CHAPTER 4

Long Term Control Plan – Table of Contents

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4 SELECTION AND IMPLEMENTATION OF THE LONG-TERM CONTROL PLAN

4.1 PUBLIC PARTICIPATION

Informing the public about CSO Control alternatives is one part of the public participation process. Once the City developed the integrated backbone alternatives presented in Section 3.3, a series of Alternative Selection Workshops were held to rank and select a backbone alternative and develop the overall conceptual LTCP:

- An initial comprehensive selection workshop was held with key City staff. Participants included experienced decision makers responsible for administration, management and operations of the Water Pollution Control Plant and the collection system. To rank the backbone alternatives, selection criteria were developed, weights were assigned to each criterion, and each backbone alternative was rated. Ratings for each alternative were weighted and totaled to develop a final numerical value reflecting the ability of each alternative to meet all the desired criteria.
- A Peer Review workshop was held to obtain outside input and objective review of the City's planning and selection process. Working with City staff, a team of independent consultants confirmed the soundness of the City's process.
- Following a transition in City administration, two additional workshops were held to confirm the selection of the backbone alternative and develop the overall conceptual LTCP.

4.2 FINAL SELECTION AND DEVELOPMENT OF RECOMMENDED PLAN

As explained in Section 3.4.5.2, Alternative 3E emerged as the preferred alternative for the City's LTCP. This conclusion was based on a systematic rating and ranking process that was carried out in two stages:

- Stage 1 evaluated all 12 of the City's candidate alternatives based on cost, performance, and non-monetary factors. This stage provided a consistent initial assessment of the full range of viable system-wide solutions.
- Stage 2 evaluated the two short-listed alternatives from Stage 1 using an expanded set of performance metrics and refined analysis methods. This allowed the City *"to 'step back' from the evaluation process to ensure that the recommendations make sense and that program goals are being met,"* consistent with the approach recommended in the CSO Guidance.

In developing the final configuration of Alternative 3E and the recommended CSO Control Measures, the City incorporated the financial capability considerations outlined in Section 3.5, the perspective of local stakeholders, and the position of the regulatory community. This process led to the development of a recommended plan that balanced control level, implementation schedule, and affordability considerations in a manner that was satisfactory to all parties.

4.2.1 Selection of Control Level for the Recommended Plan

A key decision in developing the recommended plan was selection of the ultimate CSO control level, as measured by number of activations in a typical year. As explained in Section 3.4.5.2.5.4, the cost-benefit knee-of-the curve for Alternative 3E for all metrics (annual overflow volume, annual activations, annual number of days exceeding in-stream bacteria standards) is at approximately the 3-month control level, or 4 activations per year.

As part of the control level selection process, the City investigated whether going beyond the knee-of-the-curve, to 3 activations per year, would further the goals of the EPA's CSO Control Policy by achieving additional water quality benefits commensurate with the additional cost. To do this, the City compared a 4 activation plan with 3 activation plan in terms of important CSO metrics, with the results shown in Table 4.2.1.1.

The most significant benefit of a 3 activation plan over a 4 activation plan is that it is projected to reduce annual overflow volume on a system-wide basis by approximately 25 percent. However, given that the primary pollutant of concern in the City's waterways is bacteria, the controlling metrics are activations and hours of overflow. Simply stated, bacteria by its nature is a "problem" in terms of potential recreational use anytime it reaches the receiving stream, and once its in the stream the volume of overflow is secondary. A 3 activation plan would be expected to result in one less opportunity for public contact with bacteria in the CSO-impacted rivers on an annual basis (3 times per year as opposed to 4 times per year); however, it is striking that a 3 activation plan reduces the hours of overflow by only 2 to 4 hours (depending on the river segment).

The capital cost associated with increasing the Alternative 3E control level from 4 activations per year to 3 activations per year is approximately $30M. Based on the comparison in Table 4.2.1.1, a 3 activation plan would require City ratepayers to fund an additional $30M in CSO control projects to gain at most 4 additional annual hours of overflow reduction. The City is confident that even the most ardent users of Fort Wayne's river corridors would question whether that incremental achievement represents a wise use of $30M in local funds.

Given that a system-wide 3 activation plan is not warranted from a cost-benefit point of view, the City examined the option of targeting the St. Joseph River for a locally higher level of control. This option was investigated because community surveys show that the St. Joseph River consistently receives the highest recognition for general use (riverway hiking, etc.) of any of the local waterways. In addition to this local stakeholder recognition, the CSO reach of the St. Joseph River has been identified as presenting potential instream habitat for native species (based on a species study done by the City and submitted to USEPA and IDEM in 2005 as described in Chapter 2).

The St. Joseph River receives overflows from six of the City's CSOs, as shown in Figure 4.2.1.1. Given the high local value of this waterway, the City examined a 1 activation plan with respect to the St. Joseph River, implemented over a fast-track 12-year schedule, where all six CSOs would be controlled to at most 1 activation in a typical year. Combining this St. Joseph River component with a 4 activation plan for the remainder of the combined sewer system results in a

hybrid plan with a total capital cost of $239.4M, or $18.5M more than a system-wide 4 activation plan.

Considering the local value placed on the St. Joseph River, the City made the decision to invest the additional $18.5M to achieve the hybrid control level outlined above – 4 activations in a typical year on the St. Mary's and Maumee Rivers, and 1 activation per typical year on the St. Joseph River. The logic for this hybrid plan is simple – given that a 4-activation plan is already expected to dramatically reduce overflow activity (e.g., to 12 to 30 hours per average year), additional incremental reductions in system-wide activity are difficult to justify for the associated costs. Given this, the City believes that additional investment is better targeted at the St. Joseph River as a priority waterway, where even incremental improvements are likely to be perceived as a real benefit.

The important overflow metrics for the hybrid plan are included in Table 4.2.1.1. For the St. Mary's River and Maumee River, the metrics are the same as a system-wide 4 activation plan. For the St. Joseph River, the metrics are consistently better than a system-wide 3 activation plan.

4.2.2 Technology Configuration of the Recommended Plan

The technology configuration of the recommended plan by individual CSO is shown in Table 4.2.2.1. The configuration is very similar to the original Alternative 3E; the only changes to note are as follows:

- First, since development of the original Alternative 3E configuration, IDEM has issued a draft non-rule policy document expressing an interpretation of 327 IAC 3-2-6. If such interpretation proves to be correct and legal enforceable, the City believes, for all practical purposes, it would become virtually impossible for the City to reasonably site satellite disinfection facilities within residentially developed areas. While City reserves its right to disagree with the regulatory interpretation expressed in IDEM's draft non-rule policy document it has conservatively elected to change the control technology proposed for several CSOs on the St. Joseph River from satellite disinfection to satellite storage (the draft IDEM non-rule policy document does not purport to be applicable to storage facilities). Furthermore, as explained in the footnotes to Table 4.2.4.1, other sites identified for satellite disinfection may also ultimately be changed to satellite storage (such would require additional, and currently unplanned, additional investment by the City).
- Second, current modeling projections indicate that a wet-weather EHRC/HRT facility is not required at the CSO Ponds in order to achieve a control level of 4 untreated discharges from the CSO Ponds in a typical year - the addition of storage and dewatering capabilities at CSO Pond 1 is expected to allow the achievement of the selected control level without an EHRC/HRT facility. Therefore, the CSO Pond EHRC/HRT facility is not specified in the plan and will be constructed only if required to achieve the performance criteria for the Maumee River, i.e. 4 overflow events, as determined through future performance assessments.

As part of the Alternative 3E base configuration, it is the City's intent to continue its Combined Sewer System Capital Improvement Program (CSSCIP) as noted in Section 3.3.5.2.6.3. The program is projected to address two to three combined sewer subbasins per calendar year until the program is completed. Once identified and implemented, these partial separation projects will have the effect of reducing local CSO activity and potentially reducing the size of the subsequent CSO control measure in the LTCP. Note the CSO control measures identified in Alternate 3E assume no sewer separation in the combined sewer system; therefore, the City's current facility sizing and design criteria for the CSO control level are not dependent on achieving an assumed level of sewer separation under the CSSCIP.

4.2.3 Schedule and Costs for the Recommended Plan

Table 4.2.3.1 provides the schedule and annual capital cost expenditures for the recommended plan. The plan is scheduled in terms of CSO Control Measures, which represent logical groupings of individual improvements for implementation purposes, according to priority and required engineering sequencing. As can be seen, the St. Joseph River components (CSOs 45, 51, 52, 53, and 68) are to be controlled within 12 years, and the remainder of the improvements are to be implemented within 18 years. Also to be noted is that CSO Control Measure 1 "Plant Primaries" is already in progress and projected to be completed in 2008. This Control Measure is a compilation of several plant improvements already completed, or currently underway, as part of the City's future planned upgrade of its Water Pollution Control Plant (WPCP) to 85mgd peak capacity. Additional details on the final LTCP schedule can be found in Section 4.4.

