to be sustained in order to maintain a system that meets the City's needs for future generations. As the City's infrastructure continues to age, new high-priority projects will emerge and will need to be addressed.

Table A-1
Master Plan Cost Summary (Detailed)

Present Value* of Capital Projects and Labor Needs

	Memo ID**	Item #	Critical Project or Program	Early Action Projects (Years 1-5)	Long-Term CIP (Years 6-20)	Additional City Staffing Needs (FTEs)	Total 20-year Cost
Sanitary Sewer	SA4	1	Complete Smoke Testing, Manhole Inspection and Sewer Televising in Priority Sewersheds	$ 635,000	$ -	-	$ 635,000
	SA3	2	Manhole and Pipe Repairs Identified in SSES Memorandum	$ 410,000	$ -	-	$ 410,000
	SA4	3	Arcadia / Broadmoor Rehabilitation Pilot Study	$ 1,653,000	$ -	-	$ 1,653,000
	SA3	4	Post-Rehabilitation Flow Analysis	$ 100,000	$ -	-	$ 100,000
	SA2	5	Hawthorne Collector Sewer Hydraulic Upgrade	$ -	$ 1,450,000	-	$ 1,450,000
	SA5	6	Pump Station Control Upgrades	$ 583,000	$ -	-	$ 583,000
	SA4	7	Wet Weather Storage Project (10 MG Tank)	$ -	$ 12,160,000	-	$ 12,160,000
	N/A	8	Locust/Colton – Remaining Sewer Separation Projects (primarily sanitary sewer costs)	$ 4,000,000	$ 4,900,000	-	$ 8,900,000
	N/A	9	Citywide Sanitary Sewer Rehabilitation Program***	$ 16,250,000	$ 39,250,000	2.50	$ 55,500,000
	N/A	10	Pay off inter-fund advance	$ 1,900,000	$ -	-	$ 1,900,000
			SUBTOTAL (SANITARY)	**$ 25,531,000**	**$ 57,760,000**	**2.50**	**$ 83,291,000**
Storm Sewer	ST4	11	Pond Inspection and Maintenance Program (Public and Private Ponds)	$ 2,055,000	$ 6,165,000	0.55	$ 8,220,000
	ST5	12	Floodplain/Floodway Encroachment Program	$ 375,000	$ 1,125,000	0.25	$ 1,500,000
	ST4	13	Urban Channel Retrofits	$ 1,375,000	$ 2,225,000	0.15	$ 3,600,000
	ST5	14	Floodplain Remapping	$ 330,000	$ -	-	$ 330,000
	ST5	15	Detention Pond Retrofits	$ 450,000	$ -	-	$ 450,000
	ST4	16	Streambank Stabilization (Planning Areas 4, 7, and 8)	$ -	$ 5,550,000	0.10	$ 5,550,000
	ST4	17	Remove Railroad Hydraulic Restriction (Planning Area 8)	$ -	$ 3,300,000	-	$ 3,300,000
	ST3	18	Urban Stream Repairs (From Streambank Inventory) and Ongoing Stream Inspections	$ 3,510,000	$ 300,000	0.20	$ 3,810,000
	ST4	19	Update Stormwater Ordinances	$ 130,000	$ -	-	$ 130,000
	ST2	20	Storm Sewer Hydraulic Improvements	$ 642,000	$ -	-	$ 642,000
	ST2	21	Sewer Separation Projects	$ 100,000	$ 3,354,000	0.20	$ 3,454,000
	ST2	22	Storm Trunk Sewer to Sugar Creek	$ -	$ 2,000,000	-	$ 2,000,000
	ST2	23	Regional Stormwater Detention Facilities (Ponds 1 and 2)	$ -	$ 2,900,000	0.10	$ 2,900,000
	N/A	24	Pay off inter-fund advance	$ 250,000	$ -	-	$ 250,000
			SUBTOTAL (STORM)	**$ 9,217,000**	**$ 26,919,000**	**1.55**	**$ 36,136,000**
Asset Management	AM2	25	ESRI/GIS/CCTV/MUNIS Tool Upgrades	$ 280,000	$ 158,000	-	$ 438,000
	AM5	26	CCTV Inspection Program (Ongoing)	$ 3,700,000	$ 4,300,000	2.00	$ 8,000,000
	AM5	27	Inventory Manholes/Structures	$ 120,000	$ -	-	$ 120,000
	AM5	28	Manhole Inspection Program (Ongoing)	$ 446,000	$ 850,000	0.25	$ 1,296,000
	AM5	29	FOG Inspection Program	$ 1,200,000	$ 3,700,000	2.50	$ 4,900,000
	AM5	30	GIS Coordinator Position	$ 450,000	$ 1,500,000	1.00	$ 1,950,000
			SUBTOTAL (ASSET MANAGEMENT)	**$ 6,196,000**	**$ 10,508,000**	**5.75**	**$ 16,704,000**
			MASTER PLAN TOTAL	**$ 40,944,000**	**$ 95,187,000**	**9.80**	**$ 136,131,000**

* Present value based on a 20-year cycle of all costs identified above (assumes discount rate and inflation rate will cancel each other out)
Assumed overhead/fringe burden for new City staff: 50%

** Technical Memoranda Designation (identified costs referenced in memoranda as listed in Table A-2)

*** Based on approximately 1% of sewer system rehab/replacement per year

Table A-2
List of Technical Memoranda

	Technical Memorandum Title	Projects / Programs Covered
Sanitary Sewer	East Side Interceptor Hydrologic Analysis **(SA1)***	• Summarizes flow metering results, model calibration, and design peak flow calculations for the East Side Interceptor. • Projects wastewater flows under future (Year 2035) conditions. • Identifies high priority sewersheds requiring further evaluation.
	East Side Interceptor / GE Valley Collector: System Capacity Assessment **(SA2)**	• Hydraulic analysis of the East Side Interceptor and collector sewers in the GE Valley sewer district. • Identifies existing hydraulic bottlenecks and proposed capital improvements.
	East Side Interceptor – Sanitary Sewer Evaluation Survey (SSES) **(SA3)**	• Results from smoke testing and manhole inspections in high priority sewersheds. • Identifies inflow elimination and rehabilitation projects to reduce flows.
	East Side Interceptor – Wet Weather Alternatives **(SA4)**	• Details pilot program for sewer rehabilitation and wet weather flow reduction. • Identifies wet weather storage needs and potential locations. • Includes a cost-effectiveness analysis of various alternatives.
	Sanitary Pump Stations: SCADA Recommendations **(SA5)**	• Identifies improvements to control systems for efficient pump operations.
Storm Sewer	Delineation of Stormwater Problem Areas **(ST1)**	• GIS-based mapping of the results from the public survey for drainage and sewers. • Establishes patterns used to prioritize areas for further analysis.
	Hydrologic / Hydraulic Modeling in Priority Watersheds – Oakland Avenue Watershed and Combined Sewer Separation Opportunities **(ST2)**	• Identifies solutions to relieve flooding in areas along Oakland Avenue (southeast of downtown). • Identifies sewer separation and wet weather storage. • Identifies significant wet weather flow reduction to the WWWTP.
	Streambank Inventory **(ST3)**	• Visual inspection of select reaches of open drainage channel, including the development of a new iPad application for GIS-based streambank assessment. • Identifies repairs for high priority drainage channels.
	Greenways Plan / Sustainable Design Initiatives **(ST4)**	• Details a proposed City-wide detention pond inspection and maintenance/enforcement program for public and private ponds. • Recommends specific locations for floodplain mapping revisions. • Recommends standards for drainage channel protection and right-of-way widths in developing areas. • Recommends urban drainage channel retrofits to enhance safety and ease-of-maintenance. • Recommends planning/design policies for sustainable land development.
	Sugar Creek Analysis **(ST5)**	• Recommends floodplain remapping in the upper reaches of the Sugar Creek watershed. • Identifies detention pond retrofit opportunities for peak flow reduction and water quality enhancement.
Asset Management	Pipe Condition Rating Methodology Recommendations **(AM1)**	• Establishes a methodology for the City to use in rating the structural condition of storm and sanitary sewers.
	GIS Based Infrastructure Rating System Pilot Area Evaluation – Phase 1 (CAP 1 & 2) **(AM2)**	• Summarizes the risk-based approach to evaluate existing infrastructure. • Establishes methodologies for the City to use in determining *risk of failure* and *consequence of failure*.
	Asset Management Program Work Order Needs Analysis **(AM3)**	• Recommendations to enhance the tracking of maintenance, work orders, and its integration with MUNIS.
	Assessment for CCTV Inspections **(AM4)**	• Includes recommendations to improve the CCTV inspection process to more accurately represent actual pipe conditions.
	Best Management Practices (BMPs) for Bloomington Storm and Sanitary Utility Operations **(AM5)**	• Program recommendations, staffing levels, and cost estimates to implement the Asset Management Program. • References to best practices from other communities.

* *Memo designation (see Table A-1 for links between costs and associated memoranda)*

Sanitary Sewer Technical Memoranda

SAN1 - EAST SIDE INTERCEPTOR SYSTEM HYDROLOGIC ANALYSIS

East Side Interceptor System
Hydrologic Analysis

Executive Summary

The hydrologic analysis was performed to quantify the response of the East Side Interceptor Sewer to wet weather events and to determine the design event for future capital improvements. This effort is a result of concerns about excessive inflow and infiltration ("I/I") entering the sewer system and overwhelming the Southeast Wastewater Treatment Plant (SEWWTP).

During wet weather, the collection system conveys higher flows. When the flow rate is expected to exceed the treatment capacity at the SEWWTP, the Bloomington-Normal Water Reclamation District (BNWRD) diverts flows from the East Side Interceptor to the City's older sewers. This situation is not desirable, as it can place an additional burden on the sanitary sewers on the City's west side.

This analysis relied on data received from over a dozen temporary flow meters, each strategically placed in the collection system to help define the wet weather response in different locations.

Key Findings

- The Year 2012 design event wet weather flow generated in the East Side Interceptor system, 46 cfs, exceeds the treatment capacity of the SEWWTP of 26 cfs. This results in significant flow diversion to the older sewer systems on the City's west side.
- The Year 2035 design event wet weather flow is estimated at 69.2 cfs.
- Several sub-districts within the East Side Interceptor service area were identified as having elevated I/I response compared to other sub-districts.
- Seasonal variations in observed 7-day minimum flows are typical of other wastewater collection systems, although spikes during wet weather suggest there is an opportunity to reduce the magnitude of wet weather fluctuations and reduce the volume of treated flow to the SEWWTP.
- Based on our review of similar collection systems throughout the Midwest, the East Side Interceptor system does not appear to have extraordinarily high I/I levels as compared to other collection systems, although the measured wet weather flow volume is slightly higher than the median of similar metered sewer systems

Recommendations

- The City should work closely with BNWRD to continue the flow metering program. Additional flow data will only help to increase the confidence in the sizing and design of future capital projects.

No specific cost summaries are included with this memorandum. This document consists of hydrologic findings only. All recommended projects resulting from this analysis are covered in the accompanying memoranda in the Sanitary Sewer Master Plan.

Sanitary Sewer Technical Memoranda

SAN2 - EAST SIDE INTERCEPTOR / GE VALLEY COLLECTOR SYSTEM CAPACITY ASSESSMENT

East Side Interceptor / GE Valley Collector
System Capacity Assessment

Executive Summary

This Technical Memorandum serves as a companion document to the *East Side Interceptor Hydrologic Analysis*. This document focuses on the hydraulic capacity of the East Side Interceptor, GE Valley collector sewer, and the GE Valley Pump Station. Specific actions are identified to address the hydraulic deficiencies that may have an adverse impact on existing and/or future flow scenarios. This will help to accomplish the following:

- Ensure the long-term functionality of the East Side Interceptor and an adequate Level of Service for City of Bloomington residents and businesses.
- Prevent hydraulic surcharging that could result in basement backups or Sanitary Sewer Overflows.
- Eliminate flow diversions to the City's older sewer systems tributary to the West Wastewater Treatment Plant.

Key Findings

- The East Side Interceptor is adequately sized to handle design-event wet weather flows with no or minimal hydraulic surcharge.
- The GE Valley Pump Station does not have enough capacity to manage wet weather flows without diverting flows to the City's combined sewer system.
- The Hawthorne Collector Sewer (City-owned sewer system component upstream of the GE Valley Pump Station) is undersized and presents a risk for system surcharge, especially as the City continues to grow eastward.

Recommendations

- Increase the hydraulic capacity of the Hawthorne Collector Sewer by installing a hydraulic relief at the GE Road / Airport Road intersection.
- Upgrade the GE Valley Pump Station to provide pumping capacity to manage the design event flow rate without diversion to the combined sewer system.

Cost Summary	
Hawthorne Collector Hydraulic Improvements (Alternate 2)	$ 640,000
GE Valley Pump Station Expansion	$ 810,000
TOTAL	**$ 1,450,000**

Sanitary Sewer Technical Memoranda

SAN3 - SANITARY SEWER EVALUATION SURVEY (SSES)

Sanitary Sewer Evaluation Survey (SSES)

Executive Summary

This field-based effort targeted the sewer districts identified in the *Hydrologic Analysis Memorandum* where the City has the greatest potential to achieve inflow/infiltration (I/I) source reduction through the elimination of unintended inflow sources and rehabilitating sewer structures that may be susceptible to elevated infiltration levels.

The SSES investigation included a field evaluation of 151 manholes and approximately 40,000 lineal feet of sewer mains within the East Side Interceptor service area.

Key Findings

- Numerous defects were observed in the inspected sanitary manholes. Although most of these defects do not require immediate attention, many introduce inflow/infiltration into the sanitary sewer system.
- A total of 731 gpm (about 1.6 cfs) of inflow/infiltration is estimated to enter the sanitary sewer system through the inspected manholes. About 75% of this is due to direct inflow and about 25% due to infiltration.
- Four locations were identified where surface runoff can directly enter the sanitary sewer system.

Recommendations

- Rehabilitate sewer manholes that have been identified as significant I/I sources. Most of these manholes have significant defects (cracks, openings) that can be cost-effectively addressed.
- Eliminate known inflow sources as identified in this document. These include direct connection of surface runoff to the sanitary sewer system.
- Contact property owners where private sources of I/I were identified through smoke testing, and request the necessary repairs be made. These sources can usually be repaired at minimal cost.
- Complete the SSES within the Stern, Arcadia and Broadmoor sewer districts.
- Re-evaluate the collection system after early rehabilitation using post-rehabilitation flow meter and rainfall data.

Planning-Level Cost Summary	
Complete the SSES for remaining priority districts	$ 240,000
Targeted I/I source removal projects	$ 510,000
TOTAL	$ 750,000

Sanitary Sewer Technical Memoranda

SAN4 - WET WEATHER ALTERNATIVES EAST SIDE INTERCEPTOR SYSTEM

Wet Weather Alternatives
East Side Interceptor System

Executive Summary

The East Side Interceptor sewer, which conveys wastewater flows from the east side of the City of Bloomington to Southeast Wastewater Treatment Plant (SEWWTP), experiences elevated flows during wet weather due to inflow and infiltration into the pipes. Although this is not uncommon for wastewater collection systems, it creates problems for the Bloomington-Normal Water Reclamation District (BNWRD), as the SEWWTP does not have adequate treatment capacity to handle wet weather flows. To manage this, BNWRD currently diverts a portion of the East Side Interceptor system wet weather flow to the City's older sewer system on the west side. This is undesirable to both the City and BNWRD.

In the near term, the City will need to address excess peak flows and flow volumes resulting from wet weather, and implement a continuous inflow/infiltration evaluation and removal program that is modeled after the EPA's Capacity, Management, Operations and Maintenance (CMOM) regulations.

Key Findings

- The most cost-efficient method to address wet weather flows is through storage (via tank or holding pond).
- Increasing the treatment capacity at the SEWWTP is the least cost-efficient method to address wet weather flows.
- Footing drain removals can help to reduce excess flows, although it is uncertain how many footing drains are still connected to the sanitary sewer system.
- Preliminary estimates indicate that approximately 10% of I/I may be removed from areas within the target sewer districts as part of the proposed pilot program efforts.

Recommendations

- Perform additional smoke testing and manhole inspections in the high priority meter districts.
- Clean and televise sewers within the high priority meter districts.
- Perform a pilot inflow/infiltration removal program in the Arcadia meter district. Pre-rehabilitation flow meter data should be compared to post-rehabilitation to determine cost-effectiveness.
- Evaluate the prevalence of footing drains connected to the sewer system and disconnect those footing drains. This effort will focus on the Broadmoor meter district. Pre-rehabilitation flow meter data should be compared to post-rehabilitation to determine the cost-effectiveness of footing drain removal.
- Update City policies on footing drain removals and sewer lateral replacement.
- Install a partially-buried wet weather storage tank near the Little Kickapoo Pump Station.

Cost Summary	
Wet Weather Storage near Little Kickapoo Pump Station	$ 12,160,000
Inflow/Infiltration Evaluation and Source Removal Program	$ 2,288,000
TOTAL	**$ 14,448,000**

Sanitary Sewer Technical Memoranda

SAN5 - SANITARY PUMP STATION SCADA (Supervisory Control and Data Aquisition) SYSTEM

Sanitary Pump Station SCADA
(Supervisory Control And Data Acquisition) system

EXECUTIVE SUMMARY

This summary serves as a companion document to the Sanitary Pump Station SCADA system Technical Memorandum dated December 11, 2013, prepared by Foth for the City of Bloomington.

This memorandum was prepared to:

1. Study and evaluates the control, monitoring and alarm systems for the City's sanitary sewage pump stations
2. Outline actions necessary to improve the reliability and efficiency of these systems.

Key Findings

1. The pump stations are not supervised by on-site staff.
2. Each pump station has a unique control, monitoring and alarm system.
3. Recorded operational data is limited, varies from station to station, and severely limits the ability to perform comprehensive station performance evaluations.
4. Remote alarms give limited information to the operators, requiring immediate site visits for any station alarm condition.
5. Reliable and efficient remote control, monitoring and alarm systems are necessary to improve system reliability and reduce operating costs.

Recommendations

1. Create and adopt standards for monitoring, control and alarm hardware.
2. Create and adopt standards for a SCADA (Supervisory Control And Data Acquisition) system.
3. Upgrade, remove and replace pump station hardware to comply with the adopted standards.
4. Implement a fully integrated and upgradeable SCADA system to monitor and control the pump station, improve system reliability and increase the City's operational efficiency.

The estimated project cost to implement the recommendations in this memorandum is $583,000.

Stormwater Technical Memoranda

ST1 - DELINEATION OF STORMWATER PROBLEM AREAS

DELINEATION OF STORMWATER PROBLEM AREAS

EXECUTIVE SUMMARY

This summary serves as a companion document to the Delineation of Stormwater Problem Areas Technical Memorandum dated December 11, 2013, prepared by Foth for the City of Bloomington.

This memorandum was prepared to:

1. Assist City staff with a general understanding of the extent of stormwater issues throughout the community.
2. Prioritize watershed(s) for further analysis based on the severity and density of the stormwater issues.

Questionnaires were distributed to City residences and businesses via City water bills. Over 2,300 questionnaire responses were received. All responses were reviewed, compiled and entered into the City's GIS database, together with other known stormwater issues documented by City staff.

Key Findings

1. Drainage issues are widespread throughout the City.
2. The frequency of flooding instances per acre, indicative of drainage issues, varies for each watershed in the City.
3. Based on questionnaire responses, the Oakland watershed, southeast of downtown, was found to have the highest density of reported surface flooding and basement flooding within the City.
4. City staff-reported issues in the Oakland watershed occurred at approximately eight times the average rate within the City.
5. Combined sewer overflows exist on Maizefield Avenue within the Oakland watershed.
6. Based on the above, the Oakland watershed was found to have the highest priority for further analysis.

Recommendations

The Oakland Avenue watershed is recommended for further study to identify potential solutions to the flooding problems in this watershed.

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Stormwater Technical Memoranda

ST2 - HYDROLOGIC/HYDRAULIC MODELING IN PRIORITY WATERSHEDS, OAKLAND AVENUE WATERSHED STORMWATER MODEL, COMBINDED SEWER SEPARATION OPPORTUNITIES

HYDROLOGIC/HYDRAULIC MODELING IN PRIORITY WATERSHEDS
OAKLAND AVENUE WATERSHED STORMWATER MODEL
COMBINED SEWER SEPARATION OPPORTUNITIES

EXECUTIVE SUMMARY

This executive summary is for the above Technical Memorandum dated December 11, 2013, prepared by Foth for the City of Bloomington as part of the Sewer Master Plan.

Introduction

The Oakland Avenue watershed was found to have the highest density of stormwater issues in the City (See companion Technical Memorandum - Delineation of Stormwater Problem Areas) and was recommended for further analysis. A computer Hydrologic/ Hydraulic (H/H) model using XP-SWMM was created for the watershed. Findings and recommendations based on computer modeling are presented including confirmation of system deficiencies and identification of potential system improvements.

Potential improvements included in the analysis, requested by City staff, are:

1) Separation of combined sewers in the Oakland Avenue watershed
2) Construction of a stormwater outlet from the Oakland Avenue watershed to Sugar Creek
3) Construction of two detention basins along the stormwater outlet.

Planning level cost estimates for the improvements are prepared to assist with the development of a Capital Improvement Plan (CIP).

Key Findings

Widespread surcharging occurs in the Oakland Avenue watershed combined sewer system, resulting in periodic basement flooding, street flooding and system overflows. Separating sanitary and storm flows can mitigate flooding and system overflows. Based on the H/H model analysis, sewer separation centered on reconfiguring the original combined sewer into a sanitary sewer and reconfiguring the 1946 relief combined sewer into a storm sewer is technically feasible and has merit. A phased improvement plan based on this reconfiguration was modeled and planning level cost estimates prepared.

Recommendations

A 4-phase improvement plan is recommended as follows:

Phase 1 - small scale, localized improvements to the combined sewer system. These improvements include modifications to a weir junction chamber along Taylor Street, installation of storm sewers along McGregor Avenue, additional study of flooding at the intersection of Oakland Avenue and Meadows Avenue, and elimination of the CSOs

along Maizefield Avenue at Kreitzer Avenue and Florence Avenue. Phase 1 estimated cost is $742,000.

Phase 2 - initiates sewer separation in the Oakland Avenue watershed. Reconfiguration of the 1946 parallel relief sewer system into a dedicated storm sewer system is proposed. The H/H model indicated that the 1946 relief sewers, if disconnected from the original combined sewers, would have reasonable capacity to convey stormwater. Supplemental new downstream storm sewers are requires. Following separation, the original combined sewer would function as a sanitary sewer, greatly reducing basement sewer backups and combined sewer overflows. Phase 2 estimated cost is $3,354,000.

Phase 3 - construction of a storm sewer outlet and a stormwater detention basin for the Phase 2 sewer separation improvements. The detention basin, Pond 1, is located at the site of the City's public works facility on the south side of the downtown area. These improvements will decrease upstream flooding and reduce the peak discharge into the undersized downstream combined sewers. Phase 3 estimated cost is $2,115,000.

Phase 4 - construction of a second detention basin, Pond 2, at the current Nicor Gas facility and a conveyance network along Constitution Trail from the Phase 3 improvements (Pond 1) to Pond 2 and then on to Sugar Creek. This complete stormwater separation will divert an estimated 200 million gallons of stormwater per year from the treatment facility by discharging separated stormwater directly to Sugar Creek. Phase 4 estimated cost is $2,855,000.

Summary of Planning Level Costs for Phases 1 - 4	
Phase 1	$742,000
Phase 2	$3,354,000
Phase 3	$2,115,000
Phase 4	$2,855,000
Total	$9,066,000

Summary

Implementation of the four-phase sewer separation improvement plan outlined herein will reduce peak flows in the system, reduce peak discharges to Sugar Creek, mitigate basement flooding caused by sewer backups and reduce system flooding. Stormwater flows from the Oakland Avenue watershed, currently discharging to the sewage treatment facility, would be diverted away from the plant directly to Sugar Creek. Estimated total project cost is $9.1 million

Stormwater Technical Memoranda

ST3 - STREAMBANK INVENTORY

STREAMBANK INVENTORY

EXECUTIVE SUMMARY

This summary serves as a companion document to the Streambank Inventory Technical Memorandum dated December 11, 2013, prepared by Foth for the City of Bloomington.

The South Branch Sugar Creek, Goose Creek, and Kickapoo Creek are major drainage ways within the City. These streams, together with other open channels, comprise approximately 59 miles. The City does not have an active inventory or assessment of these channels. Many channel reaches have received no maintenance, are experiencing moderate to severe erosion, and require rehabilitation.

This Memorandum summarizes findings from a pilot program undertaken to make an initial assessment of 4 miles of the City's channels using the Unified Stream Assessment (USA) method. Data collection and processing was streamlined using StreamSites, a proprietary web-based tablet application to store and analyze data in a GIS environment. Graphical and tabular summaries of channel ratings are presented. Recommended repairs and associated planning level cost estimates for two severely eroded channel reaches identified in the pilot program are outlined.

Key Findings

1. One-third (1/3) of channels assessed in the pilot program have eroded banks classified as "poor" or "severe" and are in need of rehabilitation.
2. In order to assess a variety of channels, some channel reaches with known problems were selected for the pilot program. The length of problem channel reaches selected for the pilot program may not be indicative of all problem channel reaches in the City. Therefore, extrapolation of data from the pilot program to all City channels may lead to erroneous estimates.

Recommendations

1. Expand the pilot program to create an initial assessment of all channels in the City. Use the assessment to prioritize channels requiring rehabilitation based on the severity of channel erosion.
2. Adopt a two trigger system (Static and Dynamic) to schedule periodic re-inspections.
3. Develop a Capital Improvement Plan for urban streams in the City based on a watershed approach. The Plan should include priorities based on the Unified Stream Assessment (USA) evaluations and include budgets based on incorporating the cost-effective rehabilitation options for each reach, including the evaluation of deploying BMP's in the contributing watershed.
4. Initiate early action repairs on two severely eroded channels identified in the Pilot Program along Sugar Creek and Little Kickapoo Creek (Brookridge Branch). Estimated rehabilitation cost is $2.5 million and $1 million respectively.

Stormwater Technical Memoranda

ST4 - GREENWAYS PLAN - SUSTAINABLE DESIGN INTIATIVES

Greenways Plan
Sustainable Design Initiatives

Executive Summary

This plan provides a roadmap to address future development along waterways (riparian corridors) in order to protect the "backbone" of the City's existing and future stormwater infrastructure and identify policy changes that will help to provide a more sustainable framework for land development. This plan is critical to allow for both environmental and economic sustainability.

Key Findings

- Existing drainage channels are experiencing severe erosion and places private property at risk of damage.
- A lack of easements makes drainage channel maintenance difficult or impossible.
- 73 city-owned detention ponds and over 300 privately-owned detention ponds experience significant problems resulting from a lack of maintenance. This can increase flooding risk and pose a threat to surface water quality.
- Existing City staffing is not sufficient to inspect stormwater infrastructure and implement maintenance programs necessary to avoid future damage due to failed systems.

Recommendations

- Revise floodplain boundaries at key locations where development has occurred.
- Implement streambank restoration projects and modify existing drainage channels to better withstand urban runoff.
- Implement a City-wide detention pond inspection and maintenance program.
- Establish a Greenway standard for new developments to accommodate drainage channels, pedestrian access, and maintenance access.
- Identify locations for regional stormwater detention in the City's key Planning Areas.
- Update the City's Manual of Practice to address stormwater management in order to meet pending changes to federal and state rules.
- Increase the rate for fee-in-lieu for stormwater detention to match actual costs for stormwater management.

Planning-Level Cost Summary	
Detention Pond Inspection/Maintenance Program	$ 6,470,000
Drainage Channel Improvements and Related Studies	$ 12,380,000
TOTAL	$ 19,030,000

Stormwater Technical Memoranda

ST5 - SUGAR CREEK ANALYSIS

Sugar Creek Analysis

Executive Summary

The City has recently experienced rapid development within the Sugar Creek watershed, which is on the City's east side (primarily north of the airport). New development, including the construction of numerous regional detention ponds, has changed the runoff characteristics within the upper reaches of Sugar Creek.

The purpose of this analysis is to identify changes to hydrologic response and associated floodplain elevations since the previous hydrologic and hydraulic analyses were performed in 1993 by the Illinois Department of Natural Resources (IDNR). Since that time, significant development has occurred in the headwaters of Sugar Creek (east of Veterans Parkway). Dozens of properties are within the official 100-year floodplain, which places a high economic burden on landowners through required flood insurance premiums.

Key Findings

- The Tipton Park detention ponds are not operating as intended. The predicted high water levels are significantly higher than the design high water levels, which could impact properties adjacent to the detention ponds.
- Stormwater ordinances in the City of Bloomington have resulted in the construction of over 560 acre-feet (182 million gallons) of stormwater detention pond storage in the Sugar Creek watershed, east of Veterans Parkway. This has a significant impact on reducing flood potential along the Sugar Creek, especially from Airport Road to Hershey Road. Some ponds have spare storage capacity.
- The FEMA official 100-year floodplain is no longer accurate, especially east (upstream) of Veterans Parkway. It generally over-predicts flood risk, which could impact land development potential.

Recommendations

- First floor and basement elevations within the Tipton Park Subdivision should be verified to determine whether there is a flood risk along the existing detention ponds.
- Targeted retrofits to existing detention ponds can further reduce flood potential and can enhance water quality. Furthermore, this spare volume could be sold to nearby land developers as regional stormwater detention. Four detention ponds are recommended for retrofit.
- Prepare a Letter of Map Revision (LOMR) and submit to FEMA for review and approval. This will help establish a more accurate floodplain boundary within the watershed. Up to 42 structures could be removed from the floodplain as a result of this effort.

Planning-Level Cost Summary	
Detention Pond Retrofits and FEMA LOMR	$ 460,000
TOTAL	**$ 460,000**

Asset Management Technical Memoranda

AM1 - PIPE CONDITION RATING METHODOLOGY RECOMMENDATIONS

PIPE CONDITION RATING METHODOLOGY RECOMMENDATIONS

CITY OF BLOOMINGTON, IL
DECEMBER 11, 2013

Executive Summary

This memorandum serves as a companion document to *GIS Based Infrastructure Rating System* (December 11, 2013). It provides a methodology for evaluating interior sanitary and storm sewer pipe condition.

Recommendations

- The National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) has become the industry standard for rating the interior condition of gravity pipelines. The method utilizes the PACP system of scoring defects or observations through closed-circuit television (CCTV) inspection of pipelines. It is recommended that the City of Bloomington require all CCTV inspections to comply with NASSCO-PACP specifications.
- The City of Bloomington Engineering Department utilizes PipeTech software for performing CCTV inspections. It is recommended that an automated business tool is developed to transfer pipe inspection rating scores into the Department's GIS system. This will automate storage of the data so that it can be used as part of the Department's Asset Management Program. Similarly, the business tool would include routines to back up historical data from previous inspections, so that it is accessible and not overwritten.
- It is recommended that an independent Quality Assurance review of Bloomington CCTV inspections is performed annually to evaluate its compliance with NASSCO PACP specifications. It is essential that inspections are carried out in a uniform, repeatable and compliant manner. The review would include a face-to-face feedback session for public works technicians and engineering staff.

The estimated costs for the above recommendations are summarized in the following table.

Table 0. Costs for Pipe Condition Methodology Implementation

Product	Description	Cost Estimate	Time Estimate
CCTV Integration Tool	Tool to automate transfer of CCTV inspections into City's GIS. This would include on-site testing, training and deployment.	$8,500 (one-time)	1 Week
Comply with NASSCO PACP specifications for CCTV Inspections	Quality assurance to insure compliance	$5,000 (annual)	2 weeks for review and 4 hrs for feedback session

Asset Management Technical Memoranda

AM2 - GIS BASED INFRASTRUCTURE RATING SYSTEM

GIS BASED INFRASTRUCTURE RATING SYSTEM

DECEMBER 11, 2013

EXECUTIVE SUMMARY

The following Memorandum provides specific guidelines and recommendations for the development of a GIS Based Infrastructure Rating System. This tool is a critical component of an overall strategic and justifiable approach to evaluating, prioritizing and selecting the most critical sewer/stormwater infrastructure elements on which to target funding and maintenance efforts. Bloomington's end goal for such activities is to reduce life cycle costs for its sewer assets and to practice "smart" operations, maintenance, and replacement actions that are coordinated with related asset activities including road repair and utility replacement.

The Rating System establishes a business risk score for selected assets taking into account identifiable factors that contribute to the likelihood for an asset to fail as well as those indicating a severe impact to the City of Bloomington (COB), its customers or the community if a particular asset were to fail. It relies on efficient tracking of work order history, age of infrastructure, and other data in a well maintained database that can be linked and compared to current and future planned projects across the City's departments (Parks, Engineering, Water, etc.). The frequency of large scale and potential costly failures is reduced through the use of the database in the planning and execution of repair, rehabilitation and replacement activities. At the same time, redundancy in expenditures is achieved through coordination between departments of infrastructure related activities.

The GIS Based Rating Tool has been developed to function within COB's current GIS system and information layers. One of the caveats with this particular Tool is that it is largely based on available data sources, many of which have limited historical information. Additionally, with the implementation of MUNIS or an alternative system for handling work orders and inspections currently pending along with the possible transition by COB from a file-based GIS system to a possible enterprise database system, the format and location of many supporting data references is certain to change. Therefore it is necessary to implement the following recommendations for the effective application of the GIS Tool:

1. The supporting data structures must be in place and well organized.
2. The required scripting tools must be in place and properly maintained

Costs associated with these recommendations are estimated as follows:

Table 0 – Future Costs Associated with GIS Based Infrastructure System

Product	Description	Cost Estimate	Time Estimate
Consulting/GIS BRE Toolset Development/Maintenance	Ongoing Maintenance & Support	$10,500	Annual Service (estimated at approximately 100 hours)
CCTV Integration Tool	Tool to automate transfer of CCTV inspections into Business Risk Model. This would include on-site testing, training and deployment.	$8,500	1 Week
MUNIS GIS Integration	Data conversion and business automation tools. GIS and asset management data integration and web enablement.	$100,000 – $250,000	1 Time Service (potential minor upgrades every several years as software updates occur)

Asset Management Technical Memoranda

AM3 - ASSET MANAGEMENT PROGRAM WORK ORDER NEEDS ANALYSIS

Asset Management Program Work Order Needs Analysis
City of Bloomington, IL
Michael Baker Jr., Inc.
December 11, 2013

Executive Summary

The City of Bloomington Public Works Department (COBPW) has initiated the development and implementation of an asset management program (AMP) for its storm and sewer infrastructure. Implementation of the AMP will result in a strategic and justifiable approach for evaluating, prioritizing and selecting the most critical sewer/stormwater infrastructure elements in order to target funding and maintenance efforts. The goal of such activities is to reduce life cycle costs for its sewer assets and to practice "smart" operations, maintenance, and replacement actions that are coordinated with related asset activities including road repair and utility replacement.

The implementation of a successful Asset Management Program (AMP) starts with having an accurate inventory of assets together with the means to track operations and maintenance (O&M) actions and associated repair costs. COBPW wishes to continue leveraging the efficiency of using GIS tools for accomplishing these objectives, such that the efficient capture, restoration, and editing of asset inventories in a GIS environment is indispensable. COBPW thus requires what is known as a GIS-based AMP of which the foundation is an asset management system.

Given that the City of Bloomington (COB) has selected MUNIS® ERP for the management of its assets, this memorandum describes needed functions that COBPW requires (from MUNIS or otherwise) in order to implement its Asset Management objectives. A key component for COB will involve geo-enabling the MUNIS asset management system. The MUNIS system's current non GIS-centric approach to asset management will otherwise limit its ability to perform the tracking and inventorying functions critical to COBPW's objectives.

The over-arching recommendation of this memorandum is to establish an interface between COBPW's GIS system and MUNIS such that asset additions, modifications, and repair activities are originated and directed from the GIS system. A rough estimate of the costs for implementing and maintain this functionality is provided in Table 1. The first item is an annual support service that covers other items in addition to MUNIS-COBPW interface upkeep, such as GIS-based infrastructure rating tools and pipe inspection software. The second item may be thought of as an interface that allows COBPW's GIS and MUNIS to "talk" to one another.

Table 1 GIS SERVICES FOR OPTIMIZATION OF INFRASTRUCTURE MANAGEMENT - COST ESTIMATE

Product	Description	Cost Estimate	Time Estimate
Consulting/GIS BRE Toolset Development/Maintenance	Ongoing maintenance & Support	$10,500	Annual Service (Amount estimated at approximately 100 hours of support)
MUNIS GIS Integration	Data conversion and business automation tools. GIS and asset management data integration and web enablement.	$100,000 – $250,000	One Time – Approximately 6 months

Asset Management Technical Memoranda

AM4 - ASSESSMENT FOR CCTV INSPECTIONS

JANUARY 17, 2013

Executive Summary

The City of Bloomington contracted Michael Baker Jr., Inc. (Baker) to provide an assessment of the closed circuit television (CCTV) inspection of sixteen (16) pipe segments. Baker evaluated CCTV videos and inspection forms for compliance with National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP). This report provides a summary of the deficiencies identified in the provided CCTV video and logs, and provides recommendations that will assist the City of Bloomington's staff with completing PACP-compliant inspection reviews. Proper evaluation of CCTV inspections using PACP is key to the success of the City's asset management program under development.

Recommendations

- The National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) has become the industry standard for rating the interior condition of gravity pipelines. The method utilizes the PACP system of scoring defects or observations through closed-circuit television (CCTV) inspection of pipelines. It is recommended that the City of Bloomington require all CCTV inspections to comply with NASSCO-PACP specifications.
- It is recommended that an independent Quality Assurance review of Bloomington CCTV inspections is performed annually to evaluate its compliance with NASSCO PACP specifications. It is essential that inspections are carried out in a uniform, repeatable and compliant manner. The review would include a face-to-face feedback session for public works technicians and engineering staff.

The estimated costs for the above recommendations are summarized in the following table.

Table 1. Costs for Compliance with NASSCO PACP specifications for CCTV Inspections

Product	Description	Cost Estimate	Time Estimate
Comply with NASSCO PACP specifications for CCTV Inspections	Quality assurance to insure compliance	$5,000 (annual)	2 weeks for review and 4 hrs for feedback session

Asset Management Technical Memoranda

AM5 - BEST MANAGEMENT PRACTICES (BMPS) FOR BLOOMINGTON STORM AND SANITARY UTILITY OPERATIONS

Best Management Practices (BMPs) for Bloomington Storm and Sanitary Utility Operations
City of Bloomington, IL
Michael Baker Jr., Inc.
December 11, 2013

Executive Summary

The following Memorandum provides specific guidelines and recommendations for the operation, maintenance and management of the City of Bloomington's storm and sanitary assets. The recommendations focus primarily on buried assets, though many of the strategies are applicable to above ground assets as well. The Memorandum includes details for Best Management Practices (BMP) that will reduce infrastructure life-cycle costs and result in increased stakeholder satisfaction.

For each BMP a cost estimate or framework for implementation has been provided. A summary of the cost estimates developed is presented below in Table 1. The summary indicates the total number of personnel required. In some cases Bloomington may already have existing staff employed in these positions; the table does not account or subtract for this. It is meant to provide guidance on the approximate operations, maintenance and data management investments going forward that the City of Bloomington should make in order to implement an effective sanitary sewer and stormwater program that meets established levels-of-service goals while meeting regulatory requirements and optimizing cost expenditures. Investments in actual infrastructure improvements are not included in the Memorandum, having been presented in other Master Plan documents provided by the consultant team.

A summary of recommendations provided in the sections of this report (corresponding to Table 1) is as follows:

- GIS ESRI Model Incorporation - Implement updates to COBPW's GIS database system to incorporate an ESRI Local Government Model to improve efficiency of management of critical infrastructure data
- Manhole Inventory - Perform a complete inventory of manhole structures and incorporate into COBPW's GIS data base, to permit efficient management of operations, management and repairs.
- GIS Asset Management Tools Support - COBPW has invested in the development of GIS based asset management tools that allow more efficient decision making regarding maintenance activities as well as timing of repair, rehabilitation and replacement of deteriorating infrastructure. It is necessary that ongoing support for tool upgrades and maintenance is provided.

- CCTV Integration Tool - It is recommended that an automated business tool is developed to transfer pipe inspection rating scores from COBPW's CCTV PipeTech software into the Department's GIS system. This will automate storage of the data so that it can be used as part of the Department's Asset Management Program.
- MUNIS GIS Interface for COBPW - The MUNIS system currently does not allow asset modifications and additions to be linked, or driven, by updates performed in COBPW's GIS system. This will limit executing the tracking, modification and inventorying functions critical to COBPW's asset management objectives. It is therefore recommended to establish an interface between COBPW's GIS system and MUNIS such that asset additions, modifications, and repair activities are originated and directed from the GIS system, while permitting automated transfers of information such as service calls and work order frequency.
- Establish GIS Coordinator position – COBPW currently has one GIS staff person and also makes use of summer interns. The staff person spends a significant portion of his time responding to requests for information from internal and external departments and agencies. The use of industry-standard informational tools that enable lower O&M and repair costs requires a full time, dedicated professional with the necessary experience and availability. It is recommended that COBPW add a new GIS coordinator or manager to its staff. This position description includes providing direction to all GIS related technology initiatives, coordinating GIS related training support, and implementing centralized GIS data management. Execution of consistent application of policies, procedures, and standards would be included along with implementing actions to accomplish long term asset management objectives.
- CCTV Inspection Program – To adequately project pipe renovation costs as part of Bloomington's Master Plan, as well as to gauge the rate of deteriorating infrastructure, it is necessary to establish an initial baseline condition concerning interior pipe condition. COBPW should carry out inspections of its entire sanitary system within five years, after which follow-on inspections would be performed at longer intervals depending on the risk that a pipe presents to the community.
- Manhole Inspection Program – Similar to the CCTV inspection program, Baker recommends that COBPW establish a manhole inspection program on a similar time interval. Manholes are a significant contributor of infiltration, cave-ins, and other issues when not adequately addressed and monitored.
- Fats, Oils and Grease (FOG) Inspection Program - A FOG Program that includes permitting, inspection, enforcement, and public outreach should be implemented in order to provide more reliable sanitary sewer service to customers, and to minimize the number of sanitary sewer overflows that may result from FOG accumulations. It will also reduce current expenditures for cleaning the sewers.
- Sewer Service Laterals - COBPW spends significant time and resources addressing issues with sewer service laterals. It is recommended that City Council adopt an ordinance or policy clarifying the ownership and maintenance responsibilities for sewer service laterals.

Table 1 BMP INVESTMENT COSTS FOR BLOOMINGTON SANITARY AND STORMWATER SYSTEMS

Critical Program	Early Action Projects (Year 1 -5)			Long Term CIP (Years 6-20)		
	Personnel Required*	Total Cost (labor + OH, equipment and contractor)	Net Present Value of Total Cost (4% discount rate)**	Personnel Required*	Total Cost (labor + OH, equipment and contractor)	Net Present Value of Total Cost (4% discount rate)**
Implement ESRI Local Government Model	0	$45,000	$45,000	0	0	0
Inventory Manholes and Structures	0	$120,000	$120,000	0	0	0
GIS Asset Management Tools Support	0	$52,500	$52,500	0	$157,500	$157,500
CCTV Integration Tool	0	$8,500	$8,500	0	0	0
MUNIS GIS Interface for COBPW	0	$175,000	$175,000	0	0	0
GIS Coordinator Position	1	$488,000	$488,000	1	$1,463,000	$1,463,000
CCTV Inspection Program	2	$3,706,000	$3,706,000	2	$4,281,000	$4,281,000
Manhole Inspection Program	0.7	$446,000	$446,000	0.25	$849,900	$849,900
FOG Inspection Program	2.5	$1,229,000	$1,229,000	2.5	$3,686,000	$3,686,000

*Total number of staff positions required. Does not take into account any existing personnel that Bloomington may already have in these positions.

** Prevailing municipal discount rates are very similar to the historical inflation rate – such that inflation and discount rate cancel each other out for most expenditures.

Acronyms

BMP - Best Management Practices
BRE - Business Risk Exposure
CAP - Condition Assessment Protocol
CCTV - Closed Circuit Televised Video
CIP - Capital Improvement Program
CIPP - Cured in Place Pipe
CMOM - Capacity Assurance, Management, Operation, and Maintenance Program
COBPW - City of Bloomington Public Works Department
CSO - Combined Sewer Overflow
DSS - Decision Support System
EPA - Environmental Protection Agency
FOG – Fats, Oils, and Grease
GIS - Geographic Information System
I&I - Inflow and Infiltration
LOS - Level of Service
MACP - Manhole Assessment and Certification Program
MIC - Microbiologically influenced corrosion
NASSCO - National Association of Sewer Service Companies
O&M - Operations and Maintenance
PACP - Pipeline Assessment and Certification Program
RRR List - Replace, Rehabilitate, or Repair List
SAMP - Strategic Asset Management Plan
SOP - Standard Operating Procedure
SSES - Sanitary Sewer Evaluation Studies
SSO - Sanitary Sewer Overflows