CITY OF NOBLESVILLE, INDIANA

COMBINED SEWER OVERFLOW

LONG-TERM CONTROL PLAN

JUNE 2007

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LIST OF ABBREVIATIONS

CAC	Citizen Advisory Committee
$CBOD_5$	5-Day Carbonaceous Biochemical Oxygen Demand
CSO	Combined Sewer Overflow
CSOOP	Combined Sewer Overflow Operational Plan
CSS	Combined Sewer System
CWA	Clean Water Act
EPA	Environmental Protection Agency
ETR	Endangered, Threatened, or Rare
HRT	High Rate Treatment
IDEM	Indiana Department of Environmental Management
INDOT	Indiana Department of Transportation
LTCP	Long-Term Control Plan
MCM	Minimum Control Measure
MG	Million Gallons
MGD	Million Gallons per Day
MS4	Municipal Separated Sewer System
NCDC	National Climate Data Center
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly Owned Treatment Works
SEA	Senate Enrollment Act
SEIM	Socio-Economic Indicators Matrix
SRCER	Stream Reach Characterization and Evaluation Report
SWQMP	Stormwater Quality Master Plan
TSS	Total Suspended Solids
WQS	Water Quality Standards
WW_{cph}	Wastewater Cost per Household Indicators
WWTP	Wastewater Treatment Plant

REFERENCES

HNTB, *City of Noblesville, Indiana, Draft Combined Sewer Overflow Long-Term Control Plan*, December, 2004.

HNTB, *City of Noblesville, Indiana, Stream Reach Characterization and Evaluation Report (SRCER)*, June 2001.

HNTB, City of *Noblesville, Indiana, Wastewater Treatment Plant Expansion: Facility Plan*, December, 2004.

Indianapolis Clean Stream Team, *Cost Estimating Procedures for Raw Sewage Overflow Control Program*, April 23, 2004.

IDEM, *Combined Sewer Overflow Long-Term Control Plan and Use Attainability Analysis* (UAA) Guidance Document, Water-003-NRD, December, 2001.

IDEM, *Combined Sewer Overflow Strategy*, May, 1996.

IDEM, CSO Guidance Documents.
<http://www.in.gov/idem/permits/water/wastewater/wetwthr/cso/guidance/index.html>.

USEPA, *Guidance: Coordinating CSO Long-Term Planning with Water Quality Standards Review*, EPA-833-R-01-002, July, 2001.

USEPA, *Combined Sewer Overflows: Guidance for Financial Capability Assessment and Schedule Development*, EPA-832-B-97-004, March, 1997.

USEPA, *Combined Sewer Overflows: Guidance for Long-Term Control Plan*, EPA-832-B-95-002, September, 1995.

EXECUTIVE SUMMARY

The City of Noblesville (City) prepared a Combined Sewer Overflow (CSO) Long-Term Control Plan (LTCP) that was submitted to the Indiana Department of Environmental Management (IDEM) on December 21, 2004. The plan identified several CSO abatement, facility planning and wastewater treatment plant (WWTP) improvements to address water quality standards (WQS) reflective of the Federal Environmental Protection Agency (EPA) and IDEM CSO Policy. Since the December 21, 2004 CSO LTCP submission, the City has expeditiously advanced several alternatives listed in the plan implementing system wide improvements to its wastewater treatment facility and collection system. Prior to approval of the December 21, 2004 plan by IDEM, the City requested from IDEM the opportunity to enhance and refine the submitted plan to reflect the implemented improvements and to review additional alternatives relative to the ten year one hour storm event criteria more commonly referred to as the “Michigan Approach”. Subsequently, IDEM agreed to the City submitting a revised CSO LTCP. This revised LTCP reflects the federal presumptive approach with a CSO frequency of less than four annually and incorporates the “Michigan Approach” to CSO abatement as well as reflecting storm water issues as directed by 327 IAC 15-13 (Rule 13).

This revised LTCP recommends a geographical approach to limit, transport, store, or treat the combined sewage generated during wet-weather events. The recommended control methods are as follows:

- WWTP Phase 1 Headworks Improvements
- WWTP Phase 2 Primary Treatment Improvements
- Interceptor Improvements – Pipe Bursting
- Partial Separation along Conner Street
- Partial Separation of the North region
- Increased Sewer Conveyance Capacity from the Central, East, and South regions
- Construction of additional 1.5 MG storage facility

While some of the controls listed above are currently being implemented. In all, the revised LTCP projects will cost approximately $65 million. For the completion of all of the controls the City is seeking a 15-year implementation schedule.

The City submits this revised CSO LTCP with reference to the December 21, 2004 CSO LTCP for IDEM review and approval.

SECTION 1.0: INTRODUCTION

1.1 OVERVIEW

The City prepared a CSO LTCP that was submitted to IDEM on December 21, 2004. The plan identified several CSO abatement, facility planning and wastewater treatment plant improvements to address WQS reflective of the Federal EPA and IDEM CSO Policy. Since the December 21, 2004 CSO LTCP submission, the City has expeditiously advanced several alternatives listed in the plan implementing system wide improvements to its wastewater treatment facility and collection system. Prior to approval of the December 21, 2004 plan by IDEM, the City requested from IDEM the opportunity to enhance and refine the submitted plan to reflect the implemented improvements and to review additional alternatives relative to the 10-year, 1-hour storm event criteria more commonly referred to as the “Michigan Approach”. Subsequently, IDEM agreed to the City submitting a revised CSO LTCP.

Therefore the City submits this revised CSO LTCP with reference to the December 21, 2004 CSO LTCP for IDEM review and approval.

1.2 BACKGROUND

The City is located along the White River in Hamilton County, Indiana (Figure 2.2). The City’s wastewater collection system consists of both combined sewers and separate sanitary sewers. The combined sewers convey both sanitary wastewater and rainfall runoff or snowmelt, while the sanitary sewers convey strictly sanitary wastewater. The City has a wastewater collection system that can provide sewer relief at nine National Pollution Discharge Elimination System (NPDES) permitted CSO outfalls. These outfalls are CSOs 002, 003, 004, 005, 006, 007, 008, 009, and 010. The City has one other outfall, CSO 001, which is located at the WWTP that discharges treated effluent to the White River. CSO 009 serves as a WWTP bypass during rainfall events that exceed plant capacity.

The City sewer system currently services an approximately 16,000 acre area with approximately 220 miles of sanitary sewers; an increase of approximately 7o miles of sewer compared to the previous CSO LTCP submittal (HNTB, 2004). The combined sewer system (CSS) covers 380 acres serviced by 13 miles of combined sewers. The CSS makes up approximately 2% of the current service area. Detailed system characterization is found in Section 2 of this report.

Demonstrating that uncontrolled CSOs (discharge consistent with the presumptive approach) meeting the requirements of the WQS at all locations and times has proven extremely difficult and financially consequential for Indiana municipalities. To assist in resolving these issues, IDEM has officially indicated that CSO facilities satisfying the following requirements will be assumed compliant with WQS:

- They must provide storage for wet weather flow generated by the one-year, one-hour storm, and
- They must provide thirty minutes detention time and disinfection for wet weather flows generated by the ten year storm.

These are the same criteria used to define minimum level of CSO control by the State of Michigan, and are referred to as the "Michigan Approach". IDEM reports that the EPA concurs and supports this approach for the State of Indiana. IDEM has not established permit limits for discharges from wet weather facilities utilizing the Michigan Approach. It is understood that flow greater than those generated by the 10-year 1-hour storm will be transported and treated. However, the level of treatment would be less than the 30 minute detention time. This diminished treatment is considered adequate by IDEM provided that the City operates the facility in the manner designed.

1.3 PURPOSE OF LTCP

The purpose of this revised CSO LTCP is to refine the original LTCP submitted to IDEM on December 21, 2004 and to present a site specific plan reflective of the Federal and Indiana CSO policy. This plan reflects the Federal presumptive approach with a CSO frequency of less than four events annually, it incorporates the "Michigan Approach" to CSO abatement, and it reflects storm water issues as directed by 327 IAC 15-13 (Rule 13).

1.4 OBJECTIVES

The objectives of the preparation of this revised LTCP for the City are the following:

1. Meet the requirements set forth by Federal EPA and IDEM CSO control policy
2. Maximize the opportunity to abate CSO frequency
3. Address WQS
4. Address the significant financial impact caused by the plan

Careful consideration was given to public participation and the Citizens Advisory Committee (CAC) was reactivated to provide public input regarding sensitive or priority areas, control alternatives, and financial impacts including concerns related to potential escalation of construction costs resulting from state wide CSO implementation schedules. Plan performance will be evaluated after initialization of major projects to assess CSO abatement success prior to embarking on successive major construction activities.

1.5 APPROACH

The overall planning approach for the City consisted of three major elements: system characterization, development and evaluation of alternatives, and selection and implementation of controls to meet the presumptive approach of abatement. Additionally, the approach included nine elements of the State CSO control policy. These elements are:

- **Characterization, monitoring and modeling**. Although IDEM granted the City small community consideration, limited planning level modeling was conducted to better refine control alternative evaluation.
- **Public participation**. Addressed in all three elements discussed above
- **Sensitive areas**. Including priority areas of concern as identified in public meetings.
- **Evaluation of alternatives.** Responsive to public input and constructability issues.
- **Cost/performance considerations.** Responsive to public input, constructability, and intra-agency wet weather programs.
- **Operational plan.** As the LTCP is implemented the Combined Sewer Overflow Operational Plan (CSOOP) will be advanced to reflect plant and collection system changes.
- **Maximization of treatment at the existing publicly owned treatment works (POTW).**
- **Implementation schedule.** Inclusive of intermediate monitoring to review success of LTCP implementation, effectiveness and anticipated construction cost escalations.
- **Post-construction compliance monitoring program.**

In May 2004 the State of Indiana passed Senate Enrollment Act (SEA) 620, which provides for a revision of a designated use and associated water quality criteria applicable to CSO impacted waterbodies. As such, SEA 620 provides the opportunity to change the current designated use of full body contact recreation to a CSO wet-weather limited use subcategory for a period of not more than four days after certain wet weather events. The City of Noblesville does not anticipate exercising this opportunity of changing a designated use to a CSO wet-weather limited recreational use subcategory at this time.

SECTION 2.0: SYSTEM CHARACTERISTICS

2.1 INTRODUCTION

The City's CSS results from the City augmenting the existing storm sewer system with wastewater. The single conveyance system handled both wastewater and stormwater/snowmelt runoff and discharged into streams. As the City continued to develop, separate sanitary sewers were constructed to convey flow from new development to the treatment plant without contributing to the CSS. Today CSOs occur when the volume of sewage and rainwater exceeds the interceptor carrying capacity within the CSS.

2.2 CURRENT COLLECTION SYSTEM COMPONENTS

The Noblesville CSS contains nine NPDES permitted CSOs and one WWTP outfall. Six outfalls (CSOs 002, 003, 004, 005, 006 and 010) discharge directly into the West Fork of White River and two outfalls (CSOs 007 and 008) discharge into the West Fork of White River via Wilson's Ditch and Stony Creek. CSO 009 serves as a CSO-related bypass at the WWTP. The combined sewer outfalls, regulators, and combined sewer area are presented in Figure 2-1.

Figure 2-2 presents the overall Noblesville sanitary and CSS. The City's sewer service area is 16,000 acres, with approximately 220 miles of sanitary sewers. The combined sewer system area is 380 acres, with 13 miles of combined sewers. Based on 2000-2004 operational data, the average daily flow conveyed to the WWTP headworks by the collection system is 4.3 million gallons per day (MGD), of which 0.7 MGD is from the combined area.

The City sanitary system is served by five major interceptors. The sanitary system contains 22 lift stations, which are summarized in **Table 2-1**.

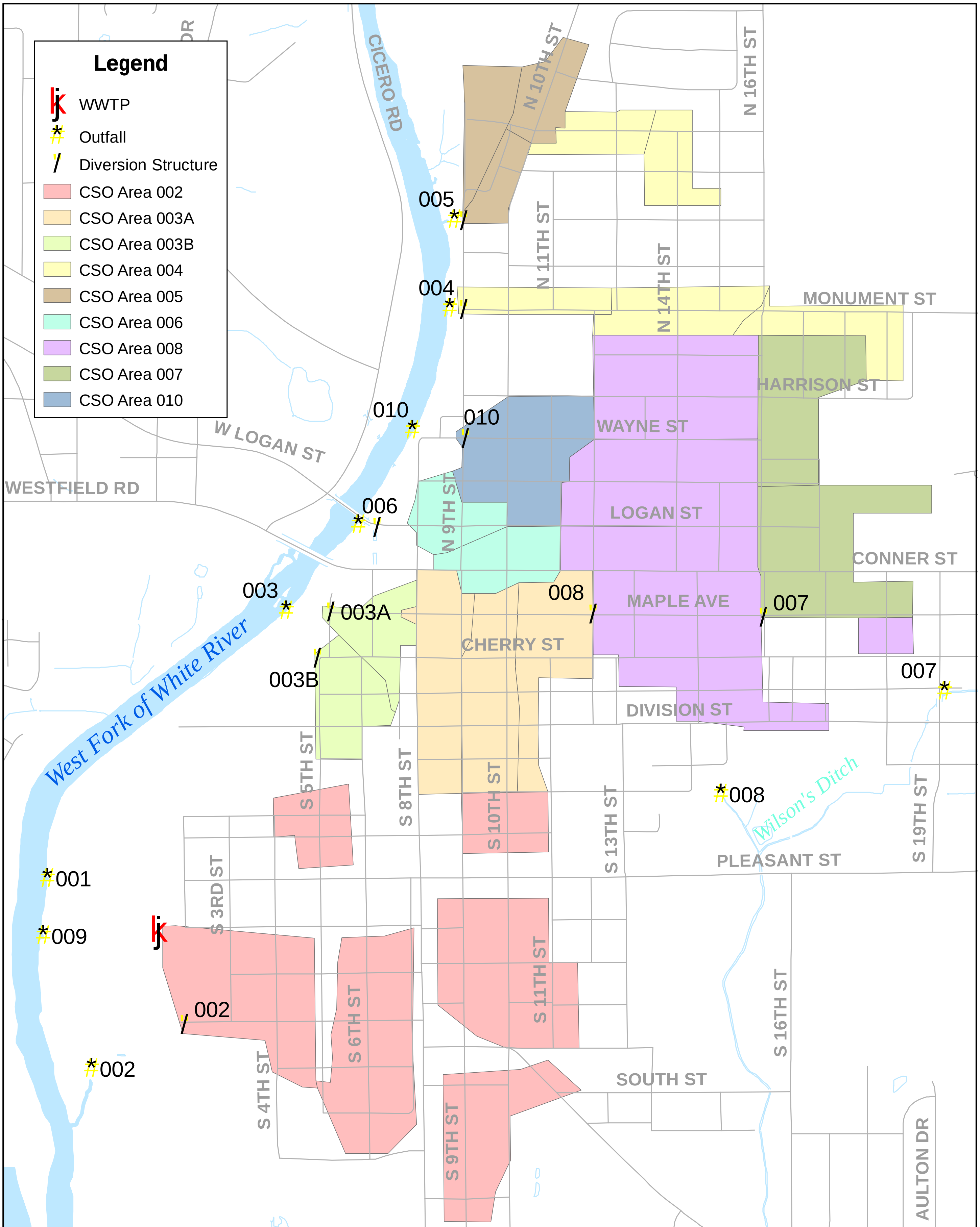

Figure 2-1
Noblesville Combined
Sewer System

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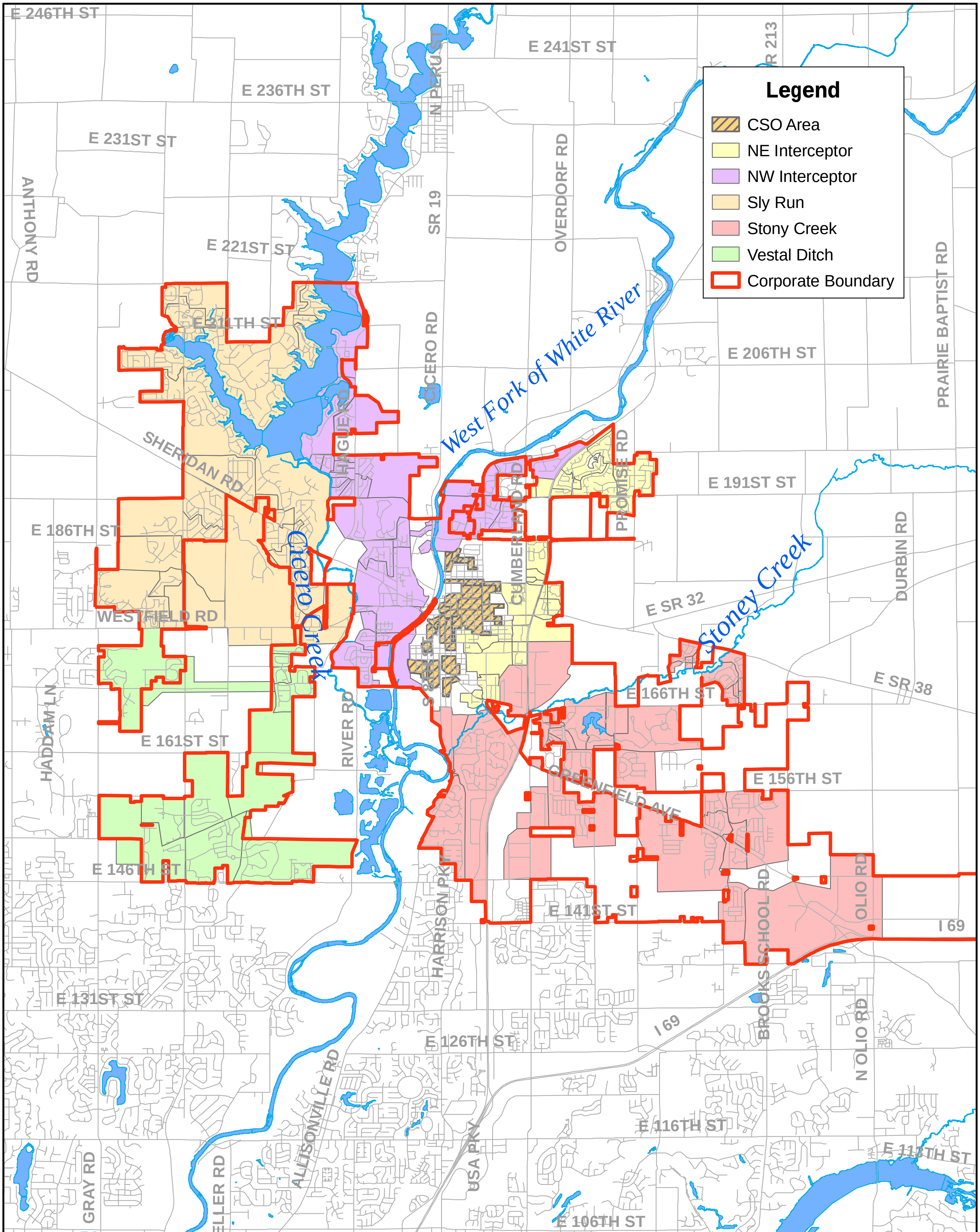

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Figure 2-2
Noblesville Collection System

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Table 2-1: Existing Lift Station Summary[1]

Lift Station		Pump 1	Pump 2	Both Pumps	Motor HP	F.M.
001	Wellington	300 gpm	300 gpm	396 gpm	(2) 15 hp	6" PVC
002	Stoney Creek	1528 gpm	1528 gpm	2463 gpm	(2) 20 hp	16" D.I.
003	Forest Hill	120 gpm	140 gpm		(2) 3 hp	6" D.I.
005	North Harbour	1000 gpm	1000 gpm	1500 gpm	(2) 30 hp	(2) 6" D.I.
006	Elmwood	230 gpm	204 gpm		(2) 10 hp	4" HDPE
007	Loren Williams	28 gpm	28 gpm	47 gpm	(2) 2 hp	2" PVC
008	Oak Bay	290 gpm	291 gpm	353 gpm	(2) 5 hp	6" PVC
009	Hawthorn Pl.	902 gpm	617 gpm	1040 gpm	(2) 20 hp	8" D.I.
010	Little Chicago Rd.	799 gpm	787 gpm	916 gpm	(2) 15 hp	8" D.I.
011	Harbour Overlook	71 gpm	77 gpm		(2) 5 hp	4" D.I.
012	Clarendon Dr.	80 gpm	80 gpm		(2) 5 hp	4" D.I.
013	East Harbour	200 gpm	200 gpm	333 gpm	(2) 7.5 hp	6" PVC
014	Westbrook Plaza	248 gpm	234 gpm	270 gpm	(2) 5 hp	4" PVC
015	Carrigan Cove	145 gpm	145 gpm		(2) 5 hp	4" PVC
016	Fairfield Farms	160 gpm	167 gpm		(2) 3 hp	4" PVC
017	Carlton Heights	180 gpm	180 gpm		(2) 5 hp	6" PVC
018	Crystal Lake	230 gpm	204 gpm	264 gpm	(2) 5 hp	4" PVC
019	Sly Run	@ 3650 GPM each / full load			(3) 125 hp	16" D.I.
020	Vestal Ditch	500 gpm	500 gpm		(2) 15 hp	10" PVC
021	Meadows	150 gpm	152 gpm		(3) 15 hp	4" PVC
022	Potters Woods	650 gpm	650 gpm	455 gpm	(3) 10 hp	
023	Roudebush Woods	356 gpm	356 gpm		(2) 15 hp	

Since the submittal of the previous CSO LTCP (HNTB, 2004) several of the alternative projects recommended by the CAC have been adopted and are either currently underway or planned for completion by 2008. The projects include the following:

- 2006 Pipe Bursting -- Upgrade CSO capture at CSOs 003A, 003B, and 006
- 2006 WWTP Phase 1: Headworks Expansion
- 2008 WWTP Phase 2: Primary Treatment Expansion
- 2008 partial sewer separation along Conner Street in conjunction with INDOT improvements

2.2.1. COMBINED SEWER OVERFLOW LOCATIONS AND PERFORMANCE

<u>CSO 002: Third Street and Chestnut Street</u>
Overflow 002 consists of a manhole with a diversion dam that directs dry-weather flow into a 12-inch sewer, while directing wet-weather overflow into a 24-inch sewer that discharges into the West Fork of White River.

[1] Based on field information and specification

COS 003-A: Eight Street and Maple Street

Overflow 003-A consists of a diversion dam. It receives flow from a 36-inch sewer and directs dry-weather flow into a 15-inch sewer by a diversion dam, while directing wet-weather overflow into a 36-inch sewer that discharges into the West Fork of White River.

CSO 003-B: Fifth Street and Cherry Street

Overflow 003-B A consists of a diversion dam located at the intersection of a 15-inch by 22-inch sewer and a 15-inch sewer. It directs dry-weather flow into an 8-inch sewer, while directing wet-weather overflow into an 18-inch sewer that discharges into the West Fork of White River.

CSO 004: Ninth Street and Monument Street

Overflow 004 consists of a diversion dam located at the intersection of a 12-inch sewer and a 24-inch sewer. It directs dry-weather flow through a 15-inch sewer, while directing wet-weather overflow into a 24-inch sewer that discharges into the West Fork of White River.

CSO 005: Ninth Street and Center Drive

Overflow 005 consists of a manhole with a diversion dam that directs dry-weather flow into a 12-inch sewer, while directing wet-weather overflow into an 18-inch sewer that discharges into the West Fork of White River.

CSO 006: Sixth Street and Logan Street

Overflow 006 consists of a manhole with a diversion dam that directs dry-weather flow into a 15-inch sewer, while directing wet-weather overflow into a 24-inch sewer that discharges into the West Fork of White River.

CSO 007: Sixteenth (16th) Street and Maple Avenue

Overflow 007 consists of a diversion dam located at the intersection of a 21-inch sewer and two 12-inch sewers. It directs dry-weather flow through a 21-inch sewer, while directing wet-weather overflow into a 30-inch sewer that discharges into Wilson's Ditch.

CSO 008: Twelfth (12th) Street and Maple Avenue

Overflow 008 consists of a diversion dam located at the intersection of a 36-inch sewer and an 8-inch sewer. It directs dry-weather flow through a 36-inch sewer, while directing wet-weather overflow into a 30-inch sewer that discharges into Wilson's Ditch.

CSO 010: Ninth Street and Wayne Street

Overflow 010 consists of a diversion dam that directs dry-weather flow through a 15-inch sewer, while directing wet-weather overflow into a 24-inch sewer that discharges into West Fork of White River.

Table 2-2 presents the average annual CSO statistics for the Noblesville combined sewer system. The statistics do not include the expected improvements from the 2006 and 2008 baseline projects discussed in Section 3.2. The average statistics were developed by applying the historical 1950-2005 precipitation record with the calibrated NetSTORM hydraulic model of the combined sewer system. For more information regarding the development, calibration, and application of the NetSTORM model, please refer to the *Noblesville Hydraulic Model Development & Calibration Memorandum* (RW Armstrong, 2006) located in Appendix A.

Table 2-2: Noblesville Average Annual CSO Statistics for Existing Conditions[2]

CSO	Frequency (Events per year)	CSO Threshold Rainfall Depth (in)	Volume (MG)
002	15	1.0"	1.3
003A	32	.4"	6.3
003B	8	1.3"	0.2
004	6	1.5"	0.3
005	4	1.9"	0.1
006	18	.8"	1.3
007	4	1.9"	0.6
008	8	1.3"	0.8
010	0.5	3.3"	0.1
WWTP	2	2.3"	0.6
Total CSO Volume / Events	32		11.1
Total Capture Volume	N/A		62.0
Percent Capture	N/A		85%

An important statistic in the characterization of the CSS is the rain event that corresponds with the overflow frequency. For example, CSO 003A's frequency of 32 events per year corresponds to approximately one overflow event every 1.6 weeks. Based on a review of the 2000-2005 local precipitation data at the Noblesville WWTP, a 1.6 week storm with a duration of 24 hours would have a total rainfall depth of 0.4". It should be noted that for most CSO structures, over an inch of rain over 24 hours would be required for a CSO event.