4.2.4 Design Criteria, Performance Criteria, and Critical Milestones for the Recommended Plan

Table 4.2.4.1 provides a full presentation of all the major CSO Control Measures in the recommended plan in terms of a description, the individual CSOs controlled by each measure, the design criteria, the performance criteria, and critical milestones. In reviewing and interpreting Table 4.2.4.1, it is important to understand several key assumptions and characteristics of the City's approach to developing and implementing the components of the recommended plan:

- Upon full implementation, the CSO Control Measures listed in Table 4.2.4.1 are expected to result in 4 CSO events on the St. Marys and Maumee Rivers and 1 CSO event on the St. Joseph River in a "typical year," as evaluated in accordance with Section 4.6 below. Either a revision to Indiana's current water quality standards or some other legal mechanism will be necessary to authorize overflows caused by storms **exceeding those levels of control**. Chapter 5 of this LTCP describes federal and state requirements associated with a Use Attainability Analysis (UAA), provides an introduction to the City's draft UAA to be submitted to IDEM for consideration, and requests approval by IDEM (and ultimately EPA) of a revision to the recreational designated use for the waterways impacted by the City's CSOs to the Indiana CSO Wet Weather Limited Use Subcategory. The design and construction of CSO Control Measures 1, 2, 4, 6, and 10 are

not dependent on the level of control ultimately determined, and therefore, the City will implement CSO Control Measures 1, 2, 4, 6, and 10 according to the terms and schedules set forth in this Table. The City is scheduled to start investing heavily in CSO Control Measures 3, 5, 7 through 9, and 11 through 15, which are level of control-dependent, in the years following approval of the City's LTCP. Accordingly, all parties intend that the UAA process be completed within five years of LTCP approval. If the UAA process is not completed within five years, under certain circumstances specified in a consent decree, the City can seek a modification of the implementation schedule set forth in Table 4.2.4.1.

- The Description and Design Criteria are based upon LTCP-level planning estimates and may be subject to revision during facility planning and design. One of the conditions of Description and Design Criteria, applicable to all of the facilities set forth in Table 4.2.4.1, is that the specific facility will be designed in accordance with good engineering practice to ensure that corresponding facility-specific, river-specific, and system-wide Performance Criteria will be achieved.
- CSO Control Measures will be designed to achieve Performance Criteria of 4 CSO events for the St. Marys and Maumee Rivers and 1 CSO event for the St. Joseph River in a "typical year." "Typical year" performance, and achievement of Performance Criteria, is based on average annual statistics over a representative five-year period. The method to assess "typical year" performance over a typical 5-year period will be selected from the options presented in Section 4.6.

4.3 FINANCING PLAN

4.3.1 Summary of Future Wastewater Utility Revenue Requirements

As explained in Section 3.5, implementing the LTCP will place a significant financial and economic burden on the City of Fort Wayne. As part of the Financial Capability Analysis (FCA) in Section 3.5, the City developed an estimated capital improvement plan and operating cost projections for the next approximately 20 years of the wastewater utility. The resulting analysis showed that the City's annual costs for its wastewater system are expected to grow nearly 10.5 percent per year between 2008 and 2014, and by 7 percent per year through 2025. This includes the cost of expanding, improving, operating and maintaining existing wastewater facilities as well as the cost to build new infrastructure to reduce sewer overflows as part of the LTCP. Comparing these costs on a common dollar base of year 2005, the estimated cost to build the remaining improvements in the LTCP from years 2008 to 2025 is $239.4 million, while the costs to operate, maintain, improve and expand the wastewater system are estimated to be $454.6 million.

4.3.2 Key Assumptions

The $239.4 million cost of the LTCP is based upon conceptual planning and facilities have not been designed and alignments have not been set. Accordingly, each project and category of work has an appropriate contingency included in its estimated cost. As facility plans and detailed engineering designs are completed, costs will be updated and the overall LTCP cost re-assessed. The City's estimation of total LTCP costs for developing the financing plan assumes

that the Consumer Price Index (CPI) increases by an average of 3.5 percent per year. Because the LTCP cost is based upon conceptual planning cost estimates, the Consent Decree includes provisions that allow the City to seek an extension of the implementation schedule for control measures if the capital cost of the LTCP exceeds a significantly higher specified amount.

The City has assumed that it will finance its program mostly through Indiana Bond Bank revenue bonds and a limited amount of State Revolving Fund (SRF) bonds. The City is assuming that this debt will carry a weighted average interest rate of 6 percent with a 20-year debt. The City is also assuming that over the 18 year implementation period, market interest rates do not increase significantly from current levels, and that its general obligation bond rating will not drop below Aa3. The weighted average rate of 6 percent provides a cushion of approximately 120-125 points above current market rates.

4.3.3 Alternative Financing Evaluations

While City of Fort Wayne rate payers clearly support the idea of river water quality improvement, their support for a higher level of water quality improvement may be inversely proportional to what they will be asked to spend to support the LTCP. While a number of alternative sources of funding for water quality improvement programs are discussed from time to time at the State and national level, the Federal requirement for CSO solutions is essentially an unfunded mandate. From the perspective of the utility, a sewer system is an asset to a community when it operates well, protects the environment and provides good service at a cost the community can afford.

The City will be organizing a panel of financial and policy experts who will help the City investigate various options for reducing the impact of LTCP costs on sewer utility rate payers. This "blue ribbon" committee will:

- Identify alternative methods for raising capital for the Fort Wayne sewer utility. The list may include methods that can currently be legally implemented by a second class city in Indiana and options that would require a change in State law. Funding methods that would allow the cost of CSO improvements to be spread over a larger base will be considered. Federally sourced funds would be the largest base, then State, then regional, county, City and lastly Sewer Utility.

- Analyze the costs and benefits of each option. A cost/benefit analysis should consider impacts to Fort Wayne civil city government, Fort Wayne's sewer and other utilities, the business community and city residents, both customers and non-customers of the sewer utility. Experiences of other communities will be valuable in this analysis.

- Based on the cost/benefit analysis and knowledge of the Fort Wayne community, develop a feasibility analysis for each option.

- For the options that are determined to be feasible, develop a brief implementation plan including an analysis of the entities that would have to approve implementation of each option.

4.4 IMPLEMENTATION SCHEDULE

4.4.1 Basis of LTCP Schedule

The agreed upon 18 year implementation schedule for the LTCP allows the City to construct CSO control measures in a planned and orderly fashion. The City reviewed all the project categories from a logical engineering and construction perspective to determine project relationships and to develop the sequence in which the projects should be constructed. The City's FCA was a significant part of the determination and negotiation for the total length of schedule in which to implement the LTCP. Also, as noted in Section 4.2.1, as part of the final LTCP development the St. Joseph River was determined to be a high priority and improvements to address CSOs along the St Joseph River were sequenced to allow for the St Joseph River control measures to be completed within 12 years.

Figure 4.4.1.1 is a graphical overview of the final LTCP implementation schedule. The schedule generally follows the 15 main categories of control measures in the LTCP per Table 4.2.4.1. The Critical Milestones, which per Table 4.2.4.1 are the "Bid Year" and "Achievement of Full Operation", are shown. The Critical Milestones dates noted are the latest dates the City can complete the milestone without paying stipulated penalties per the Consent Decree. The schedule also shows that the LTCP implementation process can be defined in terms of river watersheds, where the St. Joseph River controls will be fully implemented by 2019, the Maumee River controls by 2022, and the St. Mary's River controls by 2025.

4.5 OPERATIONAL PLAN

The Amended Combined Sewer System Operational Plan (CSSOP) Report, September 2007, is designed to be used by the City, through its wastewater utility, Board of Public Works, and other departments involved in programs that affect the operations and maintenance (O&M) of the City's combined sewer system. The Chapters describe how the City intends to continue to implement the Nine Minimum Controls (NMCs) consistently with EPA's 1995 Combined Sewer Overflows: Guidance for Nine Minimum Controls and identifies programs to be implemented to reduce the effects of Combined Sewer Overflows (CSOs) on receiving stream water quality.

The City's Amended CSSOP document is intended to be a "living" document in that the City intends to revise and update the CSSOP as (i) more information pertaining to receiving stream water quality, combined sewers, the collection system, and the WPCP becomes available; (ii) system revisions or modifications are made; and (iii) new facilities, equipment, or personnel are added. By functioning as a "living" document, changes in regulatory requirements, administrative goals, strategies, and resources will also be incorporated into the CSSOP.

The City's Amended CSSOP is a separate document and not part of its LTCP. A copy of the Amended CSSOP Report can be located in the City's Planning & Design Services department library.

4.6 POST-CONSTRUCTION MONITORING PROGRAM

4.6.1 Introduction

The City's CSO Long-Term Control Plan will implement a series of aggressive controls to dramatically reduce the amount of combined sewage discharged to the St. Joseph, St. Mary's, and Maumee Rivers. While CSOs are only one of many pollutant sources impacting the rivers, it is expected that CSO control will result in a net benefit to the rivers and improve water quality. The purpose of the Post-Construction Monitoring Program is to assess performance of the City's CSO Control Measures and to add to the City's ongoing investigation of overall stream conditions, including tracking changes in water quality over time.

This section describes the key elements of the proposed program for post-construction monitoring activities. The Post-Construction Monitoring Program has been developed to assess the performance and observable water quality impact of CSO control measures as they are implemented, while integrating with the City's ongoing water quality monitoring program (a part of which operates under a cooperative agreement with IDEM). From a regulatory perspective, the Post-Construction Monitoring Program will document the effectiveness of the City's overall CSO control program in achieving performance requirements. The elements of the program are as follows:

- A monitoring schedule, identified sampling locations, and associated monitoring procedures to collect data associated with the Performance Criteria (presented in Table 4.2.4.1) and *E. coli* levels in CSO-impacted receiving streams.
- Analysis of collected data to determine whether CSO control measures are meeting the Performance Criteria presented in Table 4.2.4.1.
- Analysis of the collected data to assess long-term trends in instream *E. coli* levels, and documentation of any environmental benefits that occur as the LTCP is implemented.
- Evaluation and analysis of the data for reporting status and progress to regulatory agencies and the public.

The City's Post-Construction Monitoring Program will be implemented on a river-watershed basis, beginning on the St. Joseph River, followed by the Maumee River, followed by the St. Mary's River. This progression is guided by the implementation schedule for CSO controls, and allows for assessment of environmental benefit on a waterbody basis. The monitoring program will assess the control program's effectiveness at meeting river-specific Performance Criteria – 1 overflow event[1] on the St. Joseph River in a typical year and 4 overflow events on the St.

[1] An "*overflow event*" is as defined in the Presumption Approach of the CSO Control Policy – "*an overflow event is one or more overflows from a CSS as the result of a precipitation event*." For the purposes of the City's selected CSO Control Measures, the definition is applied on a river system basis, i.e. independently to the St. Joseph River and the St. Marys/Maumee river system, rather than a full

Mary's/Maumee River system in a typical year. The frequency of CSO overflow events will vary year-to-year because of variation in annual rainfall. For example, where the level of control is 4 overflow events per typical year, actual overflow frequency is expected to range from 0 to 10 overflow events per year (it should be noted that it is not possible to put a firm upper bound on this range due to rainfall variability).

The City views the Post-Construction Monitoring Program as a key mechanism for supporting dialogue with the regulatory agencies and the public. Fort Wayne City Utilities will compile monitoring results, submit milestone reports to regulatory agencies, and use the information to report progress to the public.

4.6.1.1 Regulatory Requirements

U.S. EPA requires CSO communities to conduct a post-construction monitoring program during and after LTCP implementation "to help determine the effectiveness of the overall program in meeting [Clean Water Act] requirements and achieving local water quality goals."[2] This program will collect data that measures the effectiveness of CSO controls and their impact on water quality, and intends to utilize existing monitoring stations used in previous studies of the waterways and sewer system in order to compare results to conditions before controls were put in place. The program will include a map of monitoring stations, a record of sampling frequency at each station, a list of data to be collected, and a quality assurance/quality control (QA/QC) plan.

In U.S. EPA's December 2001 Report to Congress: Implementation and Enforcement of the Combined Sewer Overflow Control Policy, the agency noted the difficulty of establishing a monitoring and tracking program for CSO control programs. "Monitoring programs need to be targeted and implemented in a consistent manner from year to year to be able to establish pre-control baseline conditions and to identify meaningful trends over time as CSO controls are implemented," the report said. "In practice, it is often difficult, and in some instances impossible, to link environmental conditions or results to a single source of pollution, such as CSOs. In most instances, water quality is impacted by multiple sources, and trends over time reflect the change in loadings on a watershed scale from a variety of environmental programs." The report also noted that weather conditions and rainfall totals vary significantly from storm to storm and year to year, making comparisons difficult.

4.6.1.2 Purpose & Scope

This Post-Construction Monitoring Program will collect the necessary data to assess the impact of the City of Fort Wayne's CSO LTCP. CSO controls are expected to provide two positive impacts:

- First, control CSOs to the Performance Criteria provided in Table 4.2.4.1. The monitoring program will collect the requisite end-of-pipe data to assess performance of the controls.

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combined sewer system (CSS) basis. Furthermore, discrete overflow events are defined as being separated by a 6-hour or longer inter-event duration, consistent with the methodology and analysis presented in the City's LTCP.

[2] *Combined Sewer Overflows, Guidance for Long-Term Control Plan* (EPA 832-B-95-002, August 1995) p. 4-15.

- Second, improve water quality on local rivers. As noted in U.S. EPA's Report to Congress, "…it is often difficult, and in some instances impossible, to link environmental conditions or results to a single source of pollution, such as CSOs." However, the monitoring program will collect the requisite instream data to assess the trends over time as CSO controls are implemented. In order to compare post-construction water quality trends to current conditions and historic data, the proposed monitoring program makes use of all of the City's current water quality monitoring stations.

In addition to collecting data to assess CSO control performance and instream water quality trends, the Post-Construction Monitoring Program will develop documentation to support regulatory reporting requirements and communicate with the public.

The waterbodies included in this plan are the St. Joseph River, the Maumee River, and the St. Mary's River. The City's monitoring program is a part of the following overall scope of work:

- Document Current Baseline Conditions: During development of the LTCP, the City conducted a significant amount of characterization work. The results of the characterization and documentation of current baseline conditions are presented in Chapter 2.
- Identify Parameters of Concern: During the system characterization effort and through subsequent discussions with U.S. EPA and IDEM, the City identified *E. coli* bacteria as the parameter of concern in local waterbodies. This decision process is described in more detail in Chapter 2. Therefore, the City will use *E. coli* (or other applicable pathogen or pathogen indicator as described below in Section 4.6.2.2) to measure the effect of its long-term CSO control measures on receiving streams.
- Prepare and execute Post-Construction Monitoring: The City's monitoring program is the focus of this section 4.6, with individual elements and approach described in detail in Sections 4.6.2 through 4.6.6.
- Report Results to State and Federal Agencies: The results and observations from the post-construction monitoring will be provided to U.S. EPA and IDEM through a series of milestone reports and a final report. A milestone report will be prepared for each of the three river watersheds, when all the CSO controls in a particular river watershed are operational. The reports will provide documentation of facility performance relative to the Performance Criteria in Table 4.2.4.1, along with a presentation of observed water quality trends. Section 4.6.7 presents the City's plan for reporting progress to the regulatory agencies.
- Provide Public Information on Water Quality: Fort Wayne City Utilities will continue distributing information on the CSO LTCP, including water quality issues, to the public through the program described in Chapter 7 of the Combined Sewer System Operational Plan (CSSOP).

4.6.2 Program Elements

The City of Fort Wayne will implement the CSO Long-Term Control Plan as a series of CSO Control Measures according to the schedule provided in Table 4.2.4.1. The CSO Control Measures have been grouped for implementation purposes according to priority and required

engineering sequencing. Milestones in the implementation process can be defined in terms of river watersheds, where the St. Joseph River controls will be fully implemented by 2019, the Maumee River controls by 2022, and the St. Mary's River controls by 2025. At each implementation milestone, the City will proceed with the data evaluation and progress reporting to assess compliance with the Performance Criteria in Table 4.2.4.1 and document improvements in instream water quality conditions. Note that while the Maumee River post-construction monitoring will begin in 2022, the full impact of CSO Control Measures on Maumee River water quality will be realized in 2025 once the controls in the upstream St. Mary's River watershed are fully implemented.

4.6.2.1 Performance Criteria

The Performance Criteria for the City's CSO Control Measures are expressed as number of activations in a typical year. The required Performance Criteria - 1 overflow event on the St. Joseph River in a typical year, 4 overflow events on the Maumee River in a typical year, and 4 overflow events on the St. Mary's River in a typical year - are provided in Table 4.2.4.1. As explained in Section 4.6.1 above, the actual frequency of CSO overflow events will vary year-to-year because of variation in annual rainfall. The City will assess the average performance of CSO control measures by river watershed following the Achievement of Full Operation of the full set of controls for each river watershed. The assessment of performance, and the resulting determination of compliance with the Performance Criteria during a typical year, will be performed with a combination of outfall monitoring and collection system modeling and documented in Table 4.6.2.1. A full explanation of the performance assessment is provided in Section 4.6.4.

4.6.2.2 Water Quality Measures

The Water Quality Measures are data-based indicators of instream water quality, in particular the long-term trends in expected improvements due to implementation of the City's CSO Control Measures. A strong baseline of existing water quality conditions in the rivers has already been established through the City's ongoing water quality monitoring program. The water quality component of the Post-Construction Monitoring Program will continue to collect instream samples during and after implementation of the CSO Control measures in order to document changes in water quality conditions.

The Water Quality Measure incorporated in the City's Post-Construction Monitoring Plan is *E. coli* bacteria (or other pathogen indicator, to the extent applicable water quality standards have been revised to include a different applicable pathogen indicator). Bacteria has been established as the parameter of concern with respect to CSO control, based on the City's completed system characterization efforts and discussion with U.S. EPA and IDEM.

The City will collect data to measure and evaluate improvements to instream *E. coli* bacteria counts that can be attributed, at least in part, to CSO control measures. It is unlikely that CSO controls alone will result in attainment of Indiana's *E. coli* standards for primary contact recreation due to numerous *E. coli* sources in the environment. Because the e. coli counts in water bodies may be subject to contribution from various sources, for the purpose of determining compliance with this decree, an in-stream water quality value will not be imposed. Rather, the City will analyze trends in both dry-weather and wet-weather *E. coli* levels and compare them to

historic monitoring data and modeling predictions to determine improvement in water quality and to ensure that residual CSO discharges do not interfere with applicable recreational uses (to be determined through the City's Use Attainability Analysis). A different pathogen indicator other than *E. coli* may be requested by IDEM in accordance with this paragraph to the extent the applicable water quality standards are revised to include a different pathogen indicator.

4.6.3 Post-Construction Monitoring and Data Collection

This section details the field program that the City will implement to support the overall Post-Construction Monitoring Program. The field program combines CSO outfall flow monitoring, a pilot CSO disinfection study, river water quality sampling, WPCP effluent sampling, and rainfall monitoring to collect the data necessary for characterizing the benefits of implemented CSO Control Measures.

4.6.3.1 Monitoring Schedule

By definition, the post-construction monitoring schedule is dictated by the construction schedule for the City's LTCP. As shown in Table 4.6.2.1, post-construction monitoring will begin after completion of all LTCP projects in the St. Joseph River watershed. Post-construction monitoring will continue through implementation of the other groups of watershed controls (on the Maumee River and St. Mary's River), and provide the data for the Final Post-Construction Monitoring Report (scheduled for submission within five years following Achievement of Full Operation of all LTCP projects). After review of the Final Post-Construction Monitoring Report by U.S. EPA and IDEM, the City will modify the Post-Construction Monitoring Program as appropriate to satisfy ongoing reporting requirements.

While post-construction monitoring cannot begin until associated construction phases are completed, the City intends to continue its current monitoring programs until the St. Joseph watershed controls are implemented. As explained below, the current CSO outfall flow monitoring locations and river water quality sampling locations will also serve as the post-construction monitoring locations. Therefore, these current programs will provide an ongoing understanding of CSO performance and instream water quality conditions prior to post-construction monitoring. This data will provide the necessary baseline from which to assess the impact and benefit of implemented CSO Control Measures.

4.6.3.2 Monitoring Stations

The City's current monitoring programs have been designed to fully characterize the existing system in terms of CSO discharges and receiving water quality trends. The following stations are included in these current programs:

- *Stream monitoring.* The USGS maintains five gauging stations in and around Fort Wayne, one each on the St. Joseph River and St. Mary's River, and three on the Maumee River.
- *CSO outfall flow monitoring*. Of the City's 44 permitted CSO discharge points:
    - 33 locations are monitored with continuous depth/velocity meter configurations
    - 5 locations are monitored via pump runtime meters at overflow pump stations.

  - 3 locations (007, 012, 027) are emergency gravity discharges at overflow pump stations. These emergency overflows are not monitored, as they activate only when the associated pump stations fail.
  - 2 locations (003 and 081) are visually inspected to determine activation. Visual inspections occur daily on weekdays, and during runoff events on weekends and holidays.
  - 1 location (014) has very low flows and typically activates less than once per year.
- *River water quality sampling.* The City collects water quality samples at the following six locations in cooperation with IDEM:
  - Mayhew Road Bridge – St. Joseph
  - Tennessee Avenue Bridge – St. Joseph
  - Ferguson Road Bridge – St. Mary's
  - Spy Run Bridge – St. Mary's
  - Anthony Boulevard Bridge – Maumee
  - Landin Road Bridge – Maumee

  Monthly sampling is conducted with IDEM on a year-round basis. The City augments the monthly program with weekly sampling from April 1 to October 31.
- *WPCP effluent monitoring.* Per NPDES permit requirements, the City collects effluent samples at Outfall 001.
- *Rainfall monitoring.* The City maintains a network of 10 rain gauges, distributed over the service area to adequately capture typical rainfall patterns and distributions.

Given that the above monitoring locations were designed to properly characterize the existing system and receiving water conditions, often in concert with U.S. EPA and/or IDEM, the City has identified them as the proper monitoring locations for the Post-Construction Monitoring Program. CSO discharge locations will not change (other than through elimination), and river flow patterns will remain the same, following implementation of the CSO Control Measures. Therefore, these monitoring locations are appropriate for the purposes of the Post-Construction Monitoring Program – to assess compliance with CSO Performance Criteria, and document improvements to water quality over time. Additional details on these programs and locations are provided below in Sections 4.6.3.3 through 4.6.3.7.

The City's current (and post-construction) monitoring station locations, along with the reasons for selection, monitoring equipment types, monitoring frequencies, and monitoring parameters are presented in Table 4.6.3.1. The locations of these stations are displayed on Figure 4.6.3.1. The City's distributed rain gauge network is also shown on Figure 4.6.3.1.

The City may, after consultation and agreement with U.S. EPA and IDEM, add, modify, remove, or relocate monitoring stations, as necessary, during or after implementation of CSO Control Measures to address any changes that may be necessary as a result of facility planning, design, and construction.

4.6.3.3 Stream Monitoring

The USGS maintains five real-time stream gauging stations in and around Fort Wayne, with one each on the St. Joseph River and St. Mary's River, and three on the Maumee River, as shown on

Figure 4.6.3.1. Four of these stations monitor stage in the streams, which the USGS then uses to estimate flow. The fifth station monitors stage only. The City has used and intends to continue using this USGS data to provide long-term stream monitoring as part of their wet-weather program. As with all USGS gauging stations, standard equipment, procedures, and protocols will be used for data collection, and USGS personnel are responsible for maintenance, calibration, and data processing at these locations.

4.6.3.4 CSO Outfall Monitoring

4.6.3.4.1 Outfall Monitoring for Activations

The primary purpose of CSO outfall monitoring in the Post-Construction Monitoring Program is to determine if CSO Control Measures are complying with the Performance Criteria in Table 4.2.4.1.

The City is currently monitoring 33 CSO outfalls with continuously recording flow meters (depth/velocity meters), allowing estimates of overflow onset, duration, and volume. An additional 5 locations are monitored via pump runtime data at overflow pump stations, again allowing estimates of overflow onset, duration, and volume. The remaining 6 permitted outfalls are either emergency overflows (3 locations), visually inspected overflows using blocking to estimate activations (2 locations), or very low activity/volume overflows (1 location).

The City will continue monitoring these CSO outfalls until the initiation of post-construction monitoring (at the completion of the St. Joseph River watershed CSO Measures). The City may, after consultation and agreement with U.S. EPA and IDEM, change the monitoring equipment and protocols at selected locations during this time. For example, at locations where the depth/velocity meters are consistently problematic, or show that a CSO activates very infrequently and at low volume, the City may change to a simpler activation only monitoring scheme.

As part of initiating the post-construction monitoring, the locations and/or equipment associated with some monitoring sites may change to accommodate post-construction configurations. These changes will be discussed with U.S. EPA and IDEM prior to implementation.

4.6.3.4.2 Outfall Monitoring for Assessing Satellite Disinfection Performance

The City is proposing to construct four satellite disinfection facilities as a CSO Control Measure for Outfalls 52, 54, 61 and 62. However, the City will construct satellite storage facilities in lieu of satellite disinfection facilities if it comes to acquire, by January 1, 2010, the wastewater collection and treatment systems currently owned or operated by Utility Center, Inc. (a/k/a AquaSource or Aqua Indiana, Inc.) and connected to the Main Aboite and Midwest wastewater treatment facilities (for which the State has issued NPDES Permit Nos. IN0035378 and IN0042391). If the City does not acquire the aforementioned wastewater treatment and collection systems currently owned and operated by Utility Center, Inc. within the specified timeframe, it is not required to, but may nonetheless elect to, construct one or more satellite storage facilities in lieu of satellite disinfection facilities as the CSO Control Measure for

Outfalls 52, 54, 61 and/or 62. The effectiveness and required performance standards for any such satellite disinfection facilities in terms of pathogen control are dependent on a wide range of factors, and defining the performance of installed facilities is of high interest to the City and EPA/IDEM. If the City utilizes satellite disinfection instead of the other viable satellite control option, satellite storage, at these locations, the following conditions will apply to use of satellite disinfection.

A pilot disinfection facility shall be constructed at Outfall 52 per the schedule specified in Table 4.2.4.1. After achievement of full operation, this facility shall be studied to determine the effectiveness of disinfection of the flows entering the facility. The testing duration and protocol shall be per the City of Fort Wayne CSO Satellite Disinfection Pilot Study (Attachment 1). The effectiveness of disinfection will be measured using the testing protocol, in order to document the ability of the facility to attain the following performance measures at a minimum:

- Skimming or screening (or equivalent) of the detained flows to remove solids and floatables and proper disposal of all material in accordance with all applicable solid waste disposal laws and regulations
- Detention of flows for settling, combined with other solids removal mechanisms associated with solids and floatable control, to achieve the Total Suspended Solids (TSS) removal necessary for effective disinfection. Minimum detention period is 30 minutes.
- Disinfection of all detained flows to *E. coli* effluent limitation contained in the current NPDES permit.
- Dechlorination, if necessary, of all detained flows to the effluent limitation for Total Residual Chlorine (TRC) contained in the current NPDES permit.

If the results of the study indicate that the disinfection facility constructed at Outfall 52 does not provide effective disinfection, the City will follow the provisions outlined in the sections of the Consent Decree entitled, "*Extension of Deadlines to Achieve Performance Criteria"* and/or the "*Modification of Performance Criteria"* to identify the appropriate controls required to meet the activation performance criteria for Outfall 52, 54, 61 and 62. Conversely, if the study results indicate that the pilot satellite disinfection facility does provide effective disinfection, the City will proceed to construct the remaining satellite disinfection facilities in accordance with Tables 4.2.3.1 and 4.2.4.1 unless the City decides to install satellite storage facilities at the specified locations.

4.6.3.5 Water Quality Monitoring

The City currently collects water quality samples at six locations as part of a cooperative river water quality sampling program with IDEM. Samples are collected once per month on a year-round basis in support of the IDEM program; the City increases the frequency to weekly sampling during the period April 1 to October 31. All samples are analyzed for the following parameters:

- Field measurements are taken for pH, Dissolved Oxygen, and temperature.
- *E. coli*
- Ammonia-Nitrogen

- Total Phosphorus
- Total Suspended Solids

In addition, the monthly samples collected under the cooperative program with IDEM are analyzed for a range of metals including cadmium, copper, lead, and zinc.

This program will continue up until and after initiation of the Post-Construction Monitoring Plan (scheduled to start after completion of the St. Joseph CSO watershed controls). In this way, the City will have a strong baseline dataset to determine changes in water quality over time.

Sampling and analysis for *E. coli* bacteria (or other pathogens) is required under this Post-Construction Monitoring Plan, since it has been identified as the water quality measure for the Plan as explained in Section 4.6.2.2. The City will also continue, at its discretion, sampling and analysis for the other parameters listed above.

4.6.3.6 WPCP Effluent Monitoring

The City will continue monitoring the WPCP effluent as required by current and future NPDES permits.

4.6.3.7 Rainfall Monitoring

The City has a network of 10 rain gauges to measure rainfall across the service area. This network has been in place since 1983, and is currently maintained by the City's dedicated CSO crew. The distribution of gauges in the network has been configured to properly represent temporal and spatial rainfall patterns in the Fort Wayne area.

The City intends to maintain the current rain gauge network (or equivalent) up until and after initiation of the Post-Construction Monitoring Program. The collected rainfall data will support the wet-weather analyses and modeling described below in Section 4.6.4.

4.6.4 Data Retrieval, Management and Analysis

Two kinds of data will be collected, managed, and analyzed as part of the City's Post-Construction Monitoring Program – continuous flow data collected at CSO outfalls and discrete water quality data collected at river monitoring sites. Both of these data types are currently being collected as part of the City's ongoing monitoring program; as a result, the new data collected as part of the Post-Construction Monitoring Program will be integrated into existing data validation, archiving, retrieval, and management tools. The City will continue taking all necessary measures to ensure that monitoring objectives are attained.

This section first describes each of the data types, then presents the City's plan for using and analyzing the outfall flow data and collection system modeling tools to assess compliance with the Performance Criteria in Table 4.2.4.1.

The City has been collecting system-wide CSO outfall flow data since 2004 using flow meters and data management software provided by ADS Environmental Services (ADS). The City will have ongoing access to ADS's flow data management software (or equivalent) for the duration of

the Post-Construction Monitoring Program. This software, known as Intelliserve, provides full functionality for archiving, retrieving, managing, and analyzing flow data. In addition, the City uses their telemetry system to collect necessary data at the five CSO locations monitored with pump runtime meters.

The City has been collecting water quality data on the St. Joseph, Maumee, and St. Mary's Rivers under various programs since the 1990s. The current sampling program collects monthly samples on a year-round basis and weekly samples from April 1 through October 31 at six sites. Field measurements are taken for pH, Dissolved Oxygen, and temperature. Sample volumes are also transported to the WPCP laboratory and analyzed for *E. coli*, Ammonia-Nitrogen, Total Phosphorus, and Total Suspended Solids.

Consistent with the current monitoring programs, all personnel involved in the Post-Construction Monitoring Plan will be experienced and familiar with the requirements of the data collection program. Given the duration of the City's LTCP program and post-construction monitoring period, it is likely that data management and analysis techniques will evolve and improve within the wet-weather industry over the duration of the implementation period. If this occurs, any recommended changes to the City's approach will be discussed with U.S. EPA and IDEM to ensure consensus prior to implementation.

A primary purpose of the Post-Construction Monitoring Program is to assess compliance with the Performance Criteria set forth in Table 4.2.4.1. In order to assess the Performance Criteria in terms of CSO activations, the City is proposing a model-based approach similar to the method recently approved for the City of Indianapolis, Indiana. In addition, given the importance of the assessment process, and recognizing that methods to assess average performance of CSO control measures per the CSO Policy are in their infancy, the City is allowing for the possibility that an improved alternative, or modified, approach may be identified in the future.

4.6.4.1 Model-Based Approach to Assessing Compliance

The City of Fort Wayne began its collection system modeling program in the late 1990s, and developed a fully dynamic, planning-level collection system model to support development of the Long-Term Control Plan. As explained in Chapter 2, the City's model was reviewed and approved for LTCP development purposes by U.S. EPA and IDEM in 2005.

Under the model-based approach, the City would update and utilize their collection system model to determine whether operational CSO Control Measures have achieved compliance with the Performance Criteria set forth in Table 4.2.4.1. At least two (2) years prior to the initiation of post construction monitoring on the first river-watershed, Fort Wayne shall propose to EPA and IDEM, in writing, the five years it has selected as a five year period for a typical year. The City would take the following steps under this approach, with each step guided by modeling industry standards and sound engineering judgment:

1. Collect CSO outfall data for a 12-month post-construction monitoring period in each watershed in accordance with Section 4.6.3.4.
2. Perform quality assurance and quality control of the data collected in Step 1.

3. Utilize the model (incorporating the improved collection system) in its previously-calibrated state and the rainfall data collected during the monitoring period, to run a continuous simulation of CSO discharges for the 12-month post-construction monitoring period.
4. Compare the continuous simulation outputs to the CSO monitoring data for the 12-month post-construction monitoring period to determine whether re-calibration of the collection system model is needed. Model re-calibration will not be needed if the model achieves at least the same degree of calibration as was achieved for pre-CSO Long-Term Control conditions during the LTCP development process, and there is a high degree of agreement between the model output and CSO monitoring data for activation frequency for the 12-month post-construction monitoring period. Otherwise, model re-calibration will be needed in accordance with Steps 5-7.
5. If re-calibration is needed, select two or more appropriate rainfall events from the 12-month post-construction monitoring period for model recalibration. The City will apply the standard of practice used in the collection system modeling industry in selecting the best candidate events for model calibration.
6. Develop an initial data set for use with the model and perform successive applications of the model with appropriate parameter adjustment until there is a high degree of agreement between the model output and the CSO monitoring data for the selected recalibration events. In making such adjustments, the City will consider the inherent variability in both the collection system model and in flow monitoring data, and will exercise sound engineering judgment and best industry practices so as to not compromise the overall representativeness of the model.
7. Once the model has been re-calibrated in accordance with Step 6, the City will verify the re-calibrated model by again utilizing the model and the rainfall data collected during the 12-month post-construction monitoring period, to run another continuous simulation for the 12-month post-construction monitoring period. The City will again compare the continuous simulation outputs to the CSO monitoring data for the 12-month post-construction monitoring period as described in Step 4, to determine whether additional re-calibration of the collection system model is needed. Re-calibration will be determined to be adequate if the model achieves at least the same degree of calibration, as was achieved for pre-CSO Long-Term Control conditions during the LTCP development process, and there is a high degree of agreement between the model output and CSO monitoring data for activation frequency for the 12-month post-construction monitoring period. Otherwise, further re-calibration will be needed in accordance with these Steps 5-7 until the model achieves at least the same degree of calibration as was achieved for pre-CSO Long-Term Control conditions during the LTCP development process, and there is a high degree of agreement between the model output and CSO monitoring data for activation frequency for the 12-month post-construction monitoring period.
8. Once the City has satisfactorily re-calibrated the model in accordance with Steps 5 through 7 (or shown that recalibration is not necessary in accordance with Step 4), the City will then utilize the original model (if recalibration was determined not to be necessary in accordance with Steps 4-7) or the recalibrated model to run a continuous simulation for a representative five-year period agreed to with IDEM and U.S. EPA. The model results for this five-year simulation will be used to determine whether the City has achieved the Performance Criteria set forth in Table 4.2.4.1.

9. The City shall be deemed to have achieved the Performance Criteria if the five-year simulation shows that there were a total of 24 or fewer CSO events into the Maumee River and St. Mary's River watershed for the five-year period, and a total of 6 or fewer CSO events into the St. Joseph River watershed for the five-year period, following construction of the necessary Control Measures in Table 4.2.4.1.
10. The overflow frequency performance criterion is based upon a "typical year," calculated using the 5-year continuous simulation of the collection system model, as described above. If the modeled average annual overflow frequency is less than or equal to 1.2 for the St. Joseph River and 4.8 for the Maumee and St. Mary's Rivers, the system is deemed to be in compliance with the performance criteria of 1 and 4 overflow events per year. This "rounding" is appropriate due to the inherent variability in model predictions. If the modeled overflow frequency exceeds 1.2 for the St. Joseph River and/or 4.8 for the Maumee and St. Mary's Rivers, then the City will prepare a Milestone Report of this negative result under Paragraph 4.6.6.1. The City may include an analysis of the following in the Milestone Report: (1) the volume, frequency, and factors causing the additional overflow frequency, (2) any impact on water quality, including designated uses, from the additional overflow frequency, (3) control options, if any, to reduce the frequency towards 4/1 (as appropriate), (4) associated costs for any additional control options, (5) any expected benefits from such control options and (6) a recommendation as to whether the City should proceed under Section XXI.D, XXI.E or another provision of the Consent Decree.

It is important to note that percent capture has not been identified as a formal Performance Criterion for the City's LTCP. Based on discussions with U.S. EPA and IDEM during development of the final recommended plan, average annual overflow frequency was identified as the controlling Performance Criterion and is identified as such in Table 4.2.4.1. However, the City recognizes that percent capture can sometimes be useful in assessing performance of a combined sewer system, and will continue to develop estimates of percent capture based on the 5-year simulations described above. These estimates will be included in documentation of system performance included in the Milestone Reports described in Section 4.6.6.1.

The City also plans to use their collections system model to support the process of refining the planning-level LTCP concepts into specific CSO control projects. This will require selected improvements to the level of detail and calibration of the model on an as-needed basis over the next 18 years. This process of refining the model to meet specific project needs has always been anticipated, and is consistent with the modeling approach followed by the City since the 1990s. The model is a valuable and dynamic tool that the City will use as appropriate to further system understanding from a design, operation, and maintenance perspective as they pursue their goal of improving water quality on local rivers.

4.6.4.2 Alternate Compliance Assessment Approach

The City may propose an alternate compliance assessment approach other than that described in Section 4.6.4.1. Such an alternate compliance assessment approach may be implemented by the City, in lieu of that described in Section 4.6.4.1, if approved by U.S. EPA and IDEM and subject to other approvals, if any, required by Section XXI of the City's Consent Decree. In order to

provide sufficient time for agency review and approval to allow timely implementation, any proposal by the City for use of an alternative compliance assessment approach should be submitted to U.S. EPA and IDEM no later than December 31, 2015.

4.6.5 Quality Control

The City has Standard Operating Procedures (SOPs) in place for both of the core activities in the Post-Construction Monitoring Program, CSO outfall flow monitoring and river water quality sampling. Both of these programs have been ongoing in their current form since at least 2004, allowing for 3 years of field experience and identification of potential difficulties. The SOPs for these two programs are included in the Combined Sewer System Operational Plan.

All activities under the Post-Construction Monitoring Program will be implemented with appropriate quality control standards, including potential updates to the standards in response to industry trends. While the detailed procedures associated with many activities have in-place SOPs (as explained above), a general summary of the quality control procedures follows.

- Streamflow data is collected by the USGS under their typical quality control procedures. The City makes use of this streamflow data as part of their wet-weather program.
- CSO outfall flow monitoring is conducted by a dedicated CSO crew, following SOPs for maintenance, equipment replacement, data downloads, and associated field activities. Flow data is reviewed for validity and representativeness by the Program Manager of Wet-Weather Operations.
- The proposed City of Fort Wayne CSO Satellite Disinfection Pilot Study will be performed per the quality control requirements outlined in Attachment 1.
- River water quality sampling is performed by trained Industrial Pretreatment staff. Standard sampling procedures and documentation are a required part of the program, including use of chain-of-custody forms, appropriate sample preservation techniques, etc.
- Laboratory analysis of water quality samples is performed by the City's certified WPCP laboratory. The City's laboratory follows all standard and required protocols and documentation needs.
- Rainfall data is downloaded and archived by the dedicated CSO crew responsible for the CSO outfall monitoring program. Rain gauge field work and downloading activities are included in the flow monitoring program SOP.

4.6.6 Data Evaluation & Progress Reporting

As part of the City's agreement with U.S. EPA and IDEM, regular reporting of activities and progress is required for the duration of the LTCP implementation process. Biannual reports are required under the Consent Decree, and these will include updates on the Post-Construction Monitoring Program as appropriate. In addition to the reporting required under the Consent Decree, the City will provide the Milestone Reports and Final Report described below to U.S. EPA and IDEM specifically for the Post-Construction Monitoring Program.

A second purpose for the progress reporting is to keep Fort Wayne's public ratepayers aware of the City's progress. A key goal of the City's overall wet-weather control philosophy is to ensure that public monies are spent in an effective and prudent manner. As part of pursuing that goal,

the City is committed to keeping the public informed on where, how, and to what benefit their money is being spent.

As explained previously in this plan, and recognized by U.S. EPA in their December 2001 Report to Congress, "it is often difficult, and in some instances impossible, to link environmental conditions or results to a single source of pollution, such as CSOs. In most instances, water quality is impacted by multiple sources, and trends over time reflect the change in loadings on a watershed scale from a variety of environmental programs." Therefore, it is unlikely that the reports described below will be able to definitively link any measurable water quality indicator to in-place CSO controls. However, the City's reporting will document progress towards complying with the Performance Criteria in Table 4.2.4.1, along with progress towards the common goal of improving instream water quality.

A summary of the schedule for the Milestone Reports and Final Report is presented in Table 4.6.6.1. As can be seen, the Milestone Reports provide an explicit mechanism for demonstrating compliance with the Performance Criteria set forth in Table 4.2.4.1 by 2027, or two years after Achievement of Full Operation for all CSO Control Measures. If compliance is demonstrated in 2027, the City will have satisfied the Performance Criteria for CSO Control Measures required under the Consent Decree. If compliance is not demonstrated in 2027, the final Milestone Report will include an analysis of the following: (1) the volume, frequency, and factors causing the additional overflow frequency, (2) any impact on water quality, including designated uses, from the additional overflow frequency, (3) control options, if any, to reduce the frequency towards 4/1 (as appropriate), (4) associated costs for any additional control options, (5) any expected benefits from such control options and (6) a recommendation as to whether the City should proceed under Section XXI.D, XXI.E or another provision of the Consent Decree.

4.6.6.1 Milestone Reports

After Achievement of Full Operation of all LTCP projects in a specified river watershed (St. Joseph River, Maumee River, or St. Mary's River), the City will prepare and submit a Milestone Report to the U.S. EPA and IDEM. The Milestone Report for each watershed will be submitted within two years following Achievement of Full Operation of the applicable CSO project(s), and include data related to the following information:

- Description of river and CSO controls being implemented
- CSO monitoring and rainfall monitoring results
- River water quality sampling results
- Evaluation of the effectiveness of CSO Control Measures, including results of analyses performed to assess whether the implemented controls are complying with the Performance Criteria in Table 4.2.4.1.
- A discussion of any significant variances from the Performance Criteria, including impacting factors and associated water quality impacts (if observed)
- Re-evaluation and proposed corrective action (if necessary)
- Status of upcoming CSO Control Measures in other watersheds (reporting on status of construction schedules, etc.)

The final Milestone Report, prepared in 2027 after Achievement of Full Operation of the St. Mary's River CSO controls, will include an assessment of the combined St. Mary's River and Maumee River controls. While the performance of the Maumee River CSO controls in terms of activations can be assessed in 2024, the full impact of CSO Control Measures on the Maumee River cannot be assessed until implementation of the upstream St. Mary's River controls.

4.6.6.2 Final Report

While the Milestone Reports are targeted at the regulatory agencies for the purpose of demonstrating compliance with the Performance Criteria set forth in Table 4.2.4.1, the Final Report is targeted at a broader audience, including Fort Wayne's ratepayers. As explained previously, the City is committed to keeping the public informed on where, how, and to what benefit their money is being spent. Therefore, the Final Report will be based on up to three years of monitoring following Achievement of Full Operation in order to further assess longer-term trends in expected instream water quality improvements.

The City shall develop and submit the Final Post-Construction Monitoring Report to U.S. EPA and IDEM within three years following Achievement of Full Operation of all LTCP projects. The Final Report will consolidate the information described above with respect to each watershed, plus any additional relevant information collected since submittal of the associated Milestone Report. The purpose of the Final Post-Construction Monitoring Report shall be to provide additional documentation on the performance of the fully implemented CSO Control Measures on a system-wide basis (based on an additional CSO activation data), and provide a further assessment of the longer-term trends in expected instream water quality improvements due to implementation of the City's CSO Control Measures.

4.6.6.3 Progress Report to Public

As noted above, a key goal of the City's overall wet-weather control philosophy is to ensure that public monies are spent in an effective and prudent manner. The City takes this obligation very seriously, given that City ratepayers are funding the CSO Control Measures required under the LTCP. Therefore, progress reporting to the public is analogous to informing an owner on the status of his or her investment.

The City has an active public information program related to wet-weather control (as described in Chapter 7 of the CSSOP), and will continue disseminating information on the status of LTCP implementation through this program. Public outreach will be ongoing during LTCP implementation, starting in 2008. The Milestone Reports described above will also provide information for focused public education periods, during which ratepayers will be shown costs to date and any observed trends in improved water quality.

4.6.7 Summary

The City's Post-Construction Monitoring Program is designed to assess the impact of the CSO Long-Term Control Plan. Given the City's investment of hundreds of millions of dollars in wet-weather control, it is critical to have a mechanism to measure benefit. The Post-Construction Monitoring Program will determine, document, and disseminate the effectiveness of the CSO control program in achieving performance requirements and improving water quality.

The Program includes the following steps:

- Implementation of a defined monitoring program designed to measure reductions in overflow activations and changes in instream water quality.
- Analysis and assessment of flow monitoring data and/or model simulation results to determine whether implemented CSO Control Measures are meeting the Performance Criteria in Table 4.2.4.1.
- Analysis and assessment of water quality data to establish trends in improving instream water quality.
- Preparation of Milestone Reports and a Final Report to document the success of the LTCP implementation, or identify any weak links in the implemented CSO control system and present any necessary corrective action.
- Dissemination of information on LTCP implementation to the Fort Wayne public, including important measures of cost and benefit.

The City's Post-Construction Monitoring Program addresses U.S. EPA and IDEM requirements, as outlined in the CSO Policy, for monitoring the performance of CSO control measures.

APPENDIX 4

TABLES

Table 4.2.1.1
Summary of CSO Metrics for Range of Activation Levels

Plan	Activations in Average Year	Total Capital Cost[(1)] ($M)	System-wide Annual Overflow Volume (MG)	Annual Overflow Volume (MG)			Annual Activations			Annual Hours of Overflow		
				St. Joseph	St. Marys	Maumee	St. Joseph	St. Marys	Maumee	St. Joseph	St. Marys	Maumee
Existing Conditions	71	0	1,058									
4 activation plan	4	220.9	101	7.3	78.1	15.3	4	4	4	17	12	30
3 activation plan	3	249.4	76	5.1	59.3	12.0	3	3	3	13	10	27
Hybrid activation plan	1 to 4	239.4	96	2.9	78.1	15.3	1	4	4	6	12	30

Notes:

(1) Cost of LTCP component only
(2) Overflow metrics are based on the City's approved LTCP collection system model.

Table 4.2.2.1
Configuration of Recommended Plan by Individual Overflow

NOTE: **Yellow shading indicates a change from Table 3.3.5.3. In some cases, the change is a simple wording change.**

Overflow Permit ID	Overflow SIP ID	Regulator	Existing Conditions		Improved Conditions	Selected Alternative 3E
			Annual Overflow Volume (Typical Year) (cf)	Number of Overflow Events (Typical Year)	Annual Number of Overflow Events (Typical Year)	
18/19	K11165/ K11178	K11163/K11162	52,519,264	71	4	PI to CSO Ponds[2]
26/33/27	M10151/ M10313/ M10202	M10150/M10148/M10199	19,534,059	56	4	PI to CSO Ponds
48	O10252	O10312/010311	10,650,200	39	0	Pumped to CSO Ponds
13	K06298	K06285/K06275	8,623,553	44	4	PI to CSO Ponds
CSO PS (57)	NA	P06014	8,006,963	25	4	Increase PS capacity to CSO Ponds
55	P06192	P06119	4,604,087	47	4	PI to CSO Ponds
36	M18032	M18256	4,216,299	34	4	PI to CSO Ponds
20	K15116	K15009	3,908,404	40	4	PI to CSO Ponds
11/12	K06234	K06231	3,532,237	30	4	PI to CSO Ponds
39	N06022	N06007	2,980,121	25	4	PI to CSO Ponds
5	J11164	J11163	2,972,631	48	4	PI to CSO Ponds
21	K19044	L19018	2,645,744	41	4	PI to CSO Ponds
17	K07176	K07171	2,378,948	37	4	PI to CSO Ponds
24	L06420	L06088	2,104,910	23	4	PI to CSO Ponds
28	M10238	M10279	1,783,417	26	4	PI to CSO Ponds
50	O10277	O10273	1,705,907	44	4	PI to CSO Ponds
61	R14137	S18082	1,678,781	14	4	SD/SS[3]
62	R14138	R18188	1,176,229	14	4	SD/SS[3]
NA	NA	O10256	986,456	37	0	Eliminated
4	J02090	J02089	724,620	14	4	PI to CSO Ponds
64	S02035	Q07022/Q03011	706,082	16	4	SS[4]
52[1]	O22004	P22001	547,406	12	1	SD/SS[3]
54	O23080	O19009	511,038	27	4	SD/SS[3]
51	O22002	O22045	471,221	9	1	SS
NA	NA	L06098	454,898	20	0	Gates permanently shut; does not activate
53	O22094	O22095	411,440	13	1	SS
60	R06031	R06030	360,417	11	4	PI to CSO Ponds
32	M10306	M06706	335,513	5	4	PI to CSO Ponds
68	N18254	N18241	311,151	8	1	SS
23	L06103	L06102	306,128	13	4	PI to CSO Ponds
67		K15110	186,580	7	0	Being seprated as part of CSCIP
29[1]	M10265	M10256	168,893	4	4	PI to CSO Ponds
29[1]	M10265	M10309	147,433	3	3	None required
NA	NA	P18031	144,006	3	0	Eliminated
NA	NA	P18036	76,503	5	0	Eliminated
58	Q06034	Q06036	67,379	3	3	None required
45	N22103	N22101	28,274	2	1	SS
25	L06421	L06086	13,899	1	1	None required
NA	NA	K07006	6,621	9	0	Eliminated
52[1]	O22004	P22139	1,338	1	1	None required
14	K07106	K07101/K07115	0	0	0	Does not activate during average year
56/07	J03313	J03267	0	0	0	Does not activate during average year
44	N22093	N22092	0	0	0	Does not activate during average year
NA	NA	L06438	NA	NA	NA	Upstream of L06087/88
NA	NA	K15111	NA	NA	0	Eliminated
NA	NA	M18015	NA	NA	0	Eliminated
002[6] 003[6]	NA	NA	NA	NA	4	Pond storage and dewatering

NOTES:

1 These outfalls receive contributions from two regulators

CSO Pond Components

3E - Wet-weather storage in Pond 1 with bleedback to WPCP

2 PI to CSO Ponds - Parallel interceptor to CSO Ponds

3 SD/SS - Satellite Disinfection basin or Satellite Storage basin. The preferred CSO Control Measure for these CSOs is Satellite Disinfection based on the technology screening and selection process conducted by the City. Alternatively, the City may elect to construct Satellite Storage facilities that will achieve the same Level of Control. See Section 4.6 and Footnote #8 on Table 4.2.4.1 for details on final selection of technology.

4 SS - Satellite storage basin

5 SD - Satellite disinfection basin

6 CSOs 002 and 003 are existing discharge point, but their operating protocol will change significantly with the planned CSO Pond storage/dewatering facility. After Achievement of Full Operation of all LTCP projects, activations from Outfalls 002/003 will be reduced to 4 per typical year.

Table 4.2.3.1
CSO Control Measures, Capital Costs, and Schedule

	CSO Control Measure	Capital Cost (2005$)	Duration (Years)	Bid Date	Projected Completion Date	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1	Plant Primaries[1]	$ 65,765,888	3		2008	[5]																	
2	Plant Phase III[1]	$ 10,000,000	2	2014	2015							5,000,000	5,000,000										
3	Early Floatables Control	$ 1,000,000	2	2008	2009	500,000	500,000																
4	CSSCIP - Basins with Planned Satellite Storage/Disinfection Technologies[1]	$ 7,201,000	6	2008	2013	1,200,167	1,200,167	1,200,167	1,200,167	1,200,167	1,200,167												
5	Pond Storage & Dewatering	$ 53,894,264	3	2011	2013				17,964,755	17,964,755	17,964,755												
6	CSSCIP - Basins Tributary to PI[1]	$ 61,130,000	7	2012	2018					8,732,857	8,732,857	8,732,857	8,732,857	8,732,857	8,732,857	8,732,857							
7	Satellite Storage at St. Joseph River CSOs	$ 21,914,750	4	2016	2019									5,478,688	5,478,688	5,478,688	5,478,688						
8	Satellite Disinfection at St. Joseph River CSOs[2]	$ 1,270,994	1	2013	2014							1,270,994											
9	Satellite Disinfection[2]	$ 3,869,868	4	2018	2021											967,467	967,467	967,467	967,467				
10	Morton Street/O10101 Reroute	$ 8,750,000	1	2019	2019												8,750,000						
11	Wayne Street Parallel Interceptor	$ 44,456,005	3	2020	2022													14,818,668	14,818,668	14,818,668			
12	St. Marys Parallel Interceptor	$ 19,211,345	3	2023	2025																6,403,782	6,403,782	6,403,782
13	Late Floatables Control	$ 4,762,100	6	2020	2025													793,683	793,683	793,683	793,683	793,683	793,683
14	Satellite Storage	$ 1,937,500	1	2025	2025																		1,937,500
15	CSO Pond High Rate Treatment[3]	TBD	TBD	TBD	TBD																		
	Total LTCP Capital Costs By Year[4]	$ 305,163,713				1,700,167	1,700,167	1,200,167	19,164,921	27,897,779	27,897,779	15,003,851	13,732,857	14,211,545	14,211,545	15,179,012	15,196,154	16,579,818	16,579,818	15,612,352	7,197,465	7,197,465	9,134,965
	Total LTCP Capital Cost Year 2008 - 2025[5]	**$ 239,397,825**																					

Footnotes:

(1) The CSO Control Measure is not expected to achieve target activation levels on its own, but will work in conjunction with other CSO Control Measures at the specified CSO outfalls to achieve the performance goals.

(2) The preferred CSO Control Measure for these CSOs is Satellite Disinfection based on the technology screening and selection process conducted by the City. Alternatively, the City may elect to construct Satellite Storage facilities that acheive the same level of control. See Section 4.6 and Footnote #8 on Table 4.2.4.1 for details on final selection of technology.

(3) The completed LTCP analysis indicates that the Pond Storage & Dewatering (CSO Control Measure 3) will reduce Pond activations to 4 overflow events per "typical year." Therefore, the CSO Pond EHRC/HRT facility will be constructed only if required to achieve the agreed-upon performance criteria for the Maumee River, i.e. 4 overflow events per "typical year," following completion of CSO Control Measures 5, 11, and 12.

(4) Capital costs presented in this table reflect costs for CSO Control Measures to be implemented beginning in 2008, with the exception of CSO Control Measure 1. The City has also incurred additional capital costs for pre-2008 projects under its CSSCIP program. The total projected capital expenditures for the City's LTCP program, including pre-2008 CSSCIP costs, are presented in Chapter 3.

(5) CSO Control Measure 1 is under construction and projected to be complete in 2008. The Capital Cost for CSO Control Measure 1 is not included in the 18-year (2008 - 2025) LTCP schedule of costs .

Table 4.2.4.1
CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

	CSO Control Measure[1]	Description[2]	CSOs Controlled (By Overflow Permit ID)	Design Criteria[2]	Performance Criteria	Critical Milestones[3]
1	Plant Primaries[4]	Upgrade WPCP primaries to achieve peak capacity of 85 mgd and firm capacity of 74 mgd[5].	57; Outfall 002/003	When combined with the rest of the WPCP improvements, provide peak primary treatment capacity of 85 mgd and firm capacity of 74 mgd.	When combined with the rest of the WPCP improvements, facility achieves peak capacity of 85 mgd while complying with effluent limits of current NPDES permit at Outfall 001.	To be completed and in full operation in 2008
2	Plant Phase III[4]	Upgrade remaining WPCP facilities to achieve peak capacity of 85 mgd and firm capacity of 74 mgd[5].	57; Outfall 002/003	When combined with the rest of the WPCP improvements, provide peak secondary treatment capacity of 85 mgd and firm capacity of 74 mgd.	When combined with the rest of the WPCP improvements, facility achieves peak capacity of 85 mgd while complying with effluent limits of current NPDES permit at Outfall 001.	Bid Year - 2014 Achievement of Full Operation - 2015
3	Early Floatables Control	Pilot testing of selected floatables control technologies to assess performance in Fort Wayne[6].	3 pilot locations	CSO-specific; provide instantaneous peak floatables control rate equal to highest annual flow rate in "typical year."	Capture most coarse solids and floatables; design target is to remove one-half-inch diameter and larger solids and floatables.	Commence study - Ongoing Complete study - 2008 Initiate pilot program and make fully operational - 2009 Monitor pilot installations - 2009-2010
4	CSSCIP - Basins with Planned Satellite Storage/Disinfection Technologies[4]	Partial separation projects identified as cost-effective components of the Combined Sewer System Capacity Improvements Program.	45, 61, 62, 64, 51, 52, 53, 54, 68	Storm drains designed as per Fort Wayne Stormwater Standards. Sanitary sewers designed as per Fort Wayne Sanitary Standards and Ten State Standards.	Partial separation of sewers to address basement flooding concerns and reduce local CSOs.	The CSSCIP Program was begun in 1999. The program schedule typically addresses two to three combined sewer subbasins per calendar year. CSSCIP work under this Control Measure will be scheduled in