As shown in **Table 2-2**, Noblesville has three CSOs with more than 1.0 MG/year average annual discharge and an average annual overflow frequency above 10 events per year: CSOs 002, 003A, and 006. The existing conditions percent capture of 85% is significantly higher than the 50 to 70 percent typically seen in a combined sewer system.

2.2.2. CONTROLLED BYPASSING

The City's NPDES permit grants one CSO-related bypass outfall (009) at the WWTP. By rule the bypass can only be used when the following conditions are met:

[2] NetSTORM simulation using 1950-2005 precipitation data at Indianapolis Airport NCDC gauge. Model results were adjusted for local precipitation trends by comparing the modeled performance for 2000-2005 precipitation at both the Noblesville WWTP and Indianapolis Airport gauges. Total CSO volume does not include discharges from the WWTP, due to its capability for flow-through treatment from the equalization basins. CSO Threshold Rainfall Depth is based on 2000-2005 precipitation at the Noblesville WWTP for a 24-hour storm event.

- Bypassing is unavoidable to prevent loss of life, personal injury, or severe property damage.
- There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime.
- Notice must be submitted to IDEM.

The City of Noblesville's treatment plant maintains such a CSO-related bypass. It is used when the hydraulic capacity (maximum flow) is exceeded and the existing flow equalization basin is full. Excess CSO flow into the equalization basin can bypass full treatment, be disinfected with sodium hypochlorite and discharge into the West Fork of White River. Since the plant upgrade in 1993 this outfall has been used infrequently. The Phase 1 and 2 WWTP upgrades will significantly reduce discharges from outfall 009, and a mission of the LTCP is to provide one of the following for all wet-weather flow conveyed to the headworks:

- Full treatment;
- Primary treatment and disinfection; or
- High-rate treatment (HRT) and disinfection.

2.3 WASTEWATER TREATMENT PLANT

The Noblesville WWTP was first constructed in the late 1940s. Disinfection was added and additional upgrades were made in the late 1960s and early 1970s. In 1994, an $18 million plant expansion was completed to bring the plant to current capacity:

- Design daily average flow rate of 5 MGD
- Headworks peak pumping capacity of 15 MGD
- Primary peak hourly treatment capacity of 10 MGD
- Secondary peak hourly treatment capacity of 10 MGD
- Equalization storage of 0.45 million gallons (MG)
- Chlorination for all discharges from outfall 009

Since the submittal of the Draft CSO LTCP (HNTB, 2004), the City has identified four phases of treatment plant expansions to address future growth in the sanitary service area and additional capture of wet-weather flow from the combined sewer area. The four phases are discussed in detail in the *Noblesville Wastewater Treatment Plant Expansion: Facility Plan* (HNTB, 2004):

- Phase 1: Headworks Improvements. Increase headworks peak pumping capacity and preliminary treatment to 30 MGD.
- Phase 2: Primary and Secondary Treatment Improvements. Increase daily average treatment capacity to 10 MGD and peak hour capacity to 20 MGD.
- Phase 3: Sludge Processing Improvements. Solids handling improvements with provisions for average daily flow rate of 15 MGD.
- Phase 4: Wet-Weather Equalization Storage. Construct up to 4.6 MG of equalization storage.

Of the above four phases, Phase 1 is in construction and is expected to be completed in 2008. Phase 2 is expected to be completed in 2010.

2.4 SRCER SUMMARY OF RESULTS FOR IMPACTED BODIES OF WATER

Under the CSO control strategy, municipalities are expected to monitor waterways to effectively characterize CSO impacts and the efficacy of controls. According to Indiana's CSO strategy (IDEM, 1996) municipalities within the state are required to address this by conducting a Stream Reach Characterization Report (SRCER) which was published in 2001 (HNTB).

2.4.1. STREAMS AND SAMPLING

The objective of the water sampling was to collect a representative sample of the streams and water bodies impacted by the City's CSOs. In this case four streams were sampled: White River, Wilson's Ditch, Stony Creek, and Cicero Creek. White River and Wilson's Ditch each are impacted directly by CSO discharges and samples were taken in two locations, upstream and downstream of the CSOs. Samples for Stony Creek were taken in two locations, prior to the convergence with Wilson's Ditch and White River. Cicero Creek is not impacted by CSO discharge, but does flow into White River. One sampling location was used for Cicero Creek prior to its convergence with White River. This was done to account for its background pollutant impact on the White River.

Figure 2-3 presents the sampling locations used for the SRCER (HNTB, 2001). **Table 2-3** summarizes the sampling protocols for each site.

2.4.2. SRCER RESULTS

Stream samples were taken from April of 2000 through March 2001 during dry-weather and wet-weather flow. The 5-Day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) and Total Suspended Solids (TSS) results show that loading from the CSOs are minimal in comparison to the loadings from the tributary streams (Stony Creek and Cicero Creek). This suggests that other significant pollution sources exist along these streams. However, *E. coli* bacteria concentrations above the daily maximum bacteria standard of 235 cfu/100 ml have been observed in the White River downstream of the CSO area. For this reason, the City's LTCP evaluated alternatives under a presumptive approach to capture all CSO discharges to an acceptable level of control.

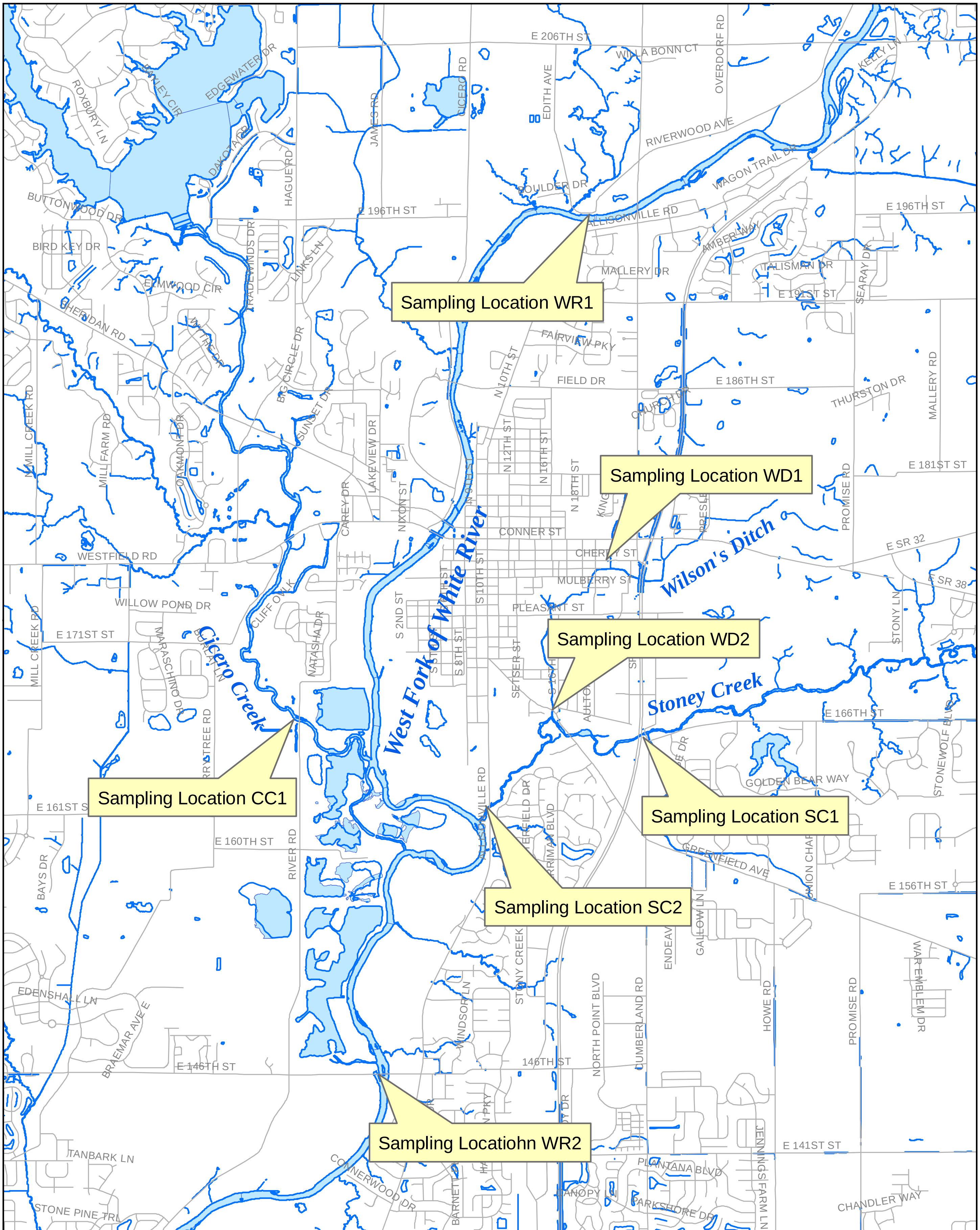

FIGURE 2-3
Sampling Location Map

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Source: HNTB SRCER

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Table 2-3: SRCER Sampling Description

Sample Location	Sample	Location Description	Sample Frequency	Sample Type
WR 1	West Fork of White River	Upstream of Potter's Bridge (upstream of all CSOs on River)	Once/Month To Once/ Week	Grab Sample taken at each third of the river width, then composited
WD 1	West Fork of White River	Upstream of bridge at 146th Street (downstream of all CSOs on River)	Once/Month To Once/ Week	Grab Sample take at each third of the river width, then composited
WD 1	Wilson's Ditch	Upstream of 19th Street (upstream of CSOs on Ditch)	Once/Month To Once/ Week	One Grab Sample
WD 1	Wilson's Ditch	Convergence with Stony Creek (downstream of all CSOs on Ditch)	Once/Month To Once/ Week	One Grab Sample
SC 1	Stony Creek	Upstream of State Road 37 bridge (upstream of Wilson's Ditch discharge)	Once/Month To Once/ Week	Grab Sample taken at each third of the river width, then composited
SC 1	Stony Creek	Convergence with White River (downstream of Wilson's Ditch Discharge)	Once/Month To Once/ Week	Grab Sample take at each third of the river width, then composited
CC1	Cicero Creek	Upstream of bridge on River Rd	Once/Month To Once/ Week	One Grab Sample

2.4.3. INDUSTRIAL DISCHARGES

Other point sources for pollution are industrial discharges. Industrial discharges include all discharges from industrial users, within the city as well as outside of the city limits, that can impact water quality during CSO discharge events. The identified industrial users can be found in **Table 2-4.** Industrial dischargers represent approximately 12% of the daily average flow conveyed to the WWTP (City of Noblesville, 2001).

Table 2-4: Permitted Industrial Discharges

Facility Name	Products
Burco Molding	Plastics Products
Firestone Industrial Products Company	Rubber Products
Irving Materials Inc.	Limestone
Martin Marietta Aggregates	Limestone
US Aggregates Inc.	Sand, Gravel

2.4.4. EXISTING USE

The existing use is defined by IDEM as the use actually attained by the water body. The water bodies impacted by the CSOs (West Fork of the White River, Wilson's Ditch, and Stony Creek) have all been designated for limited recreational use. Limited recreational use means that the body of water is used for events such as boating, but not direct contact. For these areas, the City's LTCP evaluated alternatives under a presumptive approach to capture all CSO discharges to an acceptable level of control.

2.5 IDENTIFICATION AND DOCUMENTATION OF SENSITIVE AREAS

An essential requirement of the LTCP is the identification and documentation of sensitive areas within the CSS area. Sensitive areas have been defined as waters impacted by CSO discharges, which must be given the highest priority of CSO discharge elimination, relocation or control. Sensitive areas include:

- Primary contact recreation areas (beaches and swimming areas)
- Habitat for threatened or endangered species
- Drinking water source waters
- Outstanding state resource waters and outstanding national resource waters

This reach of the West Fork of White River does not contain any beaches or general access swimming areas. The river is accessible by a boat launch ramp near the intersection of Cicero Road and Forest Park Road. The ramp is used for limited recreational purposes such as canoeing and is used by the Noblesville Police Department for training sessions an average of 7 days per year. The launch ramp may be classified as an area that offers secondary contact activities or activities where participants have little direct contact with the water and where ingestion of water is unlikely (USEPA, 2001).

A request was made to IDNR's Indiana Natural Heritage Data Center for endangered, threatened, or rare (ETR) species, high quality natural communities, and natural areas within the project impact area. While no outstanding natural waters are present near the project area, information on the ETR species is listed in Appendix B. The list includes three instances when weathered shells of mollusks with threatened or endangered species status were found. No live specimens have been reported in the project area.

A letter from the U.S. Department of the Interior Fish and Wildlife Service is attached as Appendix C that lists only the Indiana bat and the bald eagle as threatened or endangered species in Hamilton County and states both species will be helped by improvements in water quality through CSO abatement.

This reach of the West Fork of White River is not a drinking water source water, nor is it cataloged on the lists of Outstanding National Resource Waters or Outstanding State Resource Waters. A letter from the Hamilton County Health Department, included in Appendix D, indicates a surface water treatment facility near the 116th Street Bridge, approximately 10 miles downstream from the Noblesville WWTP. The surface-water treatment plant is currently notified in the event of a CSO. The Health Department also refers to two (2) active groundwater wells on the west bank of the East Fork of White River near the Forest Park Golf Course and operated by Indiana American Water Company. In a conversation with Indiana American Water, it was stated that these groundwater wells are approximately 75 feet in depth and a study conducted over 10 years ago by Indiana American Water and submitted to IDEM indicated that the stream water quality did not affect the groundwater quality.

Although the presence of viable threatened or endangered species has not been verified, the stream has been regarded as a priority area of concern for the reduction of CSO volume and frequency. Since this is an area of concern steps should be taken to reduce occurrences and overall volumes of CSOs along EPA guidelines.

SECTION 3.0: WASTEWATER COLLECTION AND TREATMENT SYSTEM UPDATE

3.1 INTRODUCTION

The City adopted a facility plan for the expansion of the WWTP (HNTB, 2004). In the Draft CSO LTCP (HNTB, 2004) six control alternatives were explored. Currently alternatives 5 and 6 are being implemented at the WWTP. These alternatives included the expansion of the headworks capacity and equalization chambers, as discussed in Section 2.2. Further improvements to reduce the number of overflows have been examined and are discussed in further detail below. The project planning schedule is included in Appendix F.

3.2 CURRENT CONDITIONS

The current conditions at the WWTP allow for flow equalization storage of up to 0.45 MG. The storage is used to capture flows in excess of the 10.0 MGD peak design hourly flow. The WWTP is currently being expanded and Phase I (described below) is expected to be completed in August 2007.

3.3 PHASE I – WET WEATHER EXPANSION

The first phase of the WWTP upgrade, projected to be completed in August 2007, involves the expansion of the preliminary treatment peak capacity from 15 MGD to 30 MGD, construction of a total of 1.0 MG of wet-weather storage/equalization capacity, and upsizing the combined sewer interceptors entering the plant through pipe bursting. The upsized interceptor sewers will allow for an increased wet-weather flow rate to the WWTP and the 1.0 MG of flow storage/equalization capacity combined with the existing 0.45 MG of storage/equalization capacity will allow the facility to store and ultimately treat a greater volume of combined sewage during storm events.

3.4 PHASE II – DRY WEATHER EXPANSION

The Phase II expansion will increase the primary treatment, secondary treatment, and disinfection capacity so that the WWTP can treat an average flow of 10 MGD and a peak hourly flow of 20 MGD. Upon completion of Phase II, half of the flow equalization tanks constructed in Phase I will be converted to primary clarifiers, thereby reducing the flow equalization tank volume by 0.5 MG (the WWTP will still have a total of 0.95 MG of flow equalization capacity). A UV disinfection facility will replace gaseous chlorination as the disinfection process.

3.5 PHASE III – SLUDGE PROCESSING FACILITIES

The Phase III will involve the implementation of a temperature-phased anaerobic digestion process to replace the current sludge treatment facilities. This will allow the facility to consistently produce a Class A sludge. The Phase III sludge processing expansion will occur independently of the LTCP recommendations.

3.6 PHASE IV – ADDITIONAL FLOW EQUALIZATION FACILITIES

Since Phase II will lead to a reduction of flow equalization, Phase IV was planned to replace the 0.5 MG that will be lost. The following two options for additional equalization currently exist: conversion of the aerobic digester to flow equalization tanks or construction of a new flow equalization basin. The size of this basin will be determined based on observations of the equalization basin for Phase I.

SECTION 4.0: EVALUATION OF CSO CONTROL ALTERNATIVES

4.1 BACKGROUND

Projects are currently being executed that will increase the system conveyance and treatment capacity at the Noblesville WWTP. Those projects are listed in **Table 4-1**.

Table 4-1: Ongoing/Planned CSO Projects

Project Description	Cost
Interceptor Upgrade Project	$ 2,180,000
Phase I WWTP Expansion	$ 9,130,000
Phase II WWTP Expansion	$ 18,160,000
Total	**$ 29,470,000**

These projects are discussed in detail in Section 3.0 and represent the baseline for the current alternative evaluation. Further improvements to reduce the number of CSO events are required. Several approaches have been examined and are described in the following sections.

4.2 CONSIDERATIONS

The goal of the Indiana CSO policy is to meet Federal Clean Water Act (CWA) requirements, however, even with total elimination of all CSOs, sampling data obtained from the SRCER (HNTB, 2001) indicated that background pollutant sources in the watershed precludes attainment of WQS. Therefore, the control strategies and recommendations presented in this LTCP are meant to meet the EPA's presumptive approach for compliance with the CSO control regulations and water quality requirements for the receiving stream.

Under the presumptive approach, controls must be adopted that meet one of the following criteria (IDEM, 2001):

1. No more than an average of 4.0 overflow events per year, providing that the permitting authority may allow up to 2.0 additional overflow events per year;
2. The elimination or capture for treatment of no less than 85% by volume of the combined sewage collected in the CSS during precipitation events on a system wide annual average basis; or
3. The elimination or removal of no less than the mass of the pollutants identified as causing water quality impairment through the sewer system characterization, monitoring, and modeling effort for the volumes that would be eliminated or captured for treatment under criterion 2 above.

The analysis performed to address the number of CSOs that can be expected during an average year with varying levels of capital improvements included the following:

- Baseline, or current condition;
- Michigan Approach, i.e. improvements that would sufficiently capture and treat the 10-year, 1-hour storm; or
- Improvements that would allow 0.0 CSOs per year.

This analysis was performed in order to decide a target storm size by comparing projected costs versus relative benefits. It was decided that capturing the 10-year, 1-hour storm was desirable.

Average annual model statistics were developed by applying the NetSTORM hydraulic model for the historical 1950 – 2005 precipitation record from the Indianapolis Airport National Climate Data Center (NCDC) gauge. Adjustments for local precipitation trends were made by comparing the modeled performance for 2000 – 2005 precipitation at both the Noblesville WWTP and the Indianapolis Airport gauges. For more information regarding the development, calibration, and application of the NetSTORM model refer to the *Noblesville Hydraulic Model Development & Calibration Memorandum* located in Appendix A.

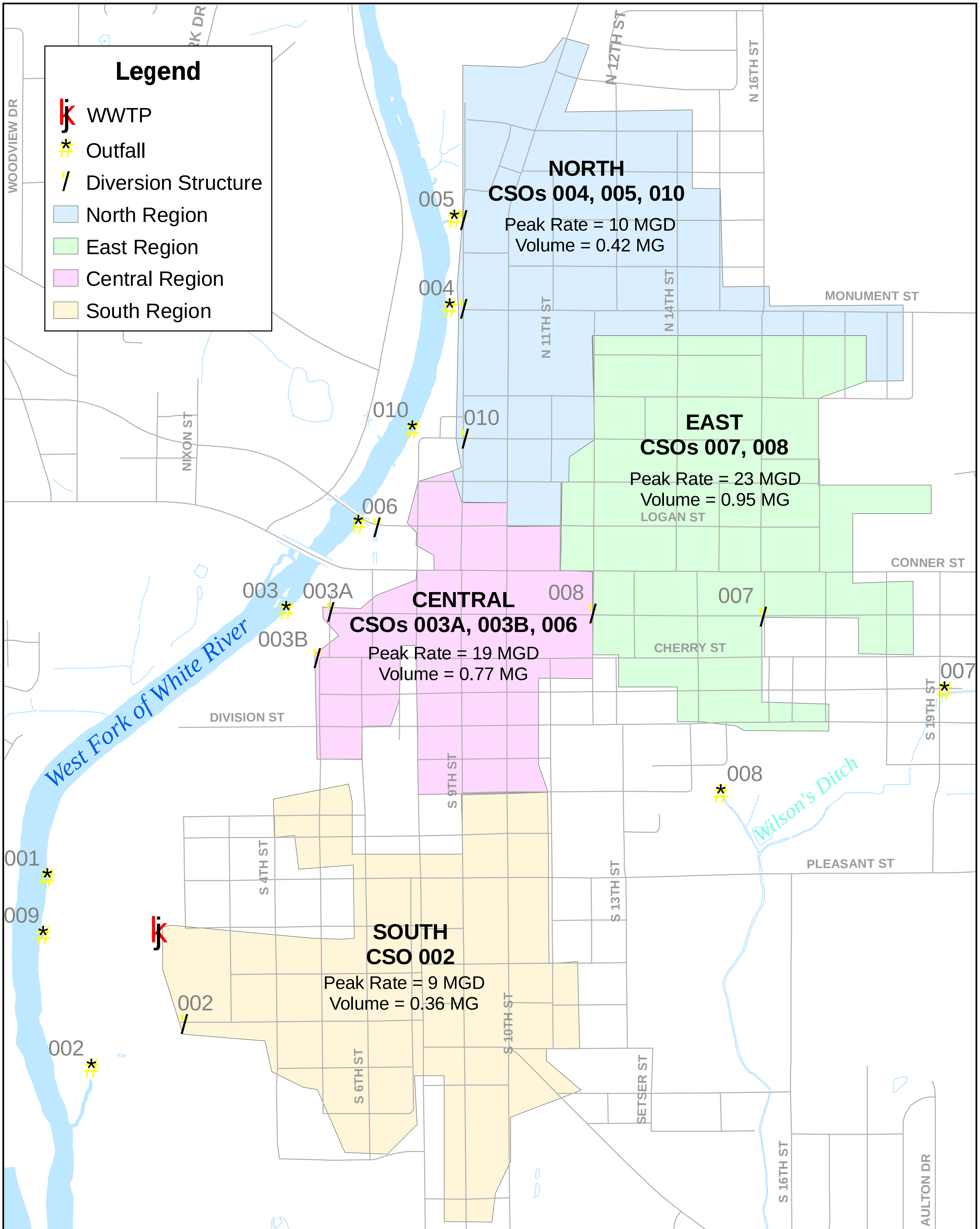
Utilization of NetSTORM also provided for conservative flow routing. For the 10-year, 1-hour storm, the full 2.0 inches of rain would be conveyed to the collection system in the same one-hour step. No attenuation in the hydrologic or hydraulic components of the system was assumed. For this reason, the resulting facility sizes are conservative.

4.3 PRIMARY SCREENING OF CONTROL ALTERNATIVES

In order to simplify the alternatives analysis, the outfall locations were grouped geographically into four discrete regions based on the following factors:

1. Partial sewer separation has been conducted in areas north of downtown;
2. Capturing CSO discharge from CSOs 004, 005, and 010 and conveying it to the WWTP through the historic downtown district would be extremely disruptive, likely cost-prohibitive, and difficult to sell to the public;
3. CSOs 007 and 008 discharge to Wilson's Ditch and the remaining seven CSOs discharge to the White River; and
4. CSOs 006 and 003 are close together and it appeared as though consolidation of the flow from these two CSOs could be feasibly conveyed to the WWTP.

The boundaries of each region are shown in **Figure 4-1** and pertinent information for each is described in **Table 4-2**.



RW ARMSTRONG

Figure 4-1
Combined Sewer Regions

1:12,000

Table 4-2: Summary of Combined Area Regions

Region	CSOs	Area (Ac)	Flow Rate[1] (MGD)	Volume[1] (MG)	Existing Annual Overflows
North	004, 005, 010	73.0	10.1	0.42	6
East	007, 008	131.9	22.8	0.95	8
Central	003A, 003B, 006	74.9	18.5	0.77	32
South	002	101.7	8.6	0.36	15

Three options (described below) to address CSO discharges for each region include:

1. Eliminating CSOs via sewer separation;
2. Conveying captured CSO volume to the WWTP; or
3. Capturing CSO volume at or near the outfalls and treating the discharge using satellite treatment.

Each was initially screened to decide if it was applicable for the system as a whole (i.e. was there a single option that could be used system wide to address every outfall in the same way). This approach proved infeasible because:

1. The size of the combined sewer system suggests that sewer separation would be cost prohibitive;
2. Conveying flow from all of the CSO outfalls to the WWTP would be disruptive to the City as a whole, but especially to the historic downtown district; and
3. The CSOs are located in close proximity to business and residential districts, which makes satellite treatment undesirable.

While one approach may not be appropriate for the system as a whole, each region was evaluated individually to determine the most appropriate option. A description of each of the options evaluated is provided below.

4.3.1. SEWER SEPARATION

Elimination of CSOs via sewer separation implies that all clear flow and storm water can be accounted for in the separation process. Historically, however, separated systems often do not address private property inflow and infiltration sources, which can result in an undersized conveyance system and the potential for sanitary sewer overflows.

Using the procedure outlined in the Indianapolis *Cost Estimating Procedures for Raw Sewage Overflow Control Program* (Indianapolis Clean Stream Team, 2003), sewer separation of all combined areas was estimated to have a total construction cost of $78 million, not including engineering, administration, and inspection costs. The high costs coupled with the wide area that would be disturbed for an extended period of time lead to rejecting sewer separation as a solution for the entire combined sewer system.

[1] Estimated combined sewer overflow peak rate and volume from a 10-year, 1-hour storm

4.3.2. CONVEY TO WASTEWATER TREATMENT PLANT

A second alternative to reduce impacts of CSO events is to provide additional conveyance capacity, which could be accomplished by upsizing the existing sewers or by installing a new interceptor sewer to convey the peak flow rates. This solution requires either the construction of a storage facility for the 10-year, 1-hour storm volume or storing the flow in the interceptor itself. If centralized storage is chosen, it could be either constructed at or just north of the WWTP.

This alternative, while viable for the combined sewer areas in close proximity to the WWTP, presents challenges for combined areas that are not close to the WWTP or where the construction of the interceptor sewers would cause disruptions to the downtown center. Therefore, while conveyance is ideal for some locations, conveying flow from all the combined areas to the WWTP is not a viable option for the entire combined collection system.

4.3.3. CONVEY TO SATELLITE TREATMENT SITES

The final alternative to reduce impacts of CSO events is to construct smaller scale treatment facilities that would receive and treat wet-weather flow at various points throughout the combined areas. This alternative requires high capital construction costs, replacing and redirecting existing sewer infrastructure, and the creation of new operation and maintenance points throughout the City. It is generally desirable for combined sewer areas that are remotely located or have limited conveyance routes connecting it to the WWTP and for where sewer separation is not feasible. Since there are no combined sewer basins that fit these criteria, the concept of incorporating satellite treatment facilities is summarily rejected.

4.4 NORTH REGION

The North region consists of CSOs 004, 005, and 010. These areas are located north of historic downtown Noblesville and the Hamilton County Government Center. These basins have been partially separated in the past with only a portion of the original combined sewer area remaining.

An electric substation and an above-ground water storage tank are located south of the North region next to the river, making conveyance of the CSO flow to the WWTP along this route problematic. Additionally, conveying the flow through the historic downtown district is not a viable option. For these reasons, sewer separation is the most appropriate option for the entire North region, because it continues the separation work already completed. The construction cost was estimated to be $6.3 million, not including engineering, administration, and inspection costs.

4.5 CENTRAL REGION

The Central region consists of CSOs 003 and 006. Two alternatives were considered based on the two remaining control options:

- **Alternative 1:** Full sewer separation in the entire region
- **Alternative 2:** Convey captured CSO and store the peak volume at a centralized location near the WWTP

Full sewer separation in this region is problematic because it covers the dense, historic downtown and would be extremely disruptive. It will also require multiple, long duration construction projects and an aggressive outreach program to ensure that all downspouts and sump pumps are disconnected from the new sanitary sewers, with no guarantee that all of the inflow sources will be removed from the system. Using the Indianapolis cost estimating procedures (Indianapolis Clean Stream Team, 2003) this region's sewer separation was estimated to cost $17.3 million, not including engineering, administration, and inspection costs. Because of the high level of disruption anticipated and the cost, sewer separation is not recommended for the Central region.

The preferred control method for CSOs 003 and 006 is to convey captured CSO volume through the proposed Central Conveyance Sewer along the route shown in **Figure 4-2** and to store the peak volume at a centralized location near the WWTP. This approach requires a 48" diameter pipeline to convey the flow from a 10-year, 1-hour storm, and it requires construction of 0.45 MG of storage at the WWTP. The cost for the pipeline is $6.7 million, not including engineering, administration, and inspection costs. The storage is estimated to cost approximately $4.9 million, resulting in a total cost of $11.6 million for this project.

4.6 EAST REGION

The East region is the largest of the four regions, covering over 130 acres and consisting of CSOs 007 and 008, which are the only two CSOs that discharge to Wilson's Ditch. The East region basins have had limited sewer separation in the past.

Four alternatives were considered based on the two remaining control options:

- **Alternative 1:** Full sewer separation in the entire region
- **Alternative 2:** Convey captured CSO volume along the Walnut/Vine Streets route and store the peak volume within the interceptor sewer
- **Alternative 3:** Convey captured CSO volume along the Walnut/Vine Streets route and store the peak volume at a centralized location near the WWTP
- **Alternative 4:** Convey captured CSO volume along the Conner Street route and store the peak volume at a centralized location near the WWTP

Each alternative is described in detail in the following sections, and Appendix G contains the detailed cost estimates for each.

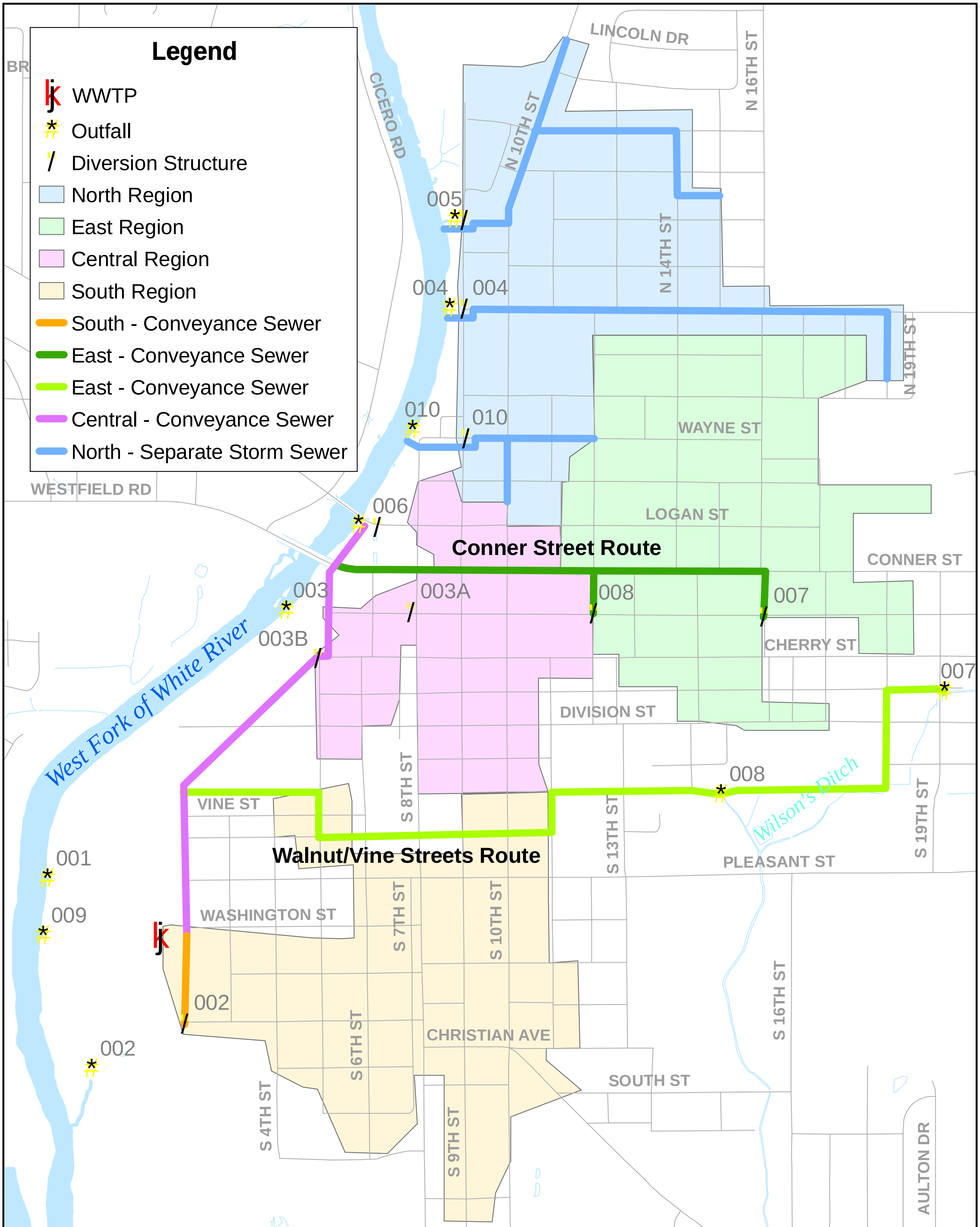


Figure 4-2
Regional Control Measures
and Alternate East Routes

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4.6.1. EAST REGION ALTERNATIVE 1

This alternative includes full sewer separation in the entire region. Using the Indianapolis cost estimating procedures (Indianapolis Clean Stream Team, 2003) this region's sewer separation was estimated to cost $30.5 million, not including engineering, administration, and inspection costs.

The primary advantage of Alternative 1 is that it will continue the separation work that has already been completed. The main disadvantage is that is will require multiple, long duration construction projects and an aggressive outreach program to ensure that all downspouts and sump pumps are disconnected from the new sanitary sewers, with no guarantee that all of the inflow sources will be removed from the system.

4.6.2. EAST REGION ALTERNATIVE 2

This alternative will convey captured CSO volume along the Walnut/Vine Streets route and store the peak volume within the interceptor sewer. A 6,860 linear foot (LF), 72" diameter pipe is required to capture and store the volume from the 10-year, 1-hour storm. The Walnut/Vine Streets route is shown in **Figure 4-2**. The cost for this alternative is $14.6 million, not including engineering, administration, and inspection costs.

The primary advantages of Alternative 2 are that it would impact a much smaller area than sewer separation, and it does not require construction of additional storage at the WWTP for flow from this region. The primary disadvantage is that there will be a greater disruption for the residents along the Walnut/Vine corridor and in the surrounding areas.

4.6.3. EAST REGION ALTERNATIVE 3

This alternative will convey captured CSO volume along the Walnut/Vine Streets route and store the peak volume at a centralized location. This alternative requires a 48" diameter pipeline to convey the flow from a 10-year, 1-hour storm, and it requires construction of 0.55 MG of additional storage capacity at the WWTP. The cost for the pipeline is $12.7 million, not including engineering, administration, and inspection costs. The additional storage is estimated to cost approximately $2.4 million, resulting in a total cost of $15.1 million for this alternative.

Alternative 3 shares the same advantages and disadvantages as Alternative 2.

4.6.4. EAST REGION ALTERNATIVE 4

This alternative will convey captured CSO volume through the proposed East Conveyance Sewer along the Conner Street route to a junction with the Central Conveyance Sewer and store the peak volume at a centralized location. The Conner Street route is shown in **Figure 4-2**. This alternative requires a 48" diameter pipeline to convey the flow from a 10-year, 1-hour storm, and it requires upsizing of the Central

Conveyance Sewer to 60" and construction of an additional 0.55 MG of storage capacity at the WWTP. The cost for the East Conveyance Sewer is $4.6 million, not including engineering, administration, and inspection costs. The additional storage is estimated to cost approximately $2.4 million, and the upsizing the Central Conveyance Sewer will cost an additional $300,000, resulting in a total cost of $7.3 million for this alternative.

The primary advantage of this alternative is that it will minimize disruption by constructing the pipeline concurrent with INDOT's "SR 32 Pavement Repair and Rehabilitation" project. In addition, routing the pipeline along Conner Street requires approximately 2,700 LF less pipeline than the Walnut/Vine Streets route. Consolidating this alternative with the INDOT project eliminates the disadvantages listed in Alternatives 2 and 3.

4.6.5. EAST REGION ALTERNATIVE ANALYSIS SUMMARY

The costs of the alternatives are compared in **Table 4-3**.

Table 4-3: East Region Alternatives Comparison

Alternative		Alternative 4
1	Sewer Separation	$ 30,500,000
2	Walnut/Vine Storage Pipeline	$ 14,600,000
3	Walnut/Vine Conveyance	$ 15,100,000
4	Conner Street Conveyance	$ 7,300,000

Alternative 4 is preferred because it is the least expensive and disruptive alternative.

4.7 SOUTH REGION

The South region consists of CSO 002. Given the proximity of the diversion structure to the WWTP, the optimal solution is to construct a new interceptor sewer to convey the peak flow to the existing storage facilities at the WWTP. No other alternatives were analyzed for the South region. The South Conveyance Sewer is shown in **Figure 4-2**. The cost for this alternative is $1.5 million, not including engineering, administration, and inspection costs.

SECTION 5.0: RECOMMENDED PLAN

This section summarizes the City's plan for addressing CSOs. The recommendations are meant to meet the presumptive approach for compliance with the CSO control policy and water quality requirements for receiving water bodies, and incorporate the "Michigan Approach" as a tool to do so.

5.1 WET WEATHER EVENTS TO BE CONTROLLED

System performance for Noblesville was projected using a calibrated NetSTORM hydraulic model for historical 1950-2005 precipitation records. The goal of an average of 0.2 CSO events per year was sought. The "Michigan Approach" allows for the capture and treatment of the 10-year, 1-hour storm.

5.2 RECOMMENDED CONTROL ALTERNATIVES

Control alternatives were evaluated for each of the four regions discussed in Section 4. The recommended control option for each region and recommended improvements to the collection system and the WWTP are summarized below. Estimated design, construction and monitoring costs are shown in **Table 5-1** and the project costing sheets that detail the total construction costs for the recommended projects (all projects except Project B) are located in Appendix G. The project schedule is included in Appendix F.

5.2.1 COLLECTION SYSTEM AND TREATMENT PLANT IMPROVEMENTS

Construction of improvements to the collection system and the WWTP (Phase 1 and 2) include: upgrading the interceptor, expanding the headworks, and increasing flow equalization. Construction of these improvements to the collection system and WWTP is estimated to cost $2.1 million and $22.86 million, respectively. Additional costs for preliminary and final design, construction administration services and post construction monitoring are also shown in **Table 5-1**. It is recommended that the WWTP Phase IV (construct up to 4.6 MG of equalization storage) be postponed until the monitoring indicates what additional volume of wet weather handling is required additional to the centralized storage basin.

5.2.2 CENTRAL REGION

Conveyance of the captured CSO flow from outfalls 003 and 006 to a centralized storage unit was selected for the Central region. Construction of the centralized storage unit and the Central Conveyance Sewer (both shown as Project A in **Table 5-1**) are estimated to cost $6.98 million and $6.99 million, respectively. Additional costs for preliminary and final design, construction administration services and post construction monitoring are also shown in **Table 5-1**.

City of Noblesville Long Term Control Plan

Table 5-1: Estimated Design, Construction Schedule and Associated Costs

Projects	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
ONGOING / PLANNED PROJECTS																		
2003 Projects																		
Interceptor Upgrade																		
Construction	$2,100,000																	$2,100,000
Services During Construction	$83,000																	$80,000
Phase 1 - Headworks Expansion & Flow Equalization																		
Design	$1,520,000																	$1,520,000
Construction	$3,179,500	$3,179,500																$6,360,000
Services During Construction	$625,000	$625,000																$1,250,000
Phase 2 Treatment Plant Expansion																		
Design		$160,000																$160,000
Construction			$5,500,000	$5,500,000	$5,500,000													$16,500,000
Services During Construction			$500,000	$500,000	$500,000													$1,500,000
Subtotal	$7,507,500	$3,964,500	$6,000,000	$6,000,000	$6,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,470,000
PROPOSED PROJECTS																		
2006 Projects																		
Project A - Centralized Storage																		
Preliminary Design		$210,000																$210,000
Final Design			$440,000				$20,000	$15,000			$15,000							$490,000
Construction							$1,817,500	$1,817,500			$1,817,500	$1,817,500						$7,270,000
Services During Construction							$70,000	$70,000			$70,000	$70,000						$280,000
Post Construction Monitoring															$23,600	$23,600	$23,600	$70,000
Project A - Central Region Conveyance																		
Preliminary Design		$210,000																$210,000
Final Design			$440,000						$50,000									$490,000
Construction									$2,330,000	$2,330,000	$2,330,000							$6,990,000
Services During Construction									$116,500	$116,500	$116,500							$350,000
Post Construction Monitoring												$7,500	$7,500	$7,500	$7,500			$30,000
Project B - Treatment Plant Improvements; High Rate Treatment																		
Preliminary Design			$60,000															$60,000
Final Design						$140,000												$140,000
Construction							$666,667	$1,333,333										$2,000,000
Services During Construction							$33,333	$66,667										$100,000
Post Construction Monitoring									$10,000	$10,000	$10,000	$10,000						$40,000
Project C - East Region Conveyance (Conner St.) * INDOT Dependent																		
Preliminary Design		$140,000																$140,000
Final Design			$300,000		$20,000													$320,000
Construction					$2,295,000	$2,295,000												$4,590,000
Services During Construction					$114,750	$114,750												$230,000
Project D - North Region Sewer Separation																		
Preliminary Design												$190,000						$190,000
Final Design												$380,000		$20,000	$20,000	$20,000		$440,000
Construction													$1,575,000	$1,575,000	$1,575,000	$1,575,000		$6,300,000
Services During Construction													$78,750	$78,750	$78,750	$78,750		$320,000
Post Construction Monitoring																$15,000	$15,000	$30,000
Project E - South Region Conveyance																		
Preliminary Design															$40,000			$40,000
Final Design																$100,000		$100,000
Construction																	$1,450,000	$1,450,000
Services During Construction																	$70,000	$70,000
Post Construction Monitoring																	$10,000	$10,000
Collection System Monitoring & Modeling																		
System Monitoring		$8,000	$8,240	$8,487	$8,742	$9,004	$9,274	$9,552	$9,839	$10,134	$10,438	$10,751	$11,074	$11,406	$11,748	$12,101	$12,464	$160,000
Collection System Capital Improvements		$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$4,800,000
Subtotal of Proposed 2006 Projects		$868,000	$1,548,240	$308,487	$2,738,492	$2,858,754	$2,916,774	$3,612,052	$2,816,339	$2,766,634	$4,669,438	$2,785,751	$1,972,324	$1,992,656	$2,056,598	$2,124,451	$1,881,064	$37,920,000
Subtotal of 2003 Projects	$7,507,500	$3,964,500	$6,000,000	$6,000,000	$6,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,470,000
Grand Totals	**$7,510,000**	**$4,830,000**	**$7,550,000**	**$6,310,000**	**$8,740,000**	**$2,860,000**	**$2,920,000**	**$3,610,000**	**$2,820,000**	**$2,770,000**	**$4,670,000**	**$2,790,000**	**$1,970,000**	**$1,990,000**	**$2,060,000**	**$2,120,000**	**$1,880,000**	**$67,390,000**

5.2.3 HIGH RATE TREATMENT

High rate treatment is an integral part of the selected recommendation for long-term CSO control. Only a small component of the 10-year, 1-hour storm will be treated and discharged by HRT; the majority of the flow will receive primary and secondary treatment at the WWTP. Only 0.5 MG of the 3.5 MG of flow conveyed to the WWTP headworks, (14%) under the conditions of a 10-year, 1-hour storm would be routed through HRT. Based on statistics developed from the 1950-2005 precipitation record, this facility would be expected to operate 2-3 times per year, which translates to a 4 to 6 month storm. Only a fraction of the wet-weather flow conveyed to the WWTP will be treated and discharged through this facility for a 4-month or 6-month storm. The hydrograph presented in Appendix H illustrates the flow that will receive treatment through the HRT facility for a 10-year, 1-hour storm. Additionally the flow chart included in **Figure 5-1** clarifies the potential use of outfall 009 as a discharge point for HRT. Any flow rates that reach the treatment facility above the peak allowable flow rate will receive at a minimum screening and disinfection and likely HRT after all plant storage has reached capacity.

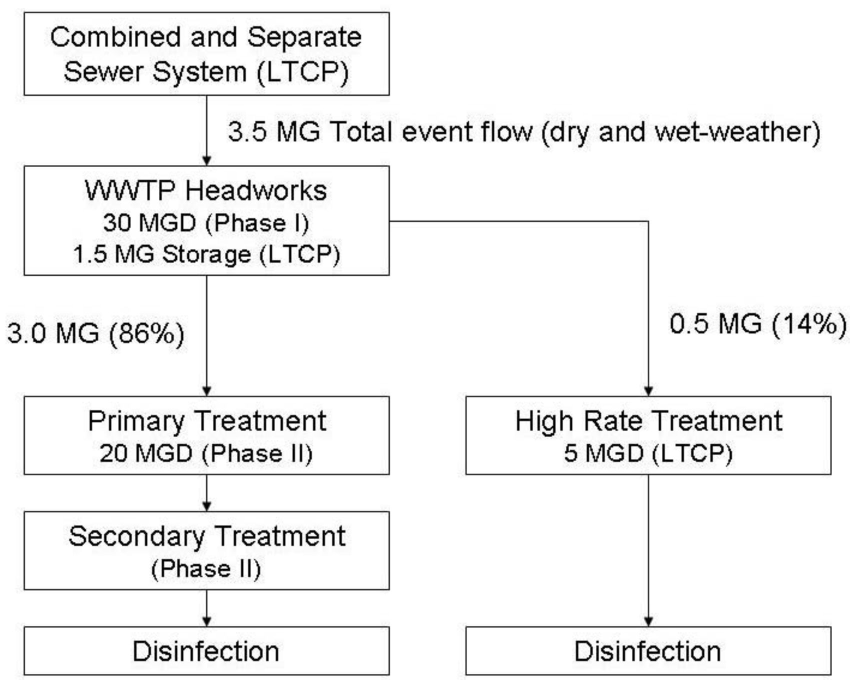

Figure 5-1: Schematic WWTP Performance for the 10-Year, 1-Hour Storm

Purchase and installation of the HRT unit (shown as Project B in **Table 5-1**) is estimated to cost $2.0 million. Additional costs for preliminary and final design, construction administration services and post construction monitoring are also shown in **Table 5-1**.

5.2.4 EAST REGION

Conveyance of the captured CSO flow from outfalls 007 and 008 to the Central Conveyance Sewer along the Conner Street route was selected for the East region. (The selection of Alternative 4 and the Conner Street route was contingent on the cost reduction related to executing this project concurrent with the INDOT project along State Road 32. The City reserves the option to revisit the alternative analysis if the INDOT project is cancelled or delayed.) Construction of the East Conveyance Sewer (shown as Project C in **Table 5-1**) is estimated to cost $4.59 million. Additional costs for preliminary and final design, construction administration services and post construction monitoring are also shown in **Table 5-1**.

5.2.5 NORTH REGION

Sewer separation was selected for the North region. Construction of the sewer separation projects (shown as Project D in **Table 5-1**) is estimated to cost $6.3 million. Additional costs for preliminary and final design, construction administration services and post construction monitoring are also shown in **Table 5-1**.

5.2.6 SOUTH REGION

Conveyance of the captured CSO flow from outfall 002 to the WWTP was selected for the South region. Construction of the South Conveyance Sewer (shown as Project E in **Table 5-1**) is estimated to cost $1.45 million. Additional costs for preliminary and final design, construction administration services and post construction monitoring are also shown in **Table 5-1**.

SECTION 6.0: AFFORDABILITY ANALYSIS

The affordability analysis for this LTCP has been updated using the 2000 census results and an updated financial capability assessment prepared by H.J. Umbaugh & Associates (November 2006) included in it's entirety in Appendix I. The analysis followed the recommended guidelines as presented in *The Combined Sewer Overflows Guidelines for Financial Capability Assessment and Schedule Development* (USEPA, 1997). Reference was also made to the *Combined Sewer Overflow Long-Term Control Plan and Use Attainability Analysis (UAA) Guidance Document (IDEM, 2001)*. However, based upon the notification on the IDEM web site ("Due to numerous inaccuracies, this document is currently undergoing revisions. Please contact Cyndi Wagner, Wet Weather Section Chief at (317) 233-0473 for further information before using this guidance"), the City and its consultant relied on clarification from IDEM and Ms. Wagner in preparing the affordability analysis in this section.

The overall financial capability matrix and implementation schedule for the City was based upon the Socio-Economic Indicators Matrix (SEIM) and the Wastewater Cost per Household Indicators (WW_{cphi}) as defined per the above reference documents.

The SEIM was composed of the City's Bond Rating, Overall net debt per capita, Unemployment rate, Median household income, Property tax revenue as a percent of full market property value, and Property tax revenue collection rate. The SEIM average score equated to 2.50 (see **Table 6-1**).

Table 6-1: Summary of Financial Capability Indicators

SEIM Factor	SEIM Value	Weak, Mid-Range or Strong	Score
City's Bond Rating (1)	Moody's A1	Strong	3
Overall Net Debt Per Capita (2)	$8,651	Weak	1
Unemplotment Rate (3)	3.1%	Strong	3
Median Household Income (4)	$61,455	Strong	3
Property Tax Revenue as a Percent of Full Market Property Value (5)	2.47%	Mid - Range	2
Property Tax Revenue Collection Rate (6)	100.13%	Strong	3
SEIM Average Score			**2.50**

The WW_{chpi} was determined by dividing the total annual wastewater treatment cost per house hold by the median household income and multiplying by 100. The WW_{cphi} equated to 1.31%.

$$\left(\frac{\$803.10}{\$61{,}455}\right)\times 100\% = 1.31\%$$

The SEIM and WW_{cphi} were then entered into an Overall Financial Capability Matrix and implementation schedule (see **Table 6-2**) to determine the suggested financial burden and implementation schedule. Based upon the SEIM average score of 2.50, and the

WW_{cphi} of 1.31%, the financial capability for the City is Medium and an implementation schedule of 5–10 years is suggested.

Table 6-2: Overall Financial Capability Matrix and Implementation Schedule

Permittee Financial Capability	Residential Indicator Cost Per Household as a % of MHI (WW_{CPHI})			Length of Time for LTCP Implementation Schedule
Indicators Score (SEIM)	Low (Below 1.0%)	Mid-Range (1.0 to 2.0%)	High (Above 2.0%)	
Weak (Below 1.5)	Medium Burden	High Burden	High Burden	High 10 - 20 years
Mid-Range (1.5 to 2.5)	Low Burden	Medium Burden	High Burden	Medium 5 - 10 years
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden	Low 5 years

Although **Table 6-2** suggests a medium burden to the community and a suggested implementation schedule of 5-10 years, mitigating circumstances, as expressed to the IDEM have determined that a 15 year implementation schedule is desirable and warranted. These circumstances are further explained in Section 10.

SECTION 7.0: PUBLIC PARTICIPATION AND IDEM INTERACTION

7.1 INTRODUCTION

The City recognizes that one of the key components to preparing a successful CSO LTCP is the early communication with both the public and IDEM. The City recognized that by informing the public and soliciting IDEM involvement in the CSO LTCP early on about the scope and goals of the program, potential conflicts could be identified, and resolved in an expeditious manner.

7.2 CITIZEN ADVISORY COMMITTEE

The City set about contacting previous Citizen Advisory Committee (CAC) members and expanded participation in the CAC to actively involve the affected public in decision making processes. Members of the CAC committee include City residents:

- John South, Indiana Soil & Water Conservation District
- Kathy Stretch, City Council District 4
- Rich Hubbard, River Clean-Up Inc.
- Roger Goings, Retired Engineer
- Bryce Adam, Investment Representative Edward Jones
- Michael Hendricks, Utility Director
- Ray Thompson
- Zbigniew “Zig” Resiak, RW Armstrong/Consultant
- Scott Miller, Umbaugh and Associates/Rate Consultant

Public concern varied from significant inconveniences associated with construction activities of magnitudes as yet unseen by the City, water quality issues associated with urban streams, the disruption of public transportation service resultant of construction activities, to the costs associated with CSO control alternatives and the effect on other municipal services. The City recognized that public support was and remains critical to the CSO LTCP process.

Three CAC/Public meetings were conducted on September 20, 2006, October 5, 2006 and October 26, 2006. Generally, the first meeting was focused on the history of national and state CSO policy, and an update of where the City currently stood, and the need to revise and refine the 2004 CSO LTCP submittal. Subsequent meetings focused on sensitive areas, priority areas, constructability issues and costs associated with abatement projects as raised by CAC attendees. The final meeting included members of the Board of Public Works and the Mayor. This final meeting was to present the proposed revised alternatives, costs and schedules prepared with CAC involvement for approval and commitment by City leaders.

Meeting agendas, power point presentations, and attendance sheets are located in Appendix J.

7.3 IDEM INTERACTION

The City actively engaged IDEM for input and comment in preparing this revision to the LTCP. The City met with IDEM staff members on September 15, 2006 to review and solicit IDEM involvement in the preparation of the revised LTCP. LTCP preparation details were discussed including; integration of the 2004 CSO alternatives, the presumptive approach in attaining WQS, the "Michigan Approach" as a tool to attain WQS, as well as constructability and implementation schedules. Modeling data and refined CSO control alternatives were reviewed and explained. Based upon the discussions with IDEM, both parties were in agreement with the direction and approach in revising the CSO LTCP.

On October 20, 2006 IDEM staff members toured the City's WWTP and one CSO regulator/outfall structure to appreciate the unique collection system issues and subsequently the CSO control alternatives necessary to abate CSO events.

The City will schedule periodic meetings with IDEM to review and discuss LTCP progress and will also schedule project review meetings at critical milestones throughout the program.

7.4 ADDITIONAL PUBLIC PARTICIPATION AND EDUCATION

The City is currently undertaking an enhanced public participation and education program that will focus on developing and communicating a consistent message about the LTCP and control projects, and developing a standard approach for communicating with the public, elected officials, and the press. The program will include public meetings at key project milestones (ground breaking, construction closeout, etc.) and will also include a process for communicating LTCP progress through newsletters, bill stuffers, the City's website, and other routine methods of communication. This program will also include additional meetings with the CAC and it may also form a technical advisory committee if warranted.

SECTION 8.0: POST-CONSTRUCTION MONITORING AND LONG-TERM MONITORING

8.1 INTRODUCTION

Post-construction monitoring and long-term monitoring plans are required by state law to ensure the recommended plan was successfully completed and performing at its selected level of control. Post-construction monitoring is used to document that the LTCP recommended was completed as proposed, and is not done continuously. This section documents the proposed post construction monitoring plan (PCMP) as well as additional monitoring programs the City expects to maintain that are not a required component of the LTCP.

Section 8.2 presents the required elements of the PCMP that are designed to confirm that the constructed CSO control measures are consistent with the presumed approach of capturing a 10-year, 1-hour storm. Section 8.3 presents non-required monitoring programs the City expects to maintain over the life of the LTCP.

8.2 POST-CONSTRUCTION MONITORING PLAN

The purpose of the PCMP is to collect hydrologic, hydraulic, and operational data and perform a hydraulic analysis to confirm the constructed CSO facilities are meeting a level of control consistent with a 10-year, 1-hour storm. The City will use rainfall data, flow monitoring data, operational data, and collection system hydraulic models to determine compliance. Monitoring will continue until the end of the 15-year plan.

8.2.1 DATA COLLECTION

The City currently maintains ADS level-velocity flow monitors in all CSO regulator structures, and a single rain gage at the WWTP site. The flow monitors use Doppler radar velocity sensors and pressure transducer level sensors. Data collected from these monitoring sites is used to prepare the monthly CSO discharge monitoring reports (DMRs) that are submitted to IDEM per NPDES permit requirements.

The data used to develop the DMRs will be the backbone of the data collected in the PCM program. Upon completion of the CSO control facilities and achievement of full operation as described in Section 10, the city will collect flow monitoring and precipitation data for 12 months. Section 8.2.2 presents the application of this data.

The City will continue to collect precipitation data to support the confirmation that the implemented CSO facilities are achieving the 10-year, 1-hour level of control. Sampling procedures of discharges from new WWTP facilities such as HRT will occur after disinfection and upstream of the outfall consistent with current permit requirements for sampling at Outfall 001. If the disinfected effluent from high rate treatment is routed to outfall 009 instead to being recombined and discharged at Outfall 001, a similar sampling procedure will be used for both outfalls.

8.2.2 DATA ANALYSIS

The CSO control measures were selected based on a level of control consistent with a 10-year, 1-hour storm. With a ten-year level of control, there is approximately a 10% chance of collecting a ten-year event in the 12 month period following achievement of full operation (AFO). For this reason, the collected data will be used to validate, and if necessary, recalibrate the City's current hydraulic model.

The validated hydraulic model will then be applied for a 10-year, 1-hour storm. If the simulated 10-year, 1-hour storm is fully captured, then the City will have achieved its level of control. If the simulated 10-year, 1-hour storm is not fully captured, then the City will submit an analysis documenting:

- The physical and operational factors contributing to the additional overflow;
- Any impact on water quality, including designated uses, from the additional overflow;
- Any physical or operational modifications to the CSO control facilities, if any, to successfully capture a 10-year, 1-hour storm;
- Any associated costs from physical or operational modifications to the CSO control facilities;
- Any expected benefits from the physical or operational modifications; and
- A recommendation as to whether the physical or operational modifications are necessary to protect designated uses

The use of the hydraulic model in conjunction with the collected flow monitoring data allows for the most effective evaluation of whether or not the level of control is being achieved.

8.2.3 QUALITY CONTROL

Quality control measures are currently in place for the flow monitoring and precipitation data that is currently collected for DMR use. The quality control procedures include the documentation of monitoring activities including installation, maintenance, calibration, field verification, and data review. All flow monitoring data is reviewed by the use of monthly level-velocity scattergraphs compared with typical hydraulic conditions.

8.2.4 REPORTING

The PCM program includes two types of reports. Six-Month reports will document bidding and construction activities of the CSO control measures described in Section 10 to confirm that compliance with the implementation schedule is maintained. The final PCM report will contain the monitoring data and subsequent analysis described in Sections 8.2.1 and 8.2.2.

8.2.4.1 SIX-MONTH REPORTS

The schedule for delivery of Six-Months Reports will be determined as follows: upon final acceptance of the LTCP report, the window for reporting will begin at the end of the quarter the LTCP is accepted. After six months (two quarters), the first Six-Month report will be submitted.

Six-Month reports will document the bidding and construction activities of the CSO control measures to confirm the completion of the bidding process and AFO targets outlined in Section 10 are achieved. The Six-Month reports will only report on schedule targets contained in the six-month period summarized in the report.

8.2.4.2 FINAL PCM REPORT

The final PCM report will be submitted three years after achievement of full operation of all CSO control measures, or two years after the 12 months of monitoring data are collected. The final PCM report will present the following:

- Flow monitoring and precipitation data collected during the 12 months of monitoring;
- Validation and recalibration (if necessary) of the hydraulic model;
- Simulation of a 10-year, 1-hour storm and resulting CSO capture; and
- Additional analyses described in Section 8.2.2 if the simulated 10-year, 1-hour storm is not fully captured.

The City will schedule a meeting with IDEM after submittal of each final PCM report to review and discuss the results of the PCM program for each individual project.

8.3 NON-REQUIRED MONITORING PROGRAMS

Additional monitoring outside of the required PCM program may be performed as a requirement of the City's NPDES permit. The additional monitoring may include dissolved oxygen (DO) and *E. coli* bacteria sampling in CSO receiving waters, analysis of USGS stream gauge 03349000 on the White River in Noblesville, or additional flow monitoring in the combined sewer system.

SECTION 9.0: COORDINATION WITH THE SWQMP

The City has entered into a co-agreement/joint effort with Hamilton County to efficiently manage storm water volume and quality in the designated Municipal Separated Storm Sewer System (MS4) Noblesville area. MS4 regulations were promulgated under 327 IAC 15-5-13, in accordance with Federal policy, and are commonly referred to as Rule 13. The rule requires a designated MS4 area to meet components of six minimum control measures (MCM's) set forth in section 12-17 of the rule. Certain MCM's, specifically; Illicit Discharge Detection & Elimination (IDDE completed August 2006) and Municipal Operations Pollution Prevention & Good Housekeeping, include a requirement to ensure storm water activities are compliant with a municipality's LTCP and CSOOP.

The City has an Ordinance (23-4-05) prohibiting contribution of pollutants by any user to the MS4 by storm water discharges, prohibiting illicit connections and discharges to the City's separate storm sewer system; and establishment of legal authority to carry out inspections, surveillance and monitoring procedures necessary to ensure compliance with the ordinance. Additionally, the City has an ordinance (24-4-05) regulating storm water run-off associated with construction and post-construction activities.

The City performs routine maintenance and cleaning of its combined sewer collection system as well as routine street sweeping and litter pick-ups to help prevent pollutants from entering the receiving stream. Removal of illicit discharges and continued combined sewer maintenance, cleaning, street sweeping and litter pick-ups will assist in removing extraneous flow and pollutants from reaching the receiving stream.

The City will continue to implement and review its storm water quality master plan (SWQMP) for consistency and efficiencies as it relates to the CSOOP and LTCP.

SECTION 10.0: IMPLEMENTATION SCHEDULE OF SELECTED PLAN

10.1 INTRODUCTION

This section presents the implementation schedule for the selected plan, which is described in detail in Section 5.

10.2 SUMMARY OF SELECTED PLAN PROJECTS

The selected plan is based on a presumptive approach to capture and provide primary treatment for CSO discharges generated by a 10-year, 1-hour storm. The following projects are required to capture this storm:

- WWTP Phase 1 Headworks Improvements
- WWTP Phase 2 Primary Treatment Improvements
- Interceptor Improvements – Pipe Bursting
- Partial Separation along Conner Street
- Partial Separation of the North region
- Increased Sewer Conveyance Capacity from the Central, East, and South Regions
- Construction of an additional 1.5 MG storage facility

10.3 SCHEDULE OF SELECTED PLAN PROJECTS

A 15-year implementation schedule, to begin on January 1, 2008, is necessary to allow the City to construct CSO control measures in a planned and orderly manner, to properly sequence individual projects to limit traffic and neighborhood disruption, to accurately evaluate the effectiveness of each project, to secure necessary rights of ways, to coordinate technical, manpower, and material needs, and to manage the financial burden on ratepayers.

The plan and implementation schedule will be reviewed every five years as required by state law. This review will allow the City to incorporate new data and to adopt new technologies that might become available during the implementation period.

The 15-year implementation schedule is based on the financial capability assessment presented in Section 6. If financial circumstances or implementation costs significantly change, the City may seek approval to extend the implementation schedule.

10.4 STEPS FOR IMPLEMENATION OF INDIVIDUAL PROJECTS

Based on the considerations of the overall 15-year implementation schedule, the implementation schedule for individual CSO projects contains the following steps:

- **Facility Planning:** Planning level geotechnical investigations, development of alignment, development of basis of design, and development of system hydraulics.
- **Design:** Preparation of contract documents, plans, and specifications, bid package development.
- **Permitting and Land Acquisition:** Preparation of construction permits, and securing of easements for right of way.
- **Construction:** Construction of the facilities consistent with contract documents, administration and inspection of all activities.
- **Startup:** Initial operation of completed facility, development of SOPs.
- **Post-Construction Monitoring:** After startup the projects will be monitored for the remainder of 15-year schedule. This will include, but not be limited to flow monitoring and hydraulic modeling to confirm that the facility is functioning as planned and designed. This phase will also include a follow-up meeting with IDEM to track progress on LTCP implementation.
- **Public Outreach:** Public meetings and presentations during the facility planning, design and construction phases.

10.5 IMPLEMENTATION SCHEDULE FOR INDIVIDUAL PROJECTS

The schedule for the individual CSO projects is presented in Appendix F.

- **Completion of the Bidding Process (Bid Year)**: The year in which the City has appropriately allocated funds for a specific CSO project (or portion thereof), the bid for the specific CSO project has been accepted and awarded for the construction of the CSO project (or portion thereof), and a notice to proceed has been issued and remains in effect.
- **Achievement of Full Operation (AFO)**: The year by which construction and installation for a specific CSO project is complete such that the project is fully operational and can be expected to perform consistent with its design criteria.

10.6 SCHEDULING FACTORS

Numerous financial, institutional, legal, and technical factors influence the time required to implement the LTCP. The plan represents one of the largest public works programs undertaken by the City. Consequently, the projects have far reaching effects to the general commerce, safety and day-to-day public transportation needs of the City. It is effectively bisected from east to west by the White River which runs north to south. The City's only hospital is located on the west side of the river, with emergency fire and EMT response services strategically located throughout the city. The City's police station, City Hall, commerce and secondary schools are located on the east side of the River. As such, it is imperative that the implementation schedule be such that no two bridges connecting the east and west sides of Noblesville are out of service at the same time. Doing so would adversely affect the public and increase emergency response time for fire, police and emergency service personnel. Also, the general flow of traffic including school buses and commerce would be significantly and unduly affected. Additionally, the Indiana Department of Transportation (INDOT) has scheduled major road reconstruction of State Road 32. The projects recommended in this LTCP are interdependent with that scheduled project. Therefore, the City believes an implementation schedule of 15 years is warranted. Finally, changes to any of the following laws, requirements, or regulations may require modification to the implementation schedule:

1. The Clean Water Act, 1994 CSO Policy, and U.S. EPA guidance for CSOs;
2. State of Indiana Water Quality Standards;
3. NPDES Permits;
4. Future judicial or administrative orders;
5. The financial capability of the city of Noblesville remains equal to or better than that indicated in Section 6;
6. The bond rating for the city of Noblesville remains equal to or better than that indicated in Section 6;
7. Approvals, permits, and land acquisitions can be obtained in the time frame shown in the implementation schedule;
8. The results of facility planning[1]; or
9. Land is acquired or easements or rights to use the land are obtained from landowners without unreasonable restrictions for all CSO projects not located at the WWTP site.

10.7 COMBINED SEWER OVERFLOW OPERATIONAL PLAN

The City developed a CSOOP in 1991 to meet the combined sewer overflow requirements of the NPDES permit. It was updated in June of 2001 to incorporate the new minimum controls set by EPA that the City had already addressed as well as to incorporate any changes made to the wastewater collection and treatment system. Currently, the City is advancing specific alternatives presented in the 2004 CSO LTCP. Subsequently, it is expected that this revision to the CSO LTCP will afford the City additional significant CSO control alternatives for implementation. As such, the City will periodically update the CSOOP upon completion of significant facility or treatment projects.

[1] At this stage, the LTCP is a conceptual plan. Alignments have not been finalized, easements have not been obtained, and the exact location and alignment of facilities has not been specifically determined. The facility plans will collect additional information, such as soil borings, and perform additional engineering such as hydraulic design, functional design, system operational design, interaction and interface studies, configuration design, and geotechnical investigations. This additional information is necessary to prepare the preliminary designs of the CSO projects. Based on the results of the investigations and studies, the facility plan findings may require revision to time requirements and the project schedule.

10.8 SUMMARY

In order to properly achieve the significant level of control determined by the presumptive approach of a 10-year, 1-hour storm, a 15-year implementation schedule is required to complete facility planning, design, permitting, land acquisition, construction, and startup of the CSO control projects. The implementation schedule should be considered a planning-level schedule as the CSO projects are all in a conceptual planning stage. The schedule is based on current financial, regulatory, and construction conditions and may require revision if the conditions change over the implementation period.

Appendix A: Noblesville Hydraulic Model Development & Calibration Memorandum

TO:	Mike Hendricks, Utility Director Noblesville, IN	**PROJECT NO.:**	20066250.50
FROM:	Chris Ranck		
RE:	Task 50 Memorandum – Noblesville Hydraulic Model Development & Calibration		
DATE:	June 26th, 2006		

The purpose of this memorandum is to summarize the development and calibration of the Network Storage Treatment Overflow Runoff Model (NetSTORM) hydraulic model that RWA prepared to support the update of Noblesville's Combined Sewer Overflow Long-Term Control Plan (CSO LTCP).

The model development and calibration is arranged by the following sections:

Section 1: Methodology
Section 2: Data Review
Section 3: Model Development
Section 4: Model Calibration
Section 5: Summary

Please note that the application of the model will be presented in the existing conditions and alternative analysis sections of the revised CSO LTCP.

1.0 METHODOLOGY

In order to properly support the LTCP update, the development of a hydraulic model was necessary to:

- Present CSO system statistics – average annual percent capture and overflow frequency
- Size CSO control facilities

The public domain NetSTORM model (CDM, 2005) was selected by RWA for its efficiency in performing long-term continuous simulations of combined sewer systems. NetSTORM is a simplistic flow routing model that uses the rational method to calculate runoff, and is considered an appropriate model for planning-level use. The more detailed Storm Water Management Model (SWMM) is appropriate for facility planning or design-level use.

RWA applied the following methodology to prepare the NetSTORM model:

1. GIS Data Review
   a. Delineate CSO basins
   b. Estimate regulator capacity and in-system storage
2. Flow Metering Data Review
   a. Review scattergraphs
   b. Review Precipitation data

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   c. Identify at calibration events
   d. Develop dry weather flow (DWF) allocation
   e. Identify average annual CSO system statistics for long-term validation
3. Model Development
   a. Create NetSTORM model schematic
   b. Apply initial parameter estimates
4. Model Calibration
   a. Single-event impervious area calibration
   b. Single-event pervious area calibration
   c. Single-event validation
   d. Long-term validation
   e. Design-event validation

2.0 DATA REVIEW

RWA's data review focused on two datasets: Noblesville's collection system GIS and 2000-2005 flow metering data. Based on the GIS data and from meetings with the Noblesville staff, the CSO basin delineations were adjusted and the acreage re-calculated. **Figure 1** presents the CSO basins. Only the hatched areas are currently connected to the combined sewer system. The GIS data for combined and sanitary sewers was processed to develop initial estimates for CSO regulator capacity and in-system storage. Both parameters were adjusted during model calibration.

RWA reviewed the 2000-2005 precipitation and flow metering data, with a focus on the 2005 data that was generated during the current flow metering program. Based on a thorough review of the flow metering scattergraphs and precipitation data, the following events were selected for calibration and validation:

- April 7, 2005 was selected as an impervious area calibration event. The < 2-month storm does not have a significant CSO response. This served as a "threshold" event for calibration to ensure proper CSO activation in the model. Calibrating to "threshold" events allows the model to produce the correct average annual overflow frequency.
- April 20-27, 2005 was selected as an impervious area calibration event. The eight-day period contains a 2-month, 3-month, and < 2-month storm event. This served as a larger event to ensure the model predicts accurate CSO volume.
- June 11-13, 2005 was selected as a pervious area calibration event. The 3-month storm has a peak intensity of 0.89 in/hour, which was used to develop the pervious area response in the model. The pervious area response ensures the model is not underpredicting peak flow and volume for high intensity events.
- June 5, 2005, was selected as a validation event. The < 2-month storm was used as a "threshold" event to validate the CSO activation in the model.
- September 28-29, 2005 was selected as a validation event. The < 2-month storm was used as a "threshold" event to validate the CSO activation in the model.

RWA used the flow metering data recorded prior to these five events to establish the baseline DWF for the NetSTORM model. **Table 1** presents the Noblesville DWF allocation.

Table 1: Dry-Weather Flow Allocation

NetSTORM Model Node	Allocated DWF (MGD)
CSO 002	0.17
CSO 003A	0.20
CSO 003B	0.01
CSO 004	0.07
CSO 005	0.02
CSO 006	0.02
CSO 007	0.05
CSO 008	0.05
CSO 010	0.003
Vine & 4th Combined	0.01
Northeast Interceptor	0.57
Northwest Interceptor	0.97
Sly Run Interceptor	1.79
Stony Creek Interceptor	0.87
Vestal Ditch Interceptor	0.19
Total DWF	**4.99**

A review of the precipitation data determined that the 2000-2005 contained significantly more large storm events than desired for a “representative” period. For example, the six year period contained seven 2-year storm events, while only three would be contained in a representative period. For this reason, the 1950-2005 precipitation record at the Indianapolis Airport gauge will be used as well as the 2000-2005 Noblesville record to establish average annual CSO statistics to be presented in the LTCP.

The review of the precipitation data also identified a rain event consistent with the peak intensity of the 10-year, 1 hour storm (2.0 in/hour) on May 27, 2004. This 2.18 in/hour event was used to provide an additional level of validation to the model to ensure that the model simulations for the 10-year, 1 hour storm are consistent with observed flow metering data.

RWA reviewed the 2000-2005 DMR and MRO data to determine the long-term average annual CSO statistics for model validation. During the review, RWA noted two significant findings:

- CSO volume metered in 2005 was significantly lower than the volume observed in 2000-2004, while the overflow frequency was consistent.
- Numerous small volume (< .01 MG) CSO events were observed.

The impacts of these findings are discussed in Section 4, Model Calibration.

3.0 MODEL DEVELOPMENT

A functional model NetSTORM requires the following parameters for each model node, which are described below with their source:

- Basin Acreage – Area tributary to the model node -- From GIS delineation
- Regulator Capacity – Flow that can be conveyed prior to an overflow – Calibration parameter (initial estimate from GIS analysis of combined sewers)

- Dry Weather Flow – System baseflow -- From flow metering data review
- C-value – Percent of precipitation that enters combined sewers from impervious area – Calibration parameter (initial estimate from site visit)
- Ksat – Precipitation threshold for pervious area response – Calibration parameter. Not all CSO basins may have a pervious area response.
- In-system storage – Equalization storage prior to an overflow when system is at capacity. In-system storage is dewatered once capacity is available – Calibration parameter (initial estimate from GIS analysis of combined sewers)
- Depression Storage – Initial abstraction or amount of precipitation that does not enter the combined sewers per rain event – Calibration parameter

NetSTORM uses the above parameters to perform the following flow balance equations for each model node for each time step. Please note that precipitation is adjusted for depression storage and seasonal evaporation.

Overflow = Total Flow – Regulator Capacity – In-system storage

Total Flow = Dry-Weather Flow + Wet-Weather Flow + Upstream Flow

Wet-Weather Flow = Impervious Area Runoff + Pervious Area Runoff

Impervious Area Runoff = C-value * Precipitation * Acreage

Pervious Area Runoff = (1 – C-value) * (Precipitation – Ksat) * Acreage

For example, consider the calibrated parameters for CSO 007 as shown in Table 8. For an individual rain event, CSO 007 would overflow if influent flows exceed 1.85 MGD and the 0.03 MG of in-system storage is exhausted. CSO 007 receives 0.05 MGD of dry-weather flow and wet-weather flow from 31 acres of upstream sanitary area. During wet-weather, the first .09 inches of rain is removed from the event due to depression storage. The adjusted precipitation is multiplied by the C-value of .15 and the area of 38.8 acres to calculate impervious area runoff. For intensities greater than 1.25 in/hour, the adjusted precipitation is multiplied by the inverse of the C-value of .85 and the area of 38.8 acres to calculate pervious area runoff.

Figure 2 presents the NetSTORM model schematic. Each CSO basin, sanitary basin upstream of the CSO basins, and sanitary interceptor were represented as a single model node. The sanitary basin with combined inlets at Vine & 4th Street was also represented as a single model node. The wastewater treatment plant (WWTP) was represented as two nodes, one for the headworks (capacity 15 MGD), and a second for primary treatment (capacity 10 MGD, 0.655 MG equalization storage).

4.0 MODEL CALIBRATION

RWA executed a calibration process to ensure the NetSTORM model will be able to accurately generate average annual CSO system statistics and size CSO facilities. The objectives of model calibration are as follows:

- Modeled event volume within +/- 20% of reliable flow metering data for both CSO capture and overflow

- Modeled average annual overflow frequency and volume are consistent with the flow metering statistics for 2005.
- Modeled event volume is consistent with flow metering data for a 10-year, 1 hour storm.

Figure 3 presents the model calibration flowchart. RWA's approach was to adjust model parameters for the two impervious area and one pervious area calibration events, then apply the single event, long-term, and design event validation events. Model parameters are not adjusted for validation events, only calibration events. If the model performance was not consistent with the metering data, then the calibration steps were repeated until the model could be successfully applied for the validation events.

The first step was the single event impervious area calibration. RWA adjusted regulator capacity, C-values, In-system storage, and depression storage to match event volume within +/- 20%, or within .02 MG of the flow metering data. **Table 2** presents a comparison of the modeled and metered capture and overflow volumes for the April 7th, 2005 and April 20-27th, 2005 calibration events.

The second step was the single event pervious area calibration. For CSOs in which the model was under-predicting the wet-weather response for high-intensity storms RWA adjusted the Ksat value to match event volume within +/- 20% or within .02 MG, where appropriate. The analysis determined that only CSO 006 had an observed pervious area response for the June 11-13th, 2005 calibration event. **Table 3** presents a comparison of the modeled and metered capture and overflow volumes for the June 11-13th, 2005 calibration event.

Table 2: Comparison of Modeled and Metered Volume for April 7, 2005 and April 20-27, 2005 Impervious Calibration Events

April 7 Event	Modeled Volume (MG)	Metered Volume (MG)	% Diff	Comments
002 Capture	0.30	0.23	30%	Metered DWF is significantly lower than average DWF
002 Overflow	0.00	0.00	0%	
003A Capture	0.63	0.66	5%	
003A Overflow	0.00	0.02	100%	Within .02 MG
003B Capture	0.04	0.03	33%	Within .02 MG
003B Overflow	0.00	0.00	0%	
004 Capture	0.15	0.15	0%	
004 Overflow	0.00	0.00	0%	
005 Capture	0.04	0.05	20%	
005 Overflow	0.00	0.00	0%	
006 Capture	0.08	0.07	14%	
006 Overflow	0.000	0.001	100%	Within .02 MG
007 Capture	0.12	0.10	20%	
007 Overflow	0.00	0.00	0%	
008 Capture	0.32	0.28	14%	
008 Overflow	0.00	0.00	0%	
010 Capture	0.004	0.003	100%	Within .02 MG
010 Overflow	0.000	0.000	0%	
WWTP Capture	5.73	4.64	23%	Metered volume is below system DWF (4.99 MGD)
WWTP Overflow	0.00	Not Reported	N/A	
April 20-27 Event	Modeled Volume (MG)	Metered Volume (MG)	% Diff	Comments
002 Capture	2.37	2.01	18%	
002 Overflow	0.08	0.08	2%	
003A Capture	4.49	5.37	16%	
003A Overflow	0.46	0.47	1%	
003B Capture	0.31	0.30	5%	
003B Overflow	0.01	0.01	0%	
004 Capture	1.24	1.20	3%	
004 Overflow	0.02	0.02	21%	Within .02 MG
005 Capture	0.35	0.19	82%	Metered capture could not be matched without compromising model validation
005 Overflow	0.0000	0.0001	100%	Within .02 MG
006 Capture	0.61	0.46	32%	Metered capture could not be matched without compromising model validation
006 Overflow	0.07	0.09	15%	
007 Capture	0.99	0.95	4%	
007 Overflow	0.00	0.00	0%	
008 Capture	2.48	2.68	8%	
008 Overflow	0.006	0.002	191%	Within .02 MG
010 Capture	0.04	0.02	77%	Within .02 MG
010 Overflow	0.00	0.00	0%	
WWTP Capture	45.79	56.20	19%	
WWTP Overflow	0.00	Reported 4/23/05	N/A	Reported bypass may not be due to wet weather

Table 3: Comparison of Modeled and Metered Volume for June 11-13 Pervious Calibration Event

June 11-13 Event	Modeled Volume (MG)	Metered Volume (MG)	% Diff	Comments
002 Capture	0.82	0.97	15%	
002 Overflow	0.18	0.10	80%	Impervious Area Response exceeds metered volume -- No pervious area response assigned
003A Capture	1.48	1.63	9%	
003A Overflow	0.41	0.32	28%	Impervious Area Response exceeds metered volume -- No pervious area response assigned
003B Capture	0.10	0.09	11%	
003B Overflow	0.03	0.02	50%	Impervious Area Response exceeds metered volume -- No pervious area response assigned
004 Capture	0.46	0.30	53%	Impervious Area Response exceeds metered volume -- No pervious area response assigned
004 Overflow	0.04	0.01	300%	Impervious Area Response exceeds metered volume -- No pervious area response assigned
005 Capture	0.13	0.13	0%	Substitute for 4/20-27, 2005 Event
005 Overflow	0.01	0.00	400%	Within .02 MG
006 Capture	0.19	0.21	10%	Substitute for 4/20-27, 2005 Event
006 Overflow	0.16	0.15	7%	
007 Capture	0.37	0.41	10%	
007 Overflow	0.04	0.04	0%	
008 Capture	0.88	0.88	0%	
008 Overflow	0.14	0.03	367%	Impervious Area Response exceeds metered volume -- No pervious area response assigned
010 Capture	0.02	0.01	100%	Within .02 MG
010 Overflow	0.00	0.01	100%	Within .02 MG
WWTP Capture	16.94	16.80	1%	
WWTP Overflow	0.00	Not reported	N/A	

The third step was the single event validation. RWA applied the June 5th and September 28-29th events and determined that the modeled event volume was within +/- 20% or within .02 MG for the majority of the CSOs. It should be noted that the meter at CSO 008 was out of service and CSO 010 recorded questionable data for the September 28-29th event. **Table 4** presents a comparison of the modeled and metered capture and overflow volumes for the June 5, 2005 and September 28-29th, 2005 validation events.

Figures 4 and 5 present the scatter plots for capture and overflow volume, respectively for the three calibration and two validation events. The “perfect” fit 1:1 line and +/- 20% percent accuracy bands are also shown. The overall model accuracy is sufficient for LTCP planning-purposes.

Table 4: Comparison of Modeled and Metered Volume for June 5, 2005 and September 28-29, 2005 Validation Events

June 5 Event	Modeled Volume (MG)	Metered Volume (MG)	% Diff	Comments
002 Capture	0.26	0.40	35%	Metered capture could not be matched without compromising model calibration
002 Overflow	0.00	0.02	100%	Within .02 MG
003A Capture	0.44	0.49	10%	
003A Overflow	0.08	0.05	60%	Metered overflow could not be matched without compromising model calibration
003B Capture	0.03	0.02	50%	Within .02 MG
003B Overflow	0.000	0.005	100%	Within .02 MG
004 Capture	0.13	0.10	30%	Metered capture could not be matched without compromising model calibration
004 Overflow	0.0000	0.0005	100%	Within .02 MG
005 Capture	0.03	0.03	0%	Substitute for 4/20-27, 2005 Event
005 Overflow	0.00	0.00	0%	
006 Capture	0.06	0.05	20%	Substitute for 4/20-27, 2005 Event
006 Overflow	0.000	0.007	100%	Within .02 MG
007 Capture	0.10	0.09	11%	
007 Overflow	0.00	0.00	0%	
008 Capture	0.24	0.23	4%	
008 Overflow	0.00	0.00	0%	
010 Capture	0.004	0.006	100%	Within .02 MG
010 Overflow	0.000	0.000	0%	
WWTP Capture	5.55	5.47	1%	
WWTP Overflow	0.00	Not Reported	N/A	
September 28-29 Event	Modeled Volume (MG)	Metered Volume (MG)	% Diff	Comments
002 Capture	0.47	0.72	35%	Metered DWF is significantly higher than average DWF
002 Overflow	0.000	0.003	100%	Within .02 MG
003A Capture	0.83	0.77	8%	
003A Overflow	0.08	0.02	300%	Metered overflow could not be matched without compromising model calibration
003B Capture	0.05	0.04	25%	Within .02 MG
003B Overflow	0.00	0.00	0%	
004 Capture	0.24	0.25	4%	
004 Overflow	0.000	0.001	100%	Within .02 MG
005 Capture	0.06	0.06	0%	Substitute for 4/20-27, 2005 Event
005 Overflow	0.00	0.00	0%	
006 Capture	0.10	0.11	9%	Substitute for 4/20-27, 2005 Event
006 Overflow	0.000	0.014	100%	Within .02 MG
007 Capture	0.17	0.14	21%	Metered capture could not be matched without compromising model calibration
007 Overflow	0.00	0.00	0%	
008 Capture	0.41	0.09	356%	Meter out of service for event
008 Overflow	0.000	0.000	0%	Meter out of service for event
010 Capture	0.01	0.00	122%	Questionable data observed for event
010 Overflow	0.00	0.00	0%	Questionable data observed for event
WWTP Capture	10.82	10.33	5%	
WWTP Overflow	0.00	Not Reported	N/A	

The fourth step was the long-term validation. RWA applied the entire 2000-2005 precipitation record and compared the average annual overflow frequency and volume against the 2000 and 2000-2005 flow metering data. Based on the analysis summarized in Section 2, RWA determined that only CSO events greater than .01 MG should be considered for the long-term model validation. These small events will be fully captured by facilities sized for the 10-year, 1-hour design storm. **Table 5** presents a comparison of the modeled and metered average annual overflow frequency for both 2005 and 2000-2005. The modeled overflow frequency is consistent with the metered data. Please note that in order to be comparable with the flow metering data presented in the DMR reports, the modeled overflow frequency is presented as days with a CSO event. This is often slightly below the actual overflow frequency, as it is possible to observe multiple CSO events in the same day. **Table 6** presents a comparison of the modeled and metered average annual overflow volume for both 2005 and 2000-2005. As discussed in Section 2, the metered overflow volume for 2005 is significantly lower than the 2000-2004 data. However, the modeled overflow volume is consistent with the 2005 data that was generated from the current flow metering program.

Table 5: Average Annual Overflow Frequency (# of Days with CSO Events)

Year	02	03A	03B	04	05	06	07	08	010	WWTP	System
2005 Metered (.01 MG and Over)	19	34	N/A	6	3	21	8	8	3	9	34
2005 Modeled	14	31	11	7	4	18	5	11	1	3	31
2000-2005 Metered (.01 MG and Over)	15	36	0.2	22	4	30	9	14	4	2	36
2000-2005 Modeled	15	32	9	7	5	20	5	9	1	3	32

Note: CSO 003B overflow events are combined with 003A on 2005 DMR reports and is not reported individually.

Table 6: Average Annual Overflow Volume (MG)

Year	02	03A	03B	04	05	06	07	08	010	WWTP	Total (MG)
2005 Metered	0.98	7.22	N/A	0.24	0.11	1.65	0.64	0.16	0.09	N/A	11.09
2005 Modeled	1.50	6.78	0.24	0.30	0.09	1.55	0.57	0.99	0.09	0.26	12.36
2000-2005 Metered	1.00	19.40	0.01	6.98	0.40	4.03	0.85	1.94	0.13	N/A	34.74
2000-2005 Modeled	1.63	7.47	0.26	0.41	0.11	1.63	0.60	1.05	0.12	0.88	14.17

Note: CSO 003B overflow volume is combined with 003A on 2005 DMR reports and is not reported individually.

To ensure that the NetSTORM model has not been calibrated to under-predict CSO volumes and therefore under-size CSO facilities, the May 27th, 2004 event was applied as a final validation step. The event has the largest peak intensity of the 2000-2005 period, 2.18 inches per hour, and was recorded during the 2000-2004 period when higher CSO volumes were observed. If the modeled CSO volumes for the May 27th, 2004 event are equal or greater than the observed CSO volume, then the model can be applied with confidence for the 10-year, 1 hour design storm. **Table 7** presents a comparison of the modeled and metered overflow volume for the May 27th, 2004 event. As shown in the table, the modeled overflow volume is greater than the metered volume.

Table 7: Comparison of Modeled and Metered Overflow Volumes
May 27, 2004 Design Event

CSO	Metered Volume (MG)	Modeled Volume (MG)
002	0.56	0.55
003A	0.79	0.78
003B	No Overflow Reported	0.12
004	0.56	0.15
005	0.01	0.08
006	0.35	0.68
007	0.10	1.09
008	0.20	0.53
010	0.03	0.41
Total	**2.59**	**4.38**

5.0 SUMMARY

Table 8 presents the calibrated input data for the NetSTORM model. The model has been successfully calibrated and validated to long-term data and may be applied to support the update of the Noblesville LTCP. As discussed in Section 2, the model will be applied for the 10-year, 1 hour design storm, the 2000-2005 Noblesville precipitation record, and the 1950-2005 long-term precipitation record at the Indianapolis Airport gauge.

Because NetSTORM is a simplistic model, RWA does not recommend its use beyond LTCP support or conceptual CSO planning purposes. To support specific facility planning or design of CSO facilities, RWA recommends that a SWMM model be developed, with additional flow meters sited in the major sanitary interceptors and combined interceptors upstream of the regulators.

cc: Roger Kelso
Zig Resiak

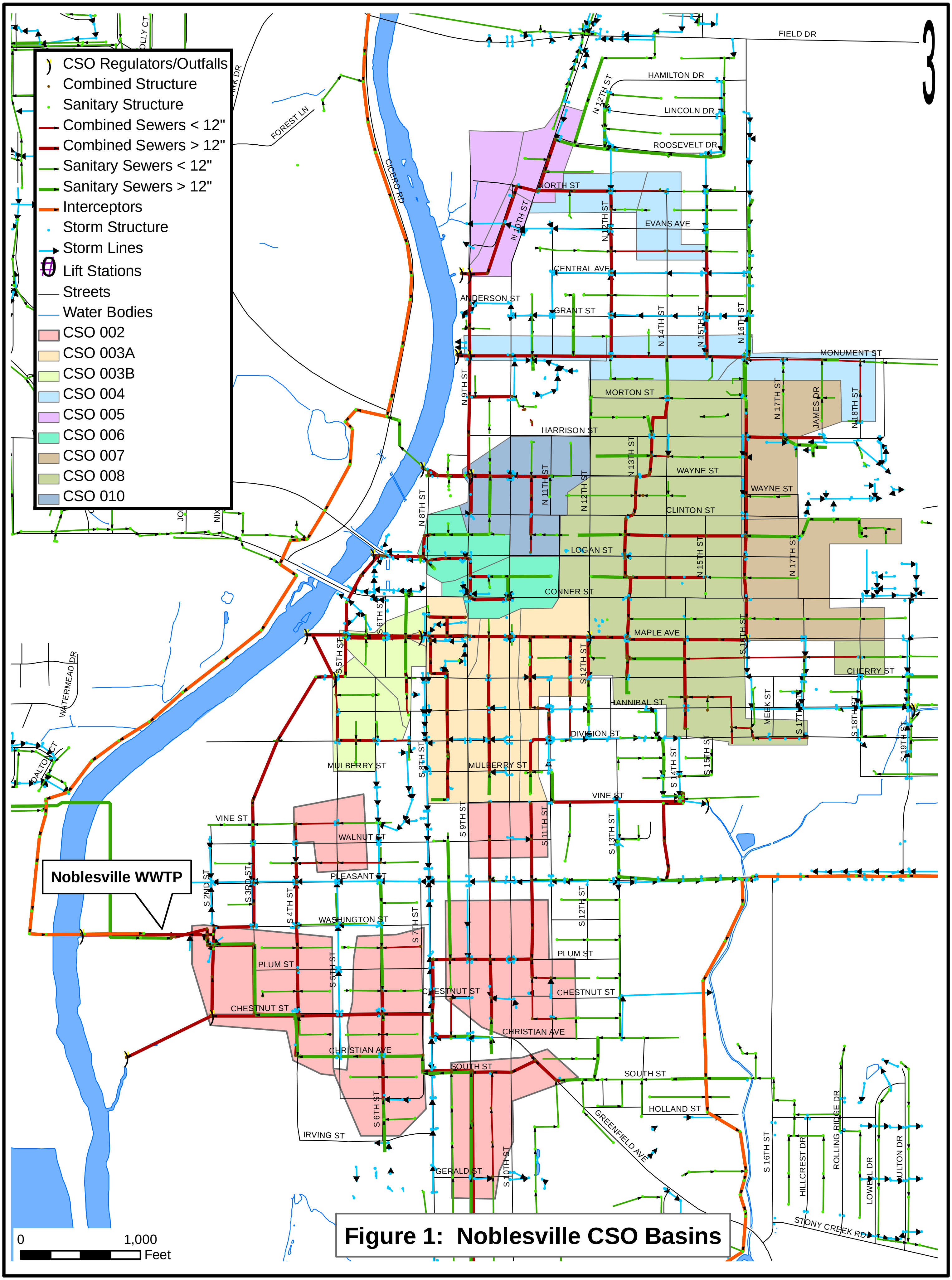


Figure 1: Noblesville CSO Basins

Figure 2: Noblesville Model Schematic

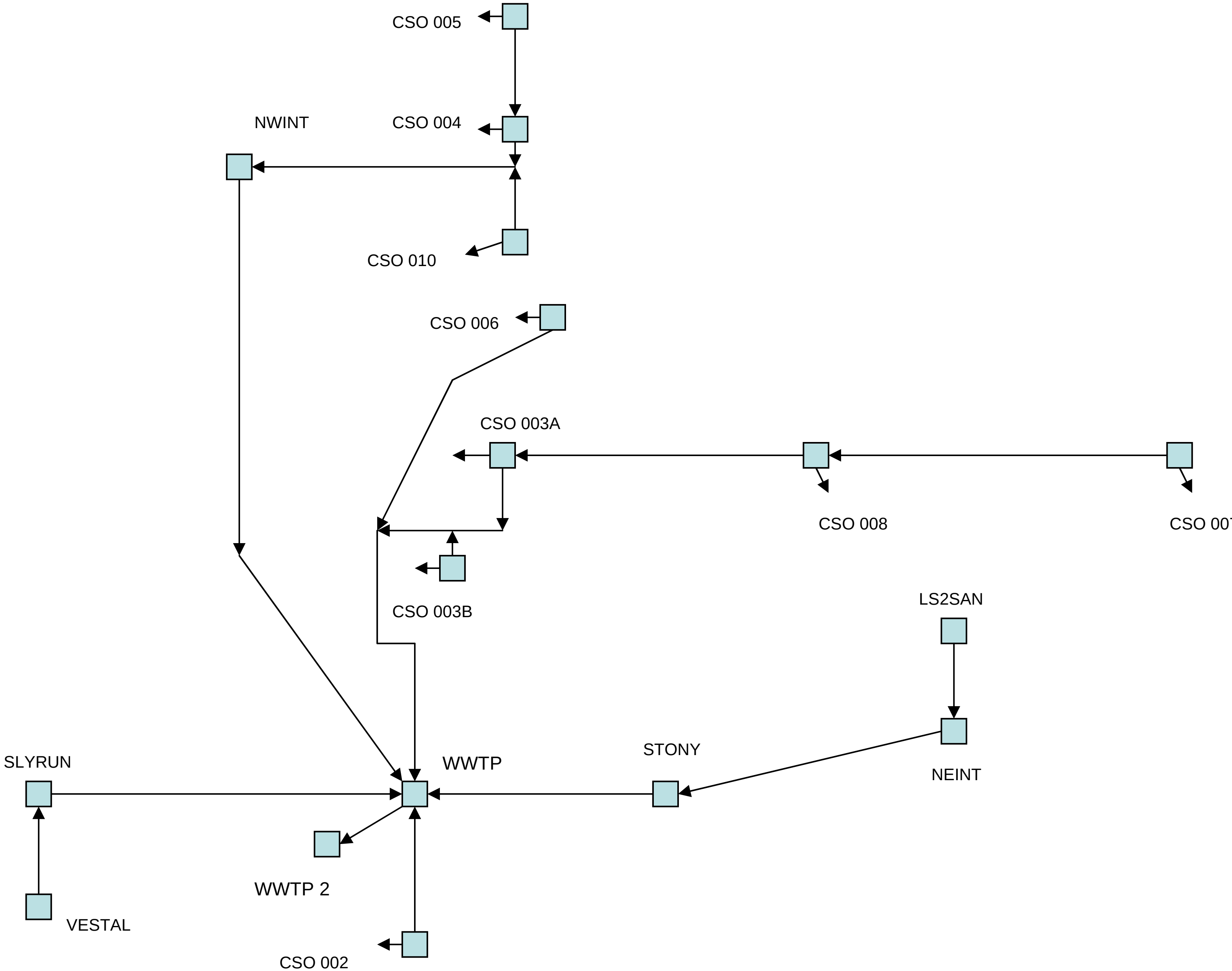


Figure 3 – Model Calibration Flowchart

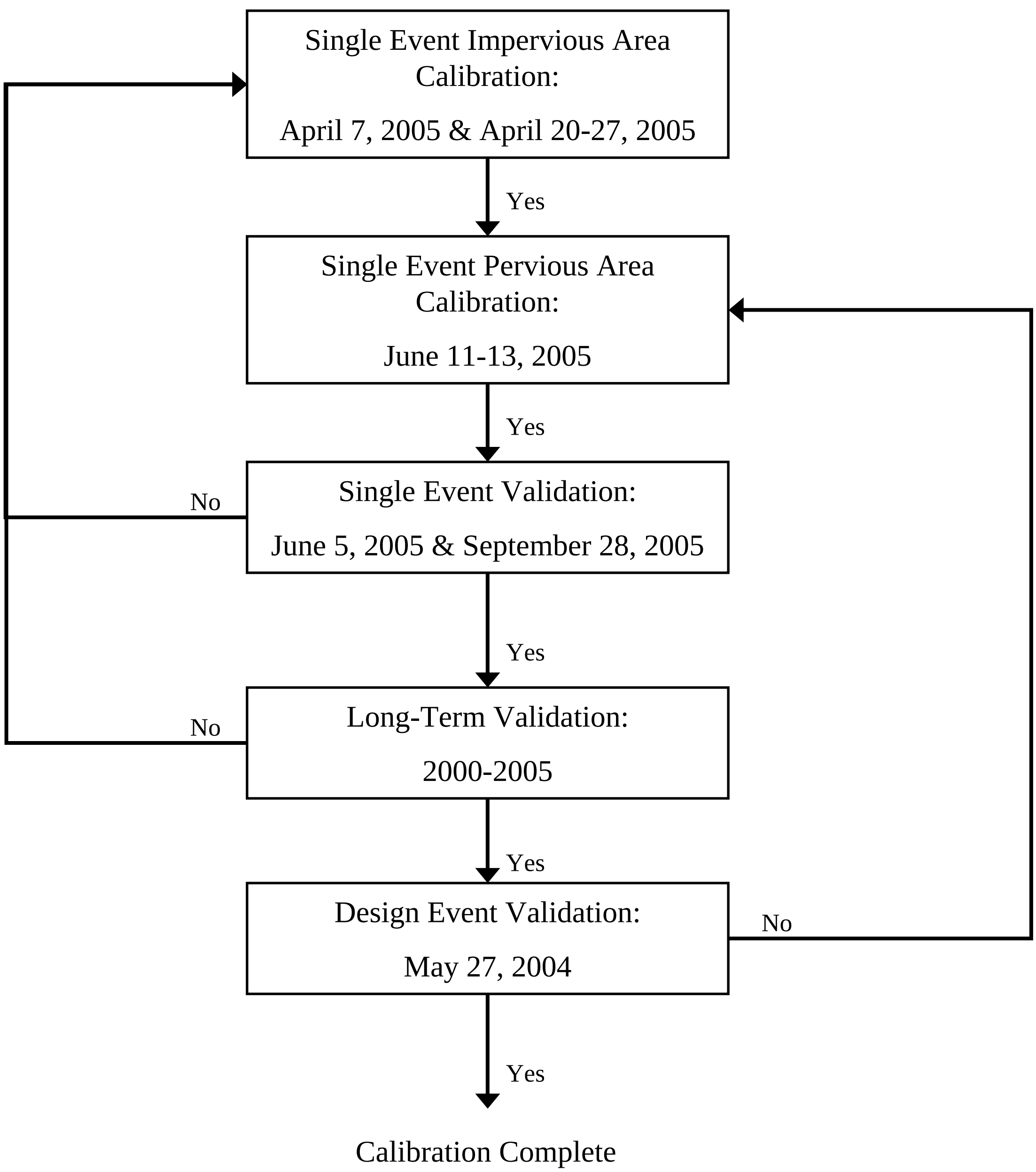


Figure 4: Noblesville Calibration And Validation Events Scatter Graph for Captured Volumes

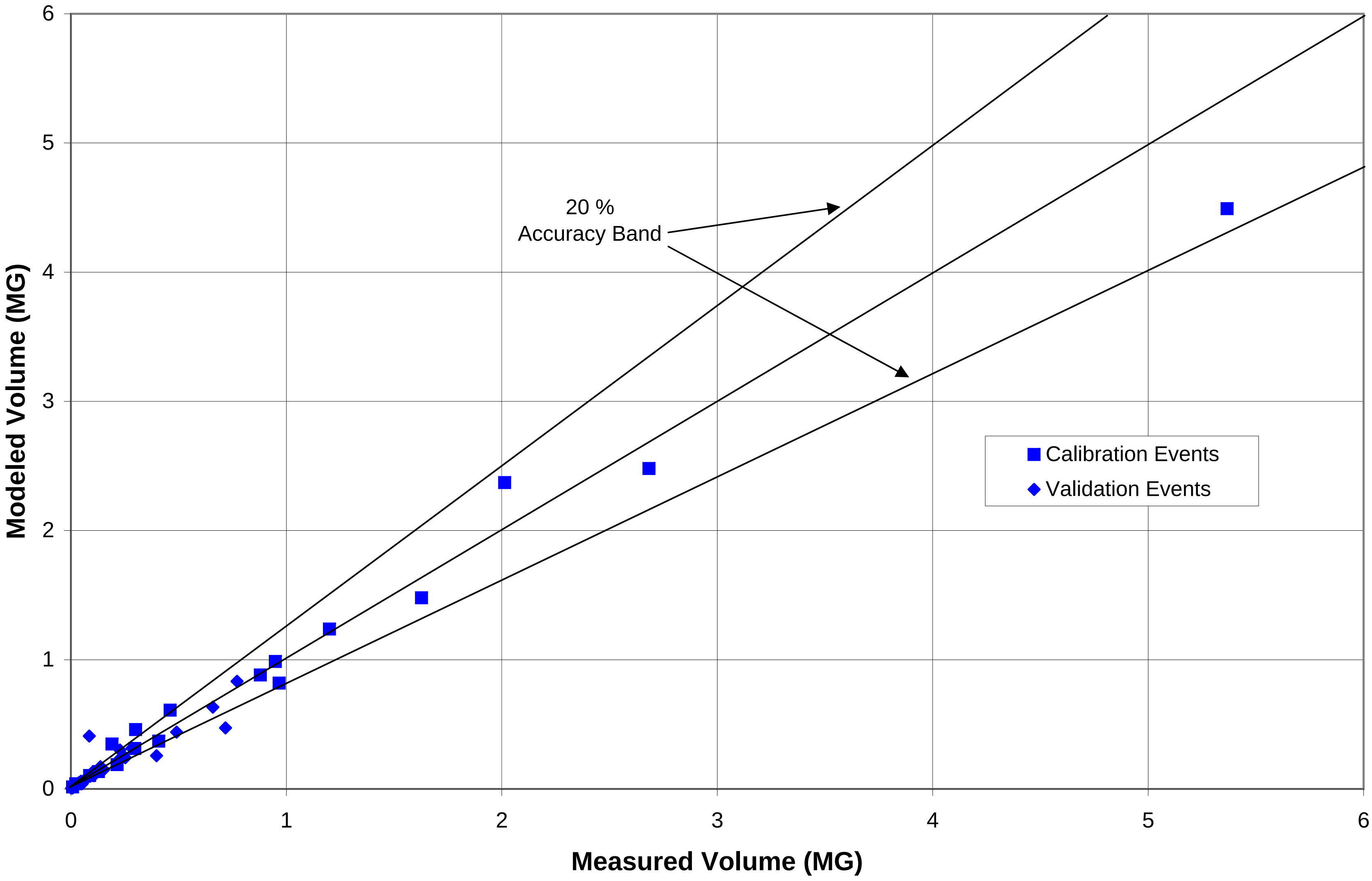


Figure 5: Noblesville Calibration And Validation Events Scatter Graph for Overflow Volumes

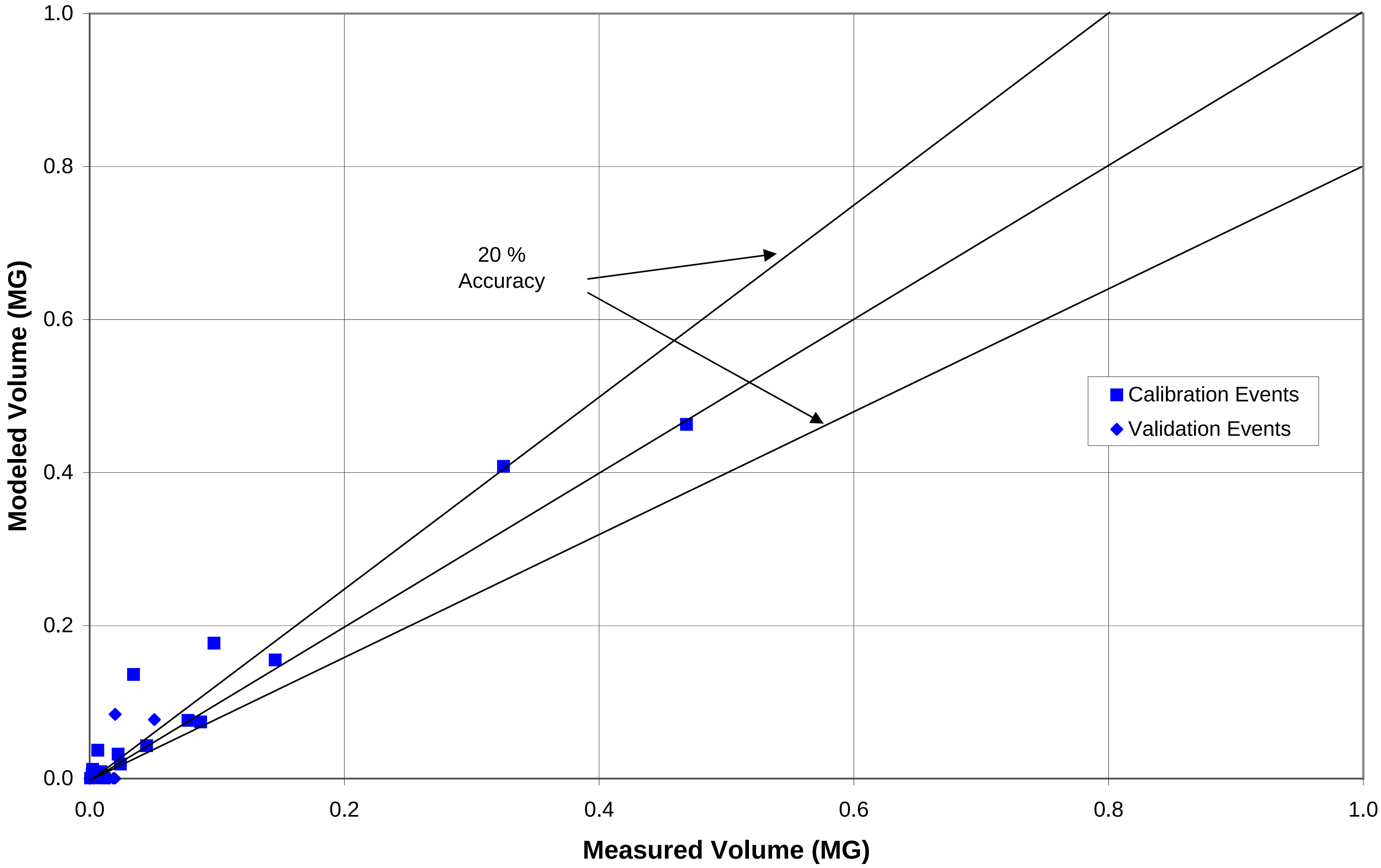


Table 8: Calibrated NetSTORM Model Parameters

Model Node	Description	Basin Area (acres)	Regulator Capacity (MGD)	DWF (MGD)	C-value	Ksat (in)	In-System Storage (MG)	Depression Storage (in)	Downstream Node
002	CSO 002 Basin	101.7	2.3	0.17	0.09	N/A	0.01	0.09	WWTP
002SAN	CSO 002 - Upstream Sanitary Area	223	1.78	0	0.01	N/A	0.08	0.2	002
003A	CSO 003A Basin	43	2.7	0.2	0.24	N/A	0.03	0.06	WWTP
003ASAN	CSO 003A - Upstream Sanitary Area	4	4.9	0	0.02	N/A	0.01	0.2	003A
003B	CSO 003B Basin	16.7	0.5	0.01	0.13	N/A	0.01	0.09	WWTP
003BSAN	CSO 003B - Upstream Sanitary Area	40	6	0	0.01	N/A	0.03	0.2	003B
004	CSO 004 Basin	11.1	0.5	0.07	0.13	N/A	0.08	0.08	NWINT
004SAN	CSO 004 - Upstream Sanitary Area	216	2.5	0	0.01	N/A	0.02	0.2	004
005	CSO 005 Basin	18.1	0.4	0.02	0.09	N/A	0.02	0.1	004
005SAN	CSO 005 - Upstream Sanitary Area	38	1.24	0	0.01	N/A	0.03	0.2	005
006	CSO 006 Basin	15.2	0.4	0.02	0.35	0.71	0.03	0.1	WWTP
006SAN	CSO 006 - Upstream Sanitary Area	8	4.26	0	0.01	N/A	0.01	0.2	006
007	CSO 007 Basin	38.8	1.85	0.05	0.15	1.25	0.03	0.09	008
007SAN	CSO 007 - Upstream Sanitary Area	31	4.56	0	0.01	N/A	0.01	0.2	007
008	CSO 008 Basin	93.1	4.5	0.05	0.12	N/A	0.03	0.08	003A
008SAN	CSO 008 - Upstream Sanitary Area	10	20.71	0	0.02	N/A	0.01	0.2	008
010	CSO 010 Basin	18.2	0.2	0.003	0.01	1.3	0.01	0.15	NWINT
010SAN	CSO 010 - Upstream Sanitary Area	24	2.68	0	0.001	N/A	0.02	0.3	010
LS2SAN	Combined Inlets @ Vine & 4th Street	15	2	0.01	0.05	N/A	0.01	0.2	NEINT
NEINT	Northeast Interceptor	1184	6.31	0.57	0.002	N/A	0.49	0.3	STONY
NWINT	Northwest Interceptor	2540	3.64	0.97	0.001	N/A	0.72	0.3	WWTP
SLYRUN	Sly Run Interceptor	4323	15.77	1.79	0.001	N/A	2.15	0.3	WWTP
STONY	Stony Creek Interceptor	4714	4.4	0.87	0.001	N/A	1.02	0.3	WWTP
VESTAL	Vestal Ditch Interceptor	2640	1.44	0.19	0.001	N/A	0.45	0.3	SLYRUN
WWTP	WWTP Headworks	0	15	0	0	N/A	0.25	0	WWTP2
WWTP2	WWTP Primary Treatment	0	10	0	0	N/A	0.655	0	NONE

Appendix B: Recorded Observations of Threatened or Endangered Species within the Project Area

Endangered, Threatened and Rare Species, and High Quality Natural Communities near a project area, Noblesville, Indiana

TYPE	SPECIES NAME	COMMON NAME	FED	STATE	TRS	LASTOBS	COMMENTS
Bird	Nycticorax nycticorax	Black-crowned Night-heron		SE	019N004E 36	1930-05-17	
Mollusk	Epioblasma torulosa rangiana	Northern Riffleshell	LE	SE	019N004E 36	2000-08-29	Weathered dead
Mollusk	Lampsilis fasciola	Wavyrayed Lampmussel		SSC	019N004E 36	2000-08-29	Weathered dead
Mollusk	Obovaria subrotunda	Round Hickorynut		SSC	017N004E 17	2000-08-29	Weathered Dead
Mollusk	Pleurobema clava	Clubshell	LE	SE	018N005E 7	2000-08-30	Weathered Dead
Mollusk	Ptychobranchus fasciolaris	Kidneyshell		SSC	019N005E 21	2000-08-29	Weathered dead
Mollusk	Quadrula cylindrica cylindrica	Rabbitsfoot		SE	018N005E 7	1991-08-18	WEATHERED SHELLS
Mollusk	Toxolasma parvum	Lilliput			019N004E 36 NWQ SEQ SEQ	1989-08-09	WEATHERED SHELLS
Mollusk	Villosa fabalis	Rayed Bean	C	SSC	019N004E 36 NWQ SEQ SEQ	1989-08-09	SUBFOSSIL
Mollusk	Villosa lienosa	Little Spectaclecase		SSC	019N004E 36 NWQ SEQ SEQ	2000-08-29	WEATHERED SHELLS

Fed: LE = listed federal endangered; C = federal candidate species

State: SE = state endangered; ST = state threatened; SR = state rare; SSC = state species of special concern; SG = state significant; WL = watch list; no rank = not ranked but tracked to monitor status

Grank: Heritage Global Rank: G1 = critically imperiled; G2 = imperiled; G3 = rare or uncommon; G4 = widespread but with long term concerns; G5 = widespread and secure; GU = unranked

Srank: State Heritage Rank: S1 = critically imperiled; S2 = imperiled; S3 = rare or uncommon; S4 = widespread but with long term concerns SNR = not ranked; B = breeding rank; SNA = not resident in state in non-breeding season

Appendix C: U.S. Fish and Wildlife Letter Regarding Endangered Species within Hamilton County

United States Department of the Interior
Fish and Wildlife Service

Bloomington Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

January 22, 2007

Mr. Jonathan Mirgeaux
R.W. Armstrong
300 South Meridian Street
Indianapolis, Indiana 46225-1193

Dear Mr. Mirgeaux:

This responds to your letter of January 12, 2007 requesting information from the U.S. Fish and Wildlife Service (FWS) for a combined sewer overflow (CSO) long-term control plan for Noblesville in Hamilton County, Indiana.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the U. S. Fish and Wildlife Service's Mitigation Policy.

The White River supports a significant aquatic faunal community and the undeveloped portions of the floodplain and tributaries provide important habitat for terrestrial and wetland wildlife. We are not aware of any significant natural areas in the study area. Portions of Stony Creek may be considered sensitive if they contain significant contaminant residues from the Firestone plant remediation. Elimination of CSO's will improve the quality of the White River.

Endangered Species

The proposed project is within the range of the federally endangered Indiana bat (*Myotis sodalis*) and federally threatened bald eagle (*Haliaeetus leucocephalus*). There are no records of either species near the study area. Bald eagles have established several nests along the White River, however as of 2006 nesting had not extended as far upstream as Hamilton County. The forested floodplain of the White River and its tributaries provide good summer habitat for Indiana bats. As long as the Plan does not include substantial tree removal we do not anticipate any adverse impacts on Indiana bats. Improvements in water quality from CSO abatement will ultimately help both species.

For further discussion, please contact Mike Litwin at (812) 334-4261 ext. 205.

Sincerely yours,

Michael S. Litwin

for Scott E. Pruitt
Field Supervisor

Appendix D: Hamilton County Health Department Letter Regarding Drinking Water Source Waters within the Project Area

HAMILTON COUNTY HEALTH DEPARTMENT

CHARLES HARRIS, M.D. • HEALTH OFFICER

March 12, 2007

RECEIVED
MAR 12 2007
By

Jonathan Mirgeaux
Project Manager
RW Armstrong
Union Station
300 S. Meridian Street
Indianapolis, IN 46225

Re: Sensitive Area Determination for the Noblesville Combined Sewer Overflow Long Term Control Plan

Dear Jonathan:

I am in receipt of your letter concerning drinking water wells within the Noblesville study area.

There are two locations of concern that you should be aware. Indiana American Water Company has two public water supply wells located adjacent to the White River north of the Logan Street bridge. The two wells are across from the Forest Park Golf course on the east side of St. Rd. 19. I am unsure of the status of these wells as the utility has constructed new wells north of Noblesville near Potters Bridge.

The other concern is quite a distance away but still might be of concern. Indianapolis (Viola) Water has a surface treatment plant on the White River just north of the 116th Street bridge on the west side of the river.

I am unaware of any other public or private water supply wells or surface water treatment plants near your study area.

If we can be of any other assistance, please do not hesitate to contact me.

Sincerely,

Barry McNulty, REHS
Administrator

ONE HAMILTON COUNTY SQUARE, SUITE 30
NOBLESVILLE, INDIANA 46060-2229
(317) 776-8500 • FAX (317) 776-8506
www.co.hamilton.in.us

Appendix E: Facility Plan (City of Noblesville, 2004) Growth Projection

CHAPTER 1

INTRODUCTION

1.1 PROJECT HISTORY

The Noblesville Wastewater Treatment Plant (WWTP) was originally constructed in 1948-49 when primary and secondary treatment units were built. Chlorination of the final effluent was added in 1969.

The plant was upgraded and expanded in 1973. The additions provided an average daily treatment capacity of 2.3 million gallons per day (MGD) and a peak hourly flow of 4.6 MGD. The 1973 improvements included raw sewage pumps, grit removal tank, conversion of secondary settling tanks to serve as primary settling tanks, aeration tanks, air supply blowers and building, secondary settling tanks, aerobic digestion tanks, and sludge lagoons.

In 1991, the City commenced construction of an expansion to the WWTP. The expansion was completed in 1994 at a cost of approximately $18 million. The expansion included the installation of a new headworks structure (consisting of two coarse bar screens, a mechanically cleaned fine screen, four raw sewage pumps, two grit tanks, two grit pumps and a grit classifier); four primary clarifiers; two primary sludge pumps; six aeration tanks; four aeration blowers; two secondary clarifiers; three return sludge pumps; two waste sludge pumps; a re-aeration structure; a chlorination/dechlorination tank; two anaerobic digesters; a sludge handling building housing a gravity belt thickener, a belt filter press; and sludge transfer pumps; a sludge loading station; an administration building; and a dewatered sludge storage area. The existing aeration tanks were converted to flow equalization tanks, the existing secondary sedimentation tanks were converted to a waste activated sludge gravity thickener, and the existing aerobic digesters were retained. The existing sludge lagoons, girt chamber, and primary settling tanks were demolished.

As a result of the 1994 expansion, the plant now has a design average daily flow rate of 5 MGD, a 10 MGD peak hourly hydraulic capacity, a 0.655 MG equalization tank capacity, and a 15 MGD pumping capacity. At flows from 5 to 10 MGD, the plant can provide full treatment (primary treatment, single stage nitrification, aeration, and effluent chlorination and dechlorination) to all flows, but not on a sustained basis, and subject to the 10 MGD mass loading effluent limits that are outlined in the City's National Pollutant Discharge Elimination System (NPDES) permit. For flows greater than 10 MGD to 15 MGD, the plant can provide preliminary (fine screening and grit removal) treatment, aeration and interim storage of that flow up to 0.655 MG for eventual full treatment. High flow in excess of the 0.655 MG storage capacity receives effluent chlorination before discharging such excess flows to the White River through Outfall 009.

This project involves two separate evaluations: wet-weather improvements and overall plant expansion. The wet-weather improvements involve modeling scenarios to determine the size of the interceptor upgrade and wet-weather storage facilities necessary to reduce CSO events. An evaluation of the headworks facilities to upgrade the headworks from 15 MGD peak capacity to 30 MGD peak capacity as well as various plant improvements to accommodate wet-weather flows will also be performed in the wet-weather improvements portion of this study. The other portion of this facility plan involves expanding the plant capacity from its current design average flow of 5 MGD to 10 MGD, with a peak hourly flow expansion from 10 MGD to 20 MGD. Alternative disinfection processes will also be evaluated. The plant expansion portion of the study will also involve an analysis of the sludge handling facilities.

1.2 DESCRIPTION OF EXISTING CONDITIONS

The City of Noblesville's sewer system contains both combined and separate sanitary sewers, with approximately 92% of the sewer system constructed as separate sewers. Although the combined sewer system is limited to the downtown area of the city, the wet-weather flows that are conveyed to the plant can cause upsets. Due to heavy rainfalls within the past three years, the City of Noblesville has experienced flooding that has raised concern about the system's ability to handle wet-weather flows. Therefore, the expansion of the plant headworks and the upgrade in size of the combined sewer interceptor will be evaluated to determine their effect on the ability of the plant to handle wet-weather flows. With this evaluation, the size and type of wet-weather storage at the WWTP will be analyzed to ensure that the Noblesville WWTP and sewer system will be adequate to capture at least 85% of the wet-weather flow events, as is mandated in the City's Combined Sewer Overflow Long Term Control Plan.

In addition to receiving wet-weather flows, the Noblesville WWTP is receiving increasingly more dry-weather flow due to the rapid growth of the City. Table 1.1 shows the population of Hamilton County, Noblesville Township, and the City of Noblesville since 1950 as well as population projections for Hamilton County through 2015. Hamilton County has the fastest growing population in Indiana, according to the 2000 Census. The population of the City of Noblesville grew by 38% between the 1990 and 2000 Census, an even greater growth than between the 1980 and 1990 Census (32% growth). It is expected that the City will continue to see a similar growth in population over the next 10-20 years based upon the City of Noblesville Comprehensive Master Plan.

With increased growth, the average daily flow of the WWTP will continue to increase. Table 1.1 shows that the population of Noblesville Township, most of which is served by the WWTP, will grow to above 50,000 by 2010. With conservative estimates of 100 gallons per capita per day (gpcd), this indicates that the plant will reach its average daily flow of 5 MGD by 2010. Therefore, the design average daily flow of the WWTP should be increased from 5 MGD to 10 MGD before 2010. The plant expansion will also increase the peak hourly flow of the WWTP from 10 MGD to 20 MGD. The peak flow expansion will allow for the treatment of additional wet-weather flow that will be captured by the interceptor upgrade and wet-weather storage facility in the wet-weather improvements.

TABLE 1.1
POPULATION OF HAMILTON COUNTY, NOBLESVILLE TOWNSHIP, AND CITY OF NOBLESVILLE (1950-PRESENT)

Year	Hamilton County	Noblesville Township	City of Noblesville
1950	28,491	11,000	6,561
1960	40,132	12,150	7,664
1970	54,532	13,289	7,548
1980	82,027	18,894	12,056
1990	108,936	24,247	17,655
2000	182,740	34,534	28,590
2005	216,826 (2003)		
2010	298,642	53,500*	
2020	369,260		

*The population projected for Noblesville Township in the City of Noblesville Comprehensive Master Plan update of 2003 was a range of 50,530 to 56,450. The number given in the table is an average of that range. Data for this table was obtained from the U.S. Census Bureau and the City of Noblesville Comprehensive Master Plan.

Appendix F: Project Planning Schedule

NOBLESVILLE LONG TERM CONTROL PLAN DESIGN & CONSTRUCTION SCHEDULE

ID	Task Name	Duration	Start	Finish
1	**CSO LTCP**	**4224 days**	**Tue 10/24/06**	**Fri 12/30/22**
2	**INTERCEPTOR UPGRADE**	**49 days**	**Tue 10/24/06**	**Fri 12/29/06**
3	Construction	49 days	Tue 10/24/06	Fri 12/29/06
4	Construction Services	49 days	Tue 10/24/06	Fri 12/29/06
5	**PHASE 1 - HEADWORKS EXPANSION & FLOW EQUALIZATION**	**310 days**	**Tue 10/24/06**	**Mon 12/31/07**
6	Design	49 days	Tue 10/24/06	Fri 12/29/06
7	Construction	175 days	Tue 5/1/07	Mon 12/31/07
8	Construction Services	175 days	Tue 5/1/07	Mon 12/31/07
9	**PHASE 2 - TREATMENT PLANT EXPANSION**	**1045 days**	**Mon 1/1/07**	**Fri 12/31/10**
10	Design	261 days	Mon 1/1/07	Mon 12/31/07
11	Construction	784 days	Tue 1/1/08	Fri 12/31/10
12	Construction Services	784 days	Tue 1/1/08	Fri 12/31/10
13	**PROPOSED PROJECTS**	**4175 days**	**Mon 1/1/07**	**Fri 12/30/22**
14	**PROJECT A - CENTRAL BASIN STORAGE**	**4110 days**	**Mon 4/2/07**	**Fri 12/30/22**
15	Preliminary Design	196 days	Mon 4/2/07	Mon 12/31/07
16	Final Design	262 days	Tue 1/1/08	Wed 12/31/08
17	Construction - Phase 1	262 days	Wed 5/30/12	Thu 5/30/13
18	Construction Services - Phase 1	262 days	Wed 5/30/12	Thu 5/30/13
19	Construction - Phase 2	180 days	Tue 8/23/16	Mon 5/1/17
20	Construction Services - Phase 2	180 days	Tue 8/23/16	Mon 5/1/17
21	Post Construction Monitoring	783 days	Wed 1/1/20	Fri 12/30/22
22	**PROJECT A - CENTRAL BASIN CONVEYANCE**	**4109 days**	**Mon 4/2/07**	**Thu 12/29/22**
23	Preliminary Design	196 days	Mon 4/2/07	Mon 12/31/07
24	Final Design	262 days	Tue 1/1/08	Wed 12/31/08
25	Construction	600 days	Thu 7/3/14	Wed 10/19/16
26	Construction Services	600 days	Thu 7/3/14	Wed 10/19/16
27	Post Construction Monitoring	1565 days	Fri 12/30/16	Thu 12/29/22
28	**PROJECT B - TREATMENT PLANT IMPROVEMENTS; HIGH RATE TREATMENT**	**3914 days**	**Tue 1/1/08**	**Fri 12/30/22**
29	Preliminary Design	110 days	Tue 1/1/08	Mon 6/2/08
30	Final Design	181 days	Mon 1/3/11	Mon 9/12/11
31	Construction	300 days	Tue 7/3/12	Mon 8/26/13
32	Construction Services	300 days	Tue 7/3/12	Mon 8/26/13
33	Post Construction Monitoring	2348 days	Wed 1/1/14	Fri 12/30/22
34	**PROJECT C - EAST BASIN CONVEYANCE (CONNER ST.) INDOT DEPENDENT**	**1049 days**	**Mon 4/2/07**	**Thu 4/7/11**
35	Preliminary Design	196 days	Mon 4/2/07	Mon 12/31/07
36	Final Design	262 days	Tue 1/1/08	Wed 12/31/08
37	INDOT Approval	110 days	Mon 4/2/07	Fri 8/31/07
38	Construction	330 days	Fri 1/1/10	Thu 4/7/11
39	Construction Services	330 days	Fri 1/1/10	Thu 4/7/11
40	**PROJECT D - NORTH BASIN SEWER SEPARATION**	**1565 days**	**Mon 1/2/17**	**Fri 12/30/22**
41	Preliminary Design	66 days	Mon 1/2/17	Mon 4/3/17
42	Final Design	174 days	Tue 5/2/17	Fri 12/29/17
43	Construction	880 days	Wed 5/2/18	Tue 9/14/21
44	Construction Services	880 days	Wed 5/2/18	Tue 9/14/21
45	Post Construction Monitoring	338 days	Wed 9/15/21	Fri 12/30/22
46	**PROJECT E - SOUTH BASIN CONVEYANCE**	**593 days**	**Wed 9/23/20**	**Fri 12/30/22**
47	Preliminary Design	60 days	Wed 9/23/20	Tue 12/15/20
48	Final Design	120 days	Wed 2/17/21	Tue 8/3/21
49	Construction	180 days	Wed 1/19/22	Tue 9/27/22
50	Construction Services	180 days	Wed 1/19/22	Tue 9/27/22
51	Post Construction Monitoring	68 days	Wed 9/28/22	Fri 12/30/22
52	**COLLECTION SYSTEM MONITORING & MODELING**	4175 days	Mon 1/1/07	Fri 12/30/22
53	**COLLECTION SYSTEM CAPITAL IMPROVEMENTS**	4175 days	Mon 1/1/07	Fri 12/30/22

Project: Noblesville LTCP Abridged
Date: Fri 6/8/07

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Appendix G: Project Cost Sheets

Project A - Centralized Storage
Total Construction Cost Estimate

Storage for CSOs 006, 003, 007, 008

Item	Description	Qty	Unit	Unit Price	Cost
1	Storage Vault (1.0 mgd)	1	LS	$2,750,000	$2,750,000
2	Excavation for Storage Unit	134,000	CY	$10	$1,340,000
3	Cleaning System	1	LS	$100,000	$100,000
4	Final Grading & Seeding	1	LS	$5,000	$5,000
				Sub Total	**$4,195,000**
				Contingency (25%)	$1,048,750
				Total Storage Cost	**$5,243,750**

Lift Station

Item	Description	Qty	Unit	Unit Price	Cost
1	Lift Station (1.7 mgd)	1	LS	$400,000	$400,000
2	10" Force Main	1,100	LF	$50	$55,000
3	Granular Backfill, Force Main, 0-10' Depth	1	LF	$50	$50
4	Final Grading & Seeding	1	LS	$5,000	$5,000
				Sub Total	**$460,050**
				Contingency (25%)	$115,013
				Total Lift Station Cost	**$575,063**

Base Construction Cost	$5,818,813
Site Adjustment Factor (25%)	$1,454,703
Total Construction Cost	**$7,270,000**

Project A - Central Region Conveyance
Total Construction Cost Estimate

CSOs 006, 003

Item	Description	Qty	Unit	Unit Price	Cost
1	60" Sewer, 15.01-20' Depth	1,300	LF	$400	$520,000
2	60" Sewer, 20.01-25' Depth	2,310	LF	$450	$1,039,500
3	Granular Backfill, 60" Sewer, 15.01-20' Depth	1,300	LF	$150	$195,000
4	Granular Backfill, 60" Sewer, 20.01'-25' Depth	2,310	LF	$180	$415,800
5	6' Dia. Manhole, 15.01-20' Depth	3	EA	$6,000	$18,000
6	6' Dia. Manhole, 20.01-25' Depth	3	EA	$7,500	$22,500
7	Asphalt Pavement Replacement	21,660	SF	$40	$866,400
8	Property Acquisition	3	EA	$225,000	$675,000
9	Curb Repair	3,610	LF	$25	$90,250
10	Sidewalk Repair	1,604	SY	$30	$48,133
11	Utility Crossing	4	EA	$2,500	$10,000
12	Final Grading & Seeding	1,000	LF	$10	$10,000
				Sub Total	**$3,910,583**
				Mobilization (5%)	$195,529
				Site Restoration (3%)	$117,318
				Sub Total	**$312,847**
				Sewer Rehab / Evaluation (10%)	$391,058
				Contingency (25%)	$977,646
				Base Construction Cost	**$5,592,134**
				Site Adjustment Factor (25%)	$1,398,034
				Total Construction Cost	**$6,990,000**

Note: All Sewer line installations are assumed to be in poor soil conditions and will require dewatering

Project C: East Region Conveyance
Total Construction Cost Estimate

CSOs 007, 008

Item	Description	Qty	Unit	Unit Price	Cost
1	48" Sewer, 15.01-20' Depth	4,100	LF	$350	$1,435,000
2	Granular Backfill, 48" Sewer, 15.01-20' Depth	4,100	LF	$150	$615,000
3	6' Dia. Manhole, 15.01-20' Depth	4	EA	$6,000	$24,000
4	6' Dia. Manhole, 20.01-25' Depth	6	EA	$7,500	$45,000
5	Upsize Central Line to 60"	2,310	LF	$100	$231,000
6	Additional Backfill	2,310	LF	$50	$115,500
7	Asphalt Pavement Replacement		SF	$40	$0
8	Curb Repair		LF	$25	$0
9	Sidewalk Repair	1,822	SY	$30	$54,667
10	Utility Crossing	15	EA	$2,500	$37,500
11	Final Grading & Seeding	1,000	LF	$10	$10,000
				Sub Total	**$2,567,667**
				Mobilization (5%)	$128,383
				Site Restoration (3%)	$77,030
				Sub Total	**$205,413**
				Sewer Rehab / Evaluation (10%)	$256,767
				Contingency (25%)	$641,917
				Base Construction Cost	**$3,671,763**
				Sight Adjustment Factor (25%)	$917,941
				Total Construction Cost	**$4,590,000**

Note: All Sewer line installations are assumed to be in poor soil conditions and will require dewatering. Assumes line run in Conner Street as part of proposed INDOT project (no pavement restoration costs). Conner St. conveyance will connect to Central Basin conveyance requiring upsizing of line.

Project D - North Region Sewer Separation
Total Construction Cost Estimate

Item	Description	Qty	Unit	Unit Price	Cost
CSO 005					
1	12" Storm Sewer, 0-6' Depth	400	LF	$80	$32,000
2	18" Storm Sewer, 5-10' Depth	850	LF	$120	$102,000
3	24" Storm Sewer, 5-10' Depth	400	LF	$160	$64,000
4	Structures	16	EA	$3,000	$48,000
5	Granular Backfill	1,000	LF	$50	$50,000
6	Pavement	5,775	SF	$40	$231,000
7	Curb Repair	1,650	LF	$25	$41,250
8	Sidewalk Repair	733	SY	$30	$22,000
9	Utility Crossing	5	EA	$2,500	$12,500
10	Grading & Seeding	100	LF	$10	$1,000
				Sub Total	**$603,750**
CSO 004					
11	12" Storm Sewer, 0-6' Depth	600	LF	$80	$48,000
12	18" Storm Sewer, 5-10' Depth	2,700	LF	$120	$324,000
13	24" Storm Sewer, 5-10' Depth	600	LF	$160	$96,000
14	Structures	48	EA	$3,000	$144,000
15	12" Storm Sewer, 0-6' Depth	200	LF	$80	$16,000
16	18" Storm Sewer, 5-10' Depth	1,550	LF	$120	$186,000
17	24" Storm Sewer, 5-10' Depth	200	LF	$160	$32,000
18	Structures	18	EA	$3,000	$54,000
19	Granular Backfill	5,000	LF	$50	$250,000
20	Pavement	20,475	SF	$40	$819,000
21	Curb Repair	5,850	LF	$25	$146,250
22	Sidewalk Repair	2,600	SY	$30	$78,000
23	Utility Crossing	7	EA	$2,500	$17,500
24	Grading & Seeding	250	LF	$10	$2,500
				Sub Total	**$2,213,250**
CSO 010					
25	12" Storm Sewer, 0-6' Depth	300	LF	$80	$24,000
26	18" Storm Sewer, 5-10' Depth	1,100	LF	$120	$132,000
27	24" Storm Sewer, 5-10' Depth	300	LF	$160	$48,000
28	Structures	22	EA	$3,000	$66,000
29	Granular Backfill	1,450	LF	$50	$72,500
30	Pavement	5,075	SF	$40	$203,000
31	Curb Repair	1,700	LF	$25	$42,500
32	Sidewalk Repair	756	SY	$30	$22,667
33	Utility Crossing	10	EA	$2,500	$25,000
34	Grading & Seeding	150	LF	$10	$1,500
				Sub Total	**$637,167**
				Separation Costs	$3,454,167
				Mobilization (5%)	$172,708
				Site Restoration (3%)	$103,625
				Subtotal	**$3,730,500**
				Sewer Rehab/Evaluation (10%)	$373,050
				Contingency (25%)	$932,625
				Base Construction Costs	**$5,036,175**
				Site Adjustment Factor (25%)	$1,259,044
				Total Construction Cost	**$6,300,000**

Project E - South Region Conveyance
Construction Cost Estimate

CSO 002

Item	Description	Qty	Unit	Unit Price	Cost
1	48" Sewer, 15.01-20' Depth	500	LF	$350	$175,000
2	48" Sewer, 20.01-25' Depth	500	LF	$400	$200,000
3	Granular Backfill, 48" Sewer, 15.01-20' Depth	500	LF	$150	$75,000
4	Granular Backfill, 48" Sewer, 20.01'-25' Depth	500	LF	$180	$90,000
5	6' Dia. Manhole, 15.01-20' Depth	1	EA	$6,000	$6,000
6	6' Dia. Manhole, 20.01-25' Depth	1	EA	$7,500	$7,500
7	Asphalt Pavement Replacement	6,000	SF	$40	$240,000
8	Curb Repair	0	LF	$25	$0
9	Sidewalk Repair	0	SY	$30	$0
10	Utility Crossing	2	EA	$2,500	$5,000
11	Final Grading & Seeding	1,000	LF	$10	$10,000
				Sub Total	**$808,500**
				Mobilization (5%)	$40,425
				Site Restoration (3%)	$24,255
				Sub Total	**$64,680**
				Sewer Rehab / Evaluation (10%)	$80,850
				Contingency (25%)	$202,125
				Base Construction Cost	**$1,156,155**
				Site Adjustment Factor (25%)	$289,039
				Total Project Cost	**$1,450,000**

Note: All Sewer line installations are assumed to be in poor soil conditions and will require dewatering

Alternative 1 & 2 - Centralized Storage
Total Construction Cost Estimate

CSOs 006, 003

Item	Description	Qty	Unit	Unit Price	Cost
1	Storage Vault (0.45 mg)	1	LS	$1,500,000	$1,500,000
2	Excavation for Storage Unit	60,000	CY	$10	$600,000
3	Cleaning System	1	LS	$100,000	$100,000
4	Final Grading & Seeding	1	LS	$5,000	$5,000
				Sub Total	**$2,205,000**
				Contingency (50%)	$1,102,500
				Total Cost	**$3,307,500**

Lift Station

Item	Description	Qty	Unit	Unit Price	Cost
1	Lift Station (1.7 mgd)	1	LS	$400,000	$400,000
2	10" Force Main	1,100	LF	$50	$55,000
3	Granular Backfill, Force Main, 0-10' Depth	1	LF	$50	$50
4	Final Grading & Seeding	1	LS	$5,000	$5,000
				Sub Total	**$460,050**
				Contingency (25%)	$115,013
				Total Lift Station Cost	**$575,063**

Base Construction Cost	$3,882,563
Site Adjustment Factor (25%)	$970,641
Total Construction Cost	**$4,850,000**

Alternative 2: East Region Storage in Conveyance - Walnut/Vine Route
Total Construction Cost Estimate

CSOs 007, 008

Item	Description	Qty	Unit	Unit Price	Cost
1	72" Sewer, 15.01'-20' Depth, Requiring Sheeting	6,860	LF	$550	$3,773,000
2	Granular Backfill, 72" Sewer, 15.01'-20' Depth	6,860	LF	$250	$1,715,000
3	8' Dia. Manhole, 10.01'-15' Depth	4	EA	$12,000	$48,000
4	8' Dia. Manhole, 15.01'-20' Depth	6	EA	$18,000	$108,000
5	Asphalt Pavement Replacement	54,880	SF	$40	$2,195,200
6	Curb Repair	6,860	LF	$25	$171,500
7	Sidewalk Repair	3,049	SY	$30	$91,467
8	Utility Crossing	15	EA	$2,500	$37,500
9	Final Grading & Seeding	1,000	LF	$10	$10,000
				Sub Total	**$8,149,667**
				Mobilization (5%)	$407,483
				Site Restoration (3%)	$244,490
				Sub Total	**$651,973**
				Sewer Rehab / Evaluation (10%)	$814,967
				Contingency (25%)	$2,037,417
				Base Construction Cost	**$11,654,023**
				Site Adjustment Factor (25%)	$2,913,506
				Total Construction Cost	**$14,570,000**

Note: All Sewer line installations are assumed to be in poor soil conditions and will require dewatering

Alternative 3: East Region Conveyance - Walnut/Vine Route
Total Construction Cost Estimate

CSOs 007, 008

Item	Description	Qty	Unit	Unit Price	Cost
1	48" Sewer, 15.01'-20' Depth, Requiring Sheeting	6,860	LF	$450	$3,087,000
2	Granular Backfill, 48" Sewer, 15.01'-20' Depth	6,860	LF	$200	$1,372,000
3	8' Dia. Manhole, 10.01'-15' Depth	4	EA	$12,000	$48,000
4	8' Dia. Manhole, 15.01'-20' Depth	6	EA	$18,000	$108,000
5	Asphalt Pavement Replacement	54,880	SF	$40	$2,195,200
6	Curb Repair	6,860	LF	$25	$171,500
7	Sidewalk Repair	3,049	SY	$30	$91,467
8	Utility Crossing	15	EA	$2,500	$37,500
9	Final Grading & Seeding	1,000	LF	$10	$10,000
				Sub Total	**$7,120,667**
				Mobilization (5%)	$356,033
				Site Restoration (3%)	$213,620
				Sub Total	**$569,653**
				Sewer Rehab / Evaluation (10%)	$712,067
				Contingency (25%)	$1,780,167
				Base Construction Cost	**$10,182,553**
				Site Adjustment Factor (25%)	$2,545,638
				Total Construction Cost	**$12,730,000**

Note: All Sewer line installations are assumed to be in poor soil conditions and will require dewatering

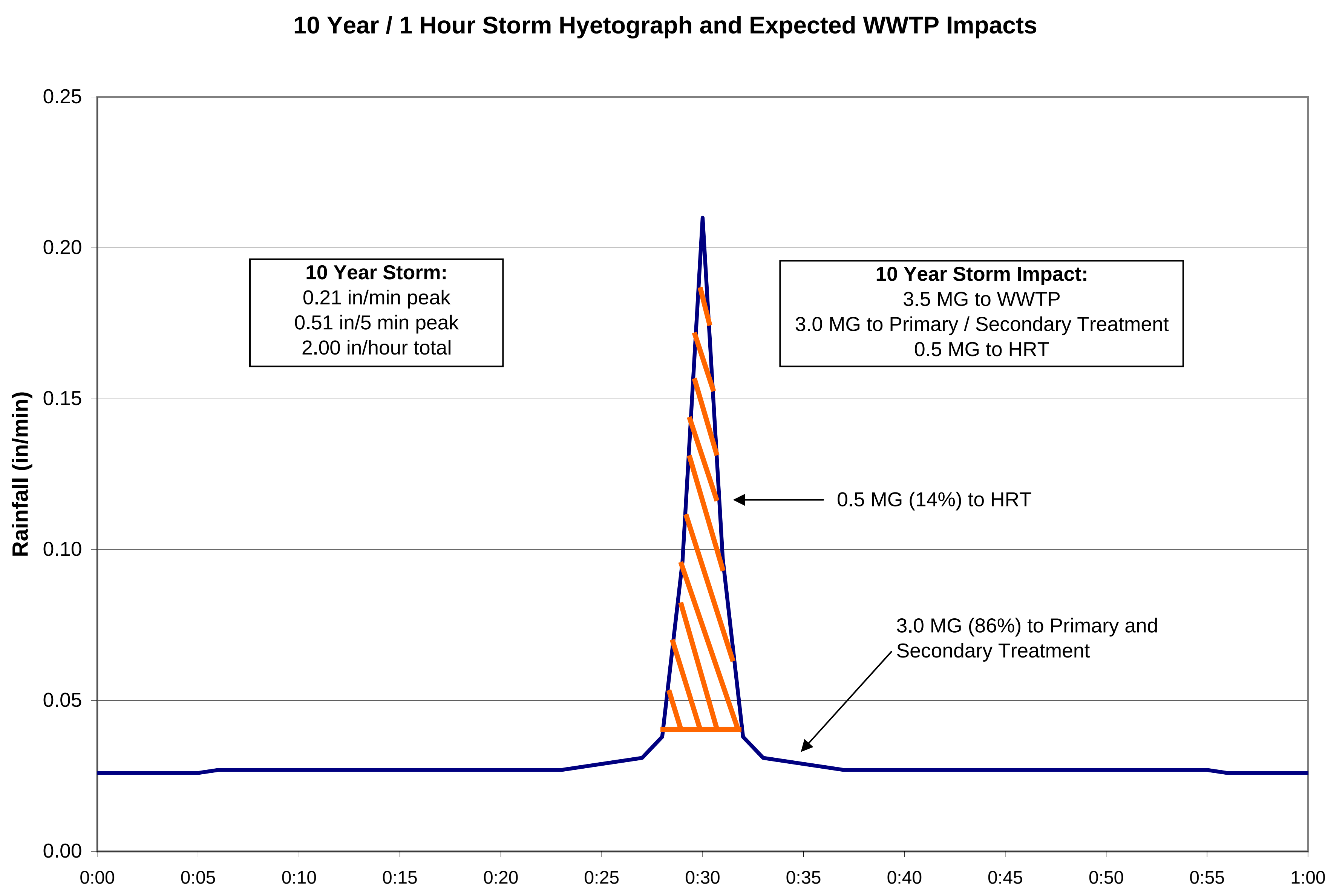
Alternative 2 & 3 - Central Region Conveyance
Total Construction Cost Estimate

CSOs 006, 003

Item	Description	Qty	Unit	Unit Price	Cost
1	48" Sewer, 15.01-20' Depth	1,300	LF	$350	$455,000
2	48" Sewer, 20.01-25' Depth	2,310	LF	$400	$924,000
3	Granular Backfill, 48" Sewer, 15.01-20' Depth	1,300	LF	$150	$195,000
4	Granular Backfill, 48" Sewer, 20.01'-25' Depth	2,310	LF	$180	$415,800
5	6' Dia. Manhole, 15.01-20' Depth	3	EA	$6,000	$18,000
6	6' Dia. Manhole, 20.01-25' Depth	3	EA	$7,500	$22,500
7	Asphalt Pavement Replacement	21,660	SF	$40	$866,400
8	Property Acquisition	3	EA	$225,000	$675,000
9	Curb Repair	3,610	LF	$25	$90,250
10	Sidewalk Repair	1,604	SY	$30	$48,133
11	Utility Crossing	4	EA	$2,500	$10,000
12	Final Grading & Seeding	1,000	LF	$10	$10,000
				Sub Total	**$3,730,083**
				Mobilization (5%)	$186,504
				Site Restoration (3%)	$111,903
				Sub Total	**$298,407**
				Sewer Rehab / Evaluation (10%)	$373,008
				Contingency (25%)	$932,521
				Base Construction Cost	**$5,334,019**
				Site Adjustment Factor (25%)	$1,333,505
				Total Construction Cost	**$6,670,000**

Note: All Sewer line installations are assumed to be in poor soil conditions and will require dewatering

Appendix H: 10-Year,1-Hour Storm Hyetograph


10 Year / 1 Hour Storm Hyetograph and Expected WWTP Impacts
Rainfall (in/min)
0.25
0.20
0.15
0.10
0.05
0.00
0:00
0:05
0:10
0:15
0:20
0:25
0:30
0:35
0:40
0:45
0:50
0:55
1:00
10 Year Storm:
0.21 in/min peak
0.51 in/5 min peak
2.00 in/hour total
10 Year Storm Impact:
3.5 MG to WWTP
3.0 MG to Primary / Secondary Treatment
0.5 MG to HRT
0.5 MG (14%) to HRT
3.0 MG (86%) to Primary and
Secondary Treatment

Appendix I: Financial Capability Assessment

UMBAUGH
H.J.Umbaugh & Associates
20 East 91st Street · Suite 100
P.O. Box 40458
Indianapolis, IN 46240-0458
Phone: 317-844-7288
Fax: 317-848-3604
Website: www.hju.com
It's all about experience.

November 22, 2006

Board of Public Works
City of Noblesville
14701 Cumberland Rd, Suite 350
Noblesville, Indiana 46060

Re: Noblesville (Indiana) Municipal Sewage Works
Combined Sewer Overflow Long-Term Control Plan

Members of the Board:

In connection with the preparation of the financial capability assessment for the Noblesville Municipal Sewage Works, we have, at your request, prepared this special purpose report and the following schedules for submission to the Indiana Department of Environmental Management regarding the Combined Sewer Overflow Long-Term Control Plan for the City of Noblesville.

In the preparation of these schedules, assumptions were made as noted regarding certain future events. As is the case with such assumptions regarding future events and transactions, some or all may not occur as expected and the resulting differences could be material. We have not examined the underlying assumptions nor have we audited or reviewed the historical data. Consequently, we express no opinion thereon nor do we have a responsibility to prepare subsequent reports.

Umbaugh

NOBLESVILLE (INDIANA) MUNICIPAL SEWAGE WORKS

SUMMARY OF COMBINED SEWER OVERFLOW ("CSO") ESTIMATED PROJECT COSTS
(Per Consulting Engineer)
(Amounts Rounded to the Nearest $100)

Proposed Project	Estimated Year of Project Financing								
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Bond Funded Projects:									
Interceptor Upgrade	$2,183,000								
Headworks Expansion and Flow Equalization	9,129,000								
Treatment Plant Expansion			$14,760,000						
Central Basin Storage			8,030,000						
Central Basin Conveyance					$7,667,700				
High Rate Treatment									
East Basin Conveyance			137,700	$5,140,500					
North Basin Separation									
South Basin Conveyance									
Cash Funded Projects:									
Coll. System Monitoring & Modeling		$8,000	8,200	8,500	8,700	$39,000	$54,300	$47,600	$9,800
Coll. System Improvements		466,700	466,700	466,700	466,700	466,700	466,700	466,700	466,700
Totals	$11,312,000	$474,700	$23,402,600	$5,615,700	$8,143,100	$505,700	$521,000	$514,300	$476,500

Proposed Project	Estimated Year of Project Financing								
	2015	2016	2017	2018	2019	2020	2021	2022	Total
Bond Funded Projects:									
Interceptor Upgrade									$2,183,000
Headworks Expansion and Flow Equalization									9,129,000
Treatment Plant Expansion									14,760,000
Central Basin Storage									8,030,000
Central Basin Conveyance									7,667,700
High Rate Treatment	$2,300,000								2,300,000
East Basin Conveyance									5,278,200
North Basin Separation					$7,239,500				7,239,500
South Basin Conveyance							$1,662,000		1,662,000
Cash Funded Projects:									
Coll. System Monitoring & Modeling	10,100	$10,400	$10,800	$11,100	11,400	$11,700	12,100	$12,500	274,200
Coll. System Improvements	466,700	466,700	466,700	466,700	466,700	466,700	466,700		7,000,500
Totals	$2,776,800	$477,100	$477,500	$477,800	$7,717,600	$478,400	$2,140,800	$12,500	$65,524,100

(The Accountants' Compilation Report and the accompanying
comments are an integral part of this statement)

NOBLESVILLE (INDIANA) MUNICIPAL SEWAGE WORKS

CALCULATION OF CURRENT COST PER HOUSEHOLD
AND CURRENT RESIDENTIAL INDICATORS
(Current CSO Projects)

Current Wastewater Treatment Costs:	
Annual cash operating expenses (excluding depreciation) (1)	$4,131,000
Current annual debt service (principal and interest) (2)	1,429,900
Estimated annual debt service on planned 2008 treatment plant expansion (3)	1,286,844
Annual capital replacement (4)	2,385,000
Total current wastewater treatment costs	$9,232,744
Residential Factor Calculation:	
Total estimated annual residential wastewater flow (1,000's of gallons) (5)	1,026,531.8
Divide by total annual wastewater flow (1,000's of gallons) (5)	1,368,709.1
Residential factor	75%
Residential allocation of wastewater treatment costs	$6,924,558
Total estimated number of households in service area (5)	11,694
Annual wastewater treatment cost per household	592.15
Divide by 12 months	12
Total monthly cost per residential user (6)	$49.35
Calculation of Residential Indicator:	
Median household income of the City of Noblesville (7)	$61,455
Cost per household as a percent of median household income	0.96%

(Continued on next page)

(The Accountants' Compilation Report and the accompanying
comments are an integral part of this statement)

NOBLESVILLE (INDIANA) MUNICIPAL SEWAGE WORKS

(Cont'd)

CALCULATION OF CURRENT COST PER HOUSEHOLD AND CURRENT RESIDENTIAL INDICATORS
(Current CSO Projects)

(1) Based on 2007 operating budget.

(2) Average annual debt service on the outstanding 2003 and 2006 bond issues.

(3) To provide an allowance for annual debt service on the proposed 2008 $14,760,000 treatment plant expansion project.

(4) Estimated annual replacement cost.

(5) Based on calendar year 2005 billing information provided by utility management.

(6) The monthly cost per residential user in an indicator. It does not represent the actual rates and charges billed by the Utility. The average residential customer of the Noblesville Municipal sewage works uses approximately 6,400 gallons of water per month. The current monthly bill for the average residential customer using 6,400 gallons per month is $32.58.

(7) Median household income as provided by the 2000 census.

(The Accountants' Compilation Report and the accompanying comments are an integral part of this statement)

NOBLESVILLE (INDIANA) MUNICIPAL SEWAGE WORKS

CALCULATION OF ESTIMATED COST PER HOUSEHOLD
AND ESTIMATED RESIDENTIAL INDICATORS
(Selected CSO Long-Term Control Plan)

Current Wastewater Treatment Costs:	
Annual cash operating expenses (excluding depreciation) (1)	$4,131,000
Current Annual debt service (principal and interest) (2)	1,429,900
Estimated annual debt service on planned 2008 treatment plant expansion (3)	1,286,844
Annual capital replacement (4)	2,385,000
Total current wastewater treatment costs	$9,232,744
Projected CSO Costs (current dollars):	
Estimated annual debt service on CSO projects to be funded (5)	$2,805,400
Average annual allowance for collection system monitoring and modeling (6)	17,138
Annual allowance for miscellaneous sewer separation costs (7)	466,667
Total projected CSO costs	$3,289,205
Total current and projected wastewater treatment and CSO costs	$12,521,949
Residential Factor Calculation:	
Total estimated annual residential wastewater flow (1,000's of gallons) (8)	1,026,531.8
Divide by total annual wastewater flow (1,000's of gallons) (8)	1,368,709.1
Residential factor	75%
Residential allocation of wastewater treatment costs	$9,391,462
Total estimated number of households in service area (8)	11,694
Annual wastewater treatment cost per household	803.10
Divide by 12 months	12
Total monthly cost per residential user (9)	$66.93
Calculation of Residential Indicator:	
Median household income of the City of Noblesville (10)	$61,455
Cost per household as a percent of median household income	1.31%

(Continued on next page)

(The Accountants' Compilation Report and the accompanying
comments are an integral part of this statement)

NOBLESVILLE (INDIANA) MUNICIPAL SEWAGE WORKS

(Cont'd)

CALCULATION OF ESTIMATED COST PER HOUSEHOLD
AND ESTIMATED RESIDENTIAL INDICATORS
(Selected CSO Long-Term Control Plan)

(1) Based on 2007 operating budget.

(2) Average annual debt service on the outstanding 2003 and 2006 bond issues.

(3) To provide an allowance for annual debt service on the proposed 2008 $14,760,000 treatment plant expansion project.

(4) Estimated annual replacement cost.

(5) Assumes proposed projects are financed by bond issues amortized over 20 years at 6%.

	Annual Debt Service
2008 Bonds (does not include plant expansion project)	$712,100
2009 Bonds	448,200
2010 Bonds	668,500
2015 Bonds	200,500
2019 Bonds	631,200
2021 Bonds	144,900
Total	$2,805,400

(6) Estimated annual collection system improvements, per consulting engineer.

(7) Annual requirement for ongoing sewer separation costs, per consulting engineer

Total requirement	$274,200
Divide by average years	16
Annual amount	$17,138

(8) Based on calendar year 2005 billing information provided by utility management.

(9) The monthly cost per residential user in an indicator. It does not represent the actual rates and charges billed by the Utility. The average residential customer of the Noblesville Municipal sewage works uses approximately 6,400 gallons of water per month. The current monthly bill for the average residential customer using 6,400 gallons per month is $32.58.

(10) Median household income as provided by the 2000 census.

(The Accountants' Compilation Report and the accompanying comments are an integral part of this statement)

NOBLESVILLE (INDIANA) MUNICIPAL SEWAGE WORKS

SUMMARY OF CSO FINANCIAL CAPABILITY INDICATOR

Indicator	Actual Value	Weak, Mid-Range Strong	Score
City's Bond Rating (1)	Moody's A1	Strong	3
Overall Net Debt Per Capita (2)	$8,651	Weak	1
Unemployment Rate (3)	3.1%	Strong	3
Median Household Income (4)	$61,455	Strong	3
Property Tax Revenue as a Percent Of Full Market Property Value (5)	2.47%	Mid-Range	2
Property Tax Revenue Collection Rate (6)	100.13%	Strong	3
Permittee Indicators Score			2.50

(1) If the City were to issue debt for CSO improvements, it would likely issue a revenue bond. The City of Noblesville Wastewater Utility last issued open market bonds in 2006 that carried an underlying A1 rating from Moody's Investors Service, Inc.

(2) Information available for Noblesville:

Current overall net debt for Noblesville including underlying and overlapping debt (As of 8/2/06)	$335,866,607
Divide by Per Capita (2005 est.):	38,825
Overall Net Debt Per Capita	$8,651

(3) Per the Indiana Business Research Center.

(4) Per the 2000 Census.

(5) Information available for Noblesville

Property taxes assessed in Noblesville for collection year 2005	$52,148,050
Divide by estimated full market property value	2,111,987,094
Property Tax Revenue as a Percent Of Full Market Property Value	2.47%

(6) Per the Hamilton County Auditor's Office.

(The Accountants' Compilation Report and the accompanying comments are an integral part of this statement)

NOBLESVILLE (INDIANA) MUNICIPAL SEWAGE WORKS

FINANCIAL CAPABILITY MATRIX SCORE

Permittee Financial Capability Indicators Score	Residential Indicator (Cost Per Household as a % of MHI)		
	Low (Below 1.0%)	Mid-Range (Between 1.0 and 2.0%)	High (Above 2.0%)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (Between 1.5 and 2.5)	Low Burden	Medium Burden	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

(The Accountants' Compilation Report and the accompanying comments are an integral part of this statement)

Appendix J: Citizen Advisory Committee Meeting Agendas, Presentations, and Sign-in Sheets

AGENDA
PUBLIC INFORMATIONAL MEETING
CSO LONG TERM CONTROL PLAN FOR NOBLESVILLE, IN
SEPTEMBER 20, 2006

1. Introduction – Purpose of meeting
2. Background
3. Federal and State regulations
4. Wastewater treatment requirements/water quality considerations
5. Noblesville's collection and treatment system:
    a. Combined and separate sewers
    b. Treatment capacity - 5 MGD
    c. Wet weather flows
6. Control Requirements for combined sewer overflow
7. Long Term Control Planning
    a. Identify Alternatives
    b. Evaluation of alternatives – level of control, cost
    c. Implementation Plan
8. Financing and affordability
9. Schedule for Plan Completion and incorporation of public comment
10. Questions

FACT SHEET
COMBINED SEWER OVERFLOW
LONG TERM CONTROL PLAN
CITY OF NOBLESVILLE

WHAT ARE COMBINED SEWERS?

Combined Sewers were designed to collect both sanitary wastewater and storm water runoff in one pipe. During wet weather, there is more flow in combined sewers than can be conveyed to the treatment plant, so a combination of storm water and wastewater is discharged to a receiving stream. This is called a combined sewer overflow, or CSO.

WHY IS THIS A PROBLEM?

Dilute untreated wastewater discharged as CSO contains pollutants that may adversely affect receiving water quality. Impacts include elevated levels of harmful bacteria and adverse affects to aquatic life.

WHAT ARE THE REGULATIONS?

Secondary treatment of sanitary wastewater has been required by the U.S. EPA and the State of Indiana since the passage of the Clean Water Act in 1972. Specific limitations on allowable discharges have been placed on municipal wastewater treatment facilities through National Pollutant Discharge Elimination System (NPDES) permits. Because CSOs are mixture of storm water and wastewater, it took many years for the regulatory agencies and the regulated community to agree on controls to be incorporated into discharge permits that would meet the need for environmental improvements without imposing unmanageable costs on communities. In 1989, U.S. EPA finalized a policy requiring all communities with CSOs to evaluate their collection and treatment systems and optimize their use to reduce their volume and frequency. In 1995, the policy was expanded to require all communities with CSOs to achieve Nine Minimum Controls and to develop Long Term Control plans. Improvements to collection and treatment facilities should result in a system with no more than an average of four CSOs per year and meet water quality standards. The Indiana Department of Environmental Management (IDEM) adopted the CSO control policy in 1996. Long Term Control Plans are now being required as a condition of NPDES permits.

HOW DO THEY APPLY TO NOBLESVILLE?

Noblesville has both combined and separate sanitary sewers that convey wastewater to the treatment plant on Washington Street. Treated wastewater is discharged to the West Fork of White River under an NPDES permit issued to the City. During wet weather, CSOs may occur at any or all of nine CSO outfalls to the river. Noblesville has optimized its collection and treatment systems to the degree possible. The City is now revising the CSO Long Term Control Plan for improvements that will meet the requirements of the CSO Control Policy and its NPDES permit.

FACT SHEET
COMBINED SEWER OVERFLOW
LONG TERM CONTROL PLAN
CITY OF NOBLESVILLE

WHAT IS THE EFFECT OF CSOs FROM NOBLESVILLE TO THE WEST FORK OF WHITE RIVER?

A study of water quality in the river following CSO events found *E. Coli* levels higher than considered safe for human contact (City of Noblesville, 2001[1]). *E. Coli* is an indicator of the presence of pathogenic bacteria from human wastewater sources. Waste from other warm blooded animals, failing septic systems, illicit connections, and stormwater runoff may also contribute to observed concentrations. Water quality indicators regarding affects on aquatic life, such as dissolved oxygen concentration were not found to be significantly affected.

WHAT ARE THE OPTIONS FOR CSO CONTROL?

The Long Term Control Plan will identify facilities to provide adequate collection and treatment of wet weather flows causing CSO. The plan must consider discharges near sensitive areas, the cost of improvements and means of finance, and a schedule for completion. Previous planning has identified future service needs also considered in the planning process. Components of the plan are likely to include a combination of new relief sewers, storage tanks, expanded full treatment, selected sewer separation, and high rate partial treatment with disinfection. Treatment plant expansions have been planned to meet future growth and wet-weather capture requirements. Phase 1 improvements to the plant headworks are currently under construction, and Phase 2 improvements to primary treatment are expected to be completed by 2008.

WHAT ARE THE COSTS AND SCHEDULE?

It is anticipated that total costs will be about $40 million and facilities will be completed over the next 10- to 15-year period. A combination of low interest loans, bonding, direct financing from user rates, and grant funding if available will be used to pay for the program.

[1] *City of Noblesville, Indiana, Stream Reach Characterization and Evaluation Report (SRCER).* (June 2001). City of Noblesville

CSO Long Term Control Plan for Noblesville, IN

Citizen Advisory Committee Meeting
September 20, 2006

Presented by:

R.W. ARMSTRONG

CITY OF NOBLESVILLE, STATE OF INDIANA

Introduction

Objectives

- Review Clean Water Act Requirements
- Review CSO Program Requirements
- Review Noblesville Wet Weather issues:
  - Collection system CSOs
  - Collection system SSOs
  - Treatment plant capacity to manage wet weather flows
- Review CSO Long Term Control Plan
  - Elements
  - Schedule
- Discuss upcoming CSO issues

Background

No Swimming at Any Time
Sewer Overflows

Clean Water Act

- 1972 - PL 92-500
  - NPDES Permitting
  - Secondary Treatment
  - CSOs permittable/SSOs not permittable
  - State to establish water quality standards
- Amendments 1977, 1987, 2000
  - CSO policy incorporated into the CWA

CSO Control Policy

- Debate on how CSO should be managed from 1972 - 1989
- 1989 – Six Minimum Controls/ Combined Sewer Operational Plans
- 1994 CSO Control Policy
  - Nine Minimum Controls
    - Implementation by 1997
  - Long Term Control Plan if water quality standards not met

Nine Minimum Controls for CSO's

- 1.0 Proper Operation and Regular Maintenance Programs for the Sewer System and the CSO's
- 2.0 Maximize Use of Existing System for Storage
- 3.0 Review & Modification of Pretreatment Program -
- 4.0 Maximizing Flow to Wastewater Treatment Plant (WWTP)
- 5.0 Prohibition of CSO Discharge During Dry Weather
- 6.0 Control of Solid & Floatable Materials
- 7.0 Pollution Prevention Program
- 8.0 Public Notification
- 9.0 Monitoring to Characterize CSO Impacts and Efficacy of CSO Controls

Elements of a Long Term Control Plan

- Characterization, modeling, monitoring of the system
- Public participation
- Identification of Sensitive Areas
- Evaluation of Alternatives
  - Presumption Approach
  - Demonstration Approach
- Cost/Performance considerations
- Update Combined Sewer Operational Plan
- Maximize Flow to Treatment
- Implementation Schedule
- Post-Construction Compliance Monitoring

Schedules

- U.S. EPA expects a 5 year completion schedule within a permit cycle or a federal consent order for a protracted schedule of 10-15 years <u>IF</u> warranted.
- State judicial agreement may be executed.
- Financial capabilities, construction costs, and periodic system calibration may extend schedules.

Wastewater Treatment Requirements/Water Quality Considerations

- Must be safe for full-body recreational use
  - Fishable/Swimable

Noblesville's Collection and Treatment System

Wastewater Collection and Treatment

- Nine combined sewer overflow (CSO) Points
  - 003, 004, 005, 006, & 010 outfall to West Fork of White River north of treatment plant
  - 009 is the CSO outfall at the treatment plant and it discharges into the West Fork of White River
  - 002 outfall on West Fork of White River south of treatment plant
  - 007 & 008 outfall to Wilson's Ditch, which drains into Stoney Creek, which drains into the White River
- Treatment Plant:
  - Design Flows (2006): Average daily = 5 MGD; Peak Flow = 15 MGD
  - Design Flows (2008): Average daily = 10 MGD; Peak Flow = 20 MGD

Long Term Control Planning

- System Issues for evaluation:
  - Based upon flow modeling, all CSO's may be substantially reduced and *nearly* eliminated.
  - Relief interceptors can be sized to convey CSO flow to the WWTP.
  - Inflow reduction necessary for all CSO's
  - Monitoring to accurately determine flow and CSO characteristics are essential to decision-making

Long Term Control Planning

- System Issues for evaluation (cont.):
  - Utilization of the "Michigan Approach" to attenuate CSO occurrence and volume.
  - Treatment plant upgrades, optimization and expansion for CSO treatment.
  - Post-Construction flow monitoring to determine effectiveness of plan implementation.
  - Other Wet Weather programs.

Long Term Control Plan: Evaluations of Alternatives

- Recommended Control objective:
  - Provide sufficient conveyance & treatment capacity to meet water quality objectives
- Plan elements to meet the objective
  - Monitor quantity and quality of CSO to fully characterize the CSO volume, flow rates, and quality characteristics
  - Identify inflow reduction alternatives, evaluate performance and cost
  - Recommend cost-effective combination of conveyance, storage and treatment to meet the water quality objective

Financing and Affordability

- Financial Capability Assessment
  - Based upon what the Community can afford.
- Level of Control
  - What makes sense.

Schedule for Plan Completion

- September & October: CAC meetings
- October 31st: LTCP to IDEM for Review
- December: Preliminary approval from IDEM and public comment
- March 2007 approval
- 15-year plan

Questions?

MEMO

CAC 10-5-06

RAY THOMPSON	CITY OF NOB.	317 776-6353 432-0347
Roger Goings		317 773-5715 517-0518
Rich Hubbard	CITY OF Noblesville / River Cleanup INC	317-776-6340
ZIG RASIAK	R.W. Armstrong	(317) 780-7249
Scott Miller	Umbaugh	317-465-1500
Mike Hendricks	City of Noblesville	317-776-6353
Kathie Stitch	City Council Dist. 4	773-6213
BRYCE ADAM	EDWARD JONES	770-1606

CSO Long Term Control Plan for Noblesville, IN

Citizen Advisory Committee Meeting
October 5th, 2006

Presented by:

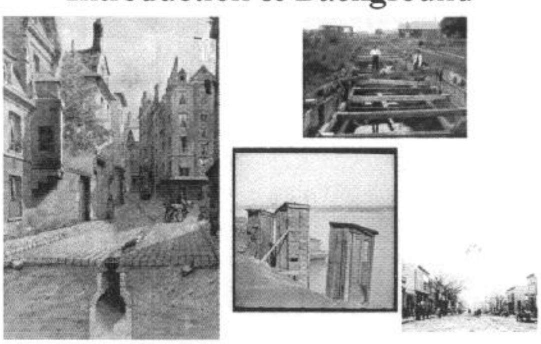
RW ARMSTRONG
Inspiration to reality.

CITY OF NOBLESVILLE INCORPORATED STATE OF INDIANA

Agenda

- CSO Program Requirements
- Noblesville Wet Weather issues:
  - Wastewater Collection & Treatment System Characteristics
  - Wastewater Collection & Treatment System Performance
- CSO Long Term Control Plan Implementation
  - Elements
  - Schedule
  - Alternatives

Introduction & Background



CSO Program Requirements (1997)

- Proper O & M
- Maximize use of existing system for storage
- Pretreatment program
- Maximize flow to treatment
- No dry weather overflows
- Control of solids and floatables
- Pollution prevention
- Public notice of CSO's and impacts
- Monitoring to characterize CSO impacts (Stream Reach Characterization and Evaluation Report)

Elements of a Long Term Control Plan

- Defines facilities, programs and funding needed to meet State and Federal water quality objectives
- Elements:
  - Characterization, modeling, monitoring of system
  - Public participation
  - Evaluation of alternatives (presumptive/demonstrative)
  - Cost/performance considerations
  - Operational Plan
  - Maximizing treatment at the treatment plant
  - Implementation schedule
  - Post construction monitoring
- Consider Long Term Needs of the Total System

Wastewater Collection and Treatment System Characteristics

- Nine combined sewer overflow (CSO) Points
  - 003, 004, 005, 006, & 010 outfall to West Fork of White River north of treatment plant
  - 009 is the CSO outfall at the treatment plant and it discharges into the West Fork of White River
  - 002 outfall on West Fork of White River south of treatment plant
  - 007 & 008 outfall to Wilson's Ditch, which drains into Stoney Creek, which drains into the West Fork of White River
- Treatment Plant:
  - Design Flows (current): Average daily = 5 MGD
Peak Flow = 15 MGD
  - Design Flows (2008): Average daily = 10 MGD
Peak Flow = 30 MG

Wastewater Collection and Treatment System Characteristics

- Total Service Area – 16,000 Acres
- Combined Sewer Service Area – 380 Acres
  - Less than 2½ % of Service Area
  - Less than 6 % of total sewer length
- Separate sewers must flow through the combined system to reach the treatment plant

Wastewater Collection and Treatment System Performance

- Currently, about 32 events annually
- About 15 events per year after current planned improvements completed
- CSO Policy under the presumptive approach is 4 – 6 events annually

Long Term Control Planning

- Performance Standard
  - Meet water quality standards
- Level of control (4-6 events)
- Control Strategy
  - Equivalent of primary treatment allowed
- Address Growth
- Financial Capability Analysis
- Schedule

Long Term Control Planning

- General Solution:
  - Separate combined systems where Practical.
  - Increase conveyance so CSO's can be completely/partially treated to provide disinfection.
  - Floatable and solids reduction needed to allow for disinfection.

Long Term Control Planning

- System Issues for evaluation:
  - Based upon flow modeling, all CSO's may be substantially reduced and *nearly* eliminated.
  - Relief interceptors can be sized to convey CSO flow to the WWTP.
  - Inflow reduction necessary for all CSO's
  - Monitoring to accurately determine flow and CSO characteristics are essential to decision-making

Long Term Control Planning

- System Issues for evaluation (cont.):
  - Utilization of the "Michigan Approach" to attenuate CSO occurrence and volume.
  - Treatment plant upgrades, optimization and expansion for CSO treatment.
  - Post-Construction flow monitoring to determine effectiveness of plan implementation.
  - Other Wet Weather programs.

Long Term Control Plan: Evaluations of Alternatives

- Recommended Control objective:
  - Provide sufficient conveyance & treatment capacity to meet water quality objectives
- Plan elements to meet the objective
  - Monitor quantity and quality of CSO to fully characterize the CSO volume, flow rates, and quality characteristics
  - Identify inflow reduction alternatives, evaluate performance and cost
  - Recommend cost-effective combination of separation, conveyance, storage and treatment to meet the water quality objective

Financing and Affordability

- Financial Capability Assessment
  - Based upon what the Community can afford.
- Anticipated Costs
  - 2005 – 2009 = $ 24 million (interceptor, WWTF Ph 1 & 2, Connor St. Separation)
  - 2007 - 2017 = $ 7 million (Collection System CIP)
  - 2009 - 2010 = $ 6.4 Million (WWTF Ph 3)
  - 2007 – 2017 = $ 20 million (CSO abatement projects)
  - Total Approximately = $ 57.4 million
- Level of Control
  - What makes sense.

LTCP Implementation Schedule

- U.S. EPA expects a 5 year completion schedule within a permit cycle or a federal consent order for a protracted schedule of 10-15 years **IF** warranted.
- State judicial agreement may be executed.
- Financial capabilities, construction costs, and periodic system calibration may extend schedules.

Schedule for Plan Completion

- September & October: CAC meetings
- October 31st, Submit LTCP to IDEM for Review
- December: Preliminary Approval from IDEM and Public Comment
- March 2007 approval
- Implement 15-year plan

Questions?

CSO Long Term
Control Plan for Noblesville, IN
Sign In Sheet

NAME	PHONE NUMBER	E-MAIL ADDRESS
Scott Miller	465-1500	Smiller@umbaugh.com
JOHN SOUTH	776-0299	john-south@iaswcd.org
JOHN DITSLEAR	776-6323	jditslear@NOBLESVILLE.IN.US
RAY THOMPSON	776-6353	RTHOMPSON2@NOBLESVILLE.IN.US
Roger Goings	773-5715	roger306@insightbb.com
Janet Jaros	774-6328	JJaros@noblesville.IN.US
RUSTY BODENHORN	776-6324	RBODENHORN@noblesville.IN.US
Michael Hendricks	776-6353	mhendricks@noblesville.in.us
LARRY STORK	773-1832	LARSAL@ATT.NET
KAthie Stretch	753-3336	kstretch@insightbb.COM
BRYCE ADAM	770-1606	bryce.adam@insightbb.com

CSO Long Term Control Plan for Noblesville, IN

Citizen Advisory Committee Meeting
October 26th, 2006

Presented by:

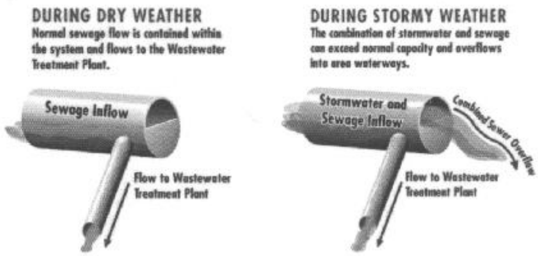
Agenda

- CSO Program Requirements
- Noblesville Wet Weather issues:
  - Wastewater Collection & Treatment System Characteristics
  - Wastewater Collection & Treatment System Performance
- CSO Long Term Control Plan Implementation
  - Elements
  - Alternatives
  - Schedule

Introduction & Background




CSO Event



City of Wilmington, Delaware. 2005 <http://www.wilmingtoncso.com/pages/projects/CSOfaq.htm>

CSO Program Requirements (1997) "What Was"

- Proper O & M
- Maximize use of existing system for storage
- Pretreatment program
- Maximize flow to treatment
- No dry weather overflows
- Control of solids and floatables
- Pollution prevention
- Public notice of CSO's and impacts
- Monitoring to characterize CSO impacts (Stream Reach Characterization and Evaluation Report)

Elements of a Long Term Control Plan "What Is"

- Defines facilities, programs and funding needed to meet State and Federal un-funded water quality objectives
- Elements:
  - Characterization, modeling, monitoring of system
  - Public participation
  - Evaluation of alternatives (presumptive/demonstrative)
  - Cost/performance considerations
  - Operational Plan
  - Maximizing treatment at the treatment plant
  - Implementation schedule
  - Post construction monitoring
- Consider Long Term Needs of the Total System

Wastewater Collection and Treatment System Characteristics

- Nine combined sewer overflow (CSO) Points
  - 003, 004, 005, 006, & 010 outfall to West Fork of White River north of treatment plant
  - 009 is the CSO outfall at the treatment plant and it discharges into the West Fork of White River
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- Currently, about 32 events annually
- About 15 events per year after current planned improvements completed
- CSO Policy under the presumptive approach is 4 – 6 events annually

CSO LTCP Implementation

- Performance Standard
  - Meet water quality standards
- Level of control/ Presumptive Approach(4-6 events)
- Control Strategy
  - Equivalent of primary treatment allowed
- Address Growth
- Financial Capability Analysis
- Schedule

CSO LTCP Implementation

- General Solution:
  - Separate combined systems where Practical.
  - Increase conveyance so CSO's can be completely/partially treated to provide disinfection.
  - Floatable and solids reduction needed to allow for disinfection.

CSO LTCP Implementation

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- System Issues for evaluation (cont.):
  - Utilization of the "Michigan Approach" to attenuate CSO occurrence and volume.
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  - Post-Construction flow monitoring to determine effectiveness of plan implementation.
  - Other Wet Weather programs.

Long Term Control Plan: Evaluations of Alternatives

- Recommended Control objective:
  - Provide sufficient conveyance & treatment capacity to meet water quality objectives
- Plan elements to meet the objective
  - Monitor quantity and quality of CSO to fully characterize the CSO volume, flow rates, and quality characteristics
  - Identify inflow reduction alternatives, evaluate performance and cost
  - Recommend cost-effective combination of separation, conveyance, storage and treatment to meet the water quality objective

Regional Approach

- North – Separate by installing storm sewers
- Central – Convey to WWTF
- South – Convey to WWTF
- East – Alternative analysis
  - 1: Separate by installing storm sewers
  - 2: Convey along Walnut/Vine St - store within sewer
  - 3: Convey along Walnut/Vine St - central storage
  - 4: Convey along Conner St - central storage

Financing and Affordability

- Financial Capability Assessment
  - Based upon what the Community can afford.
- Anticipated Costs
  - 2005 – 2010 = $ 24 million (interceptor, WWTF Ph 1 & 2)
  - 2007 - 2022 = $ 7 million (Collection System CIP)
  - 2007 – 2022 = $ 32 million (CSO abatement projects)
  - Total Approximately = $ 63 million
- Level of Control
  - What makes sense.

LTCP Implementation Schedule

- U.S. EPA expects a 5 year completion schedule within a permit cycle or a federal consent order for a protracted schedule of 10-15 years **IF** warranted.
- State judicial agreement may be executed.
- Financial capabilities, construction costs, and periodic system calibration may extend schedules.

Schedule for Plan Completion

- September & October: CAC meetings
- October 31st, Submit LTCP to IDEM for Review
- December: Preliminary Approval from IDEM and Public Comment
- March 2007 approval
- Implement 15-year plan

Questions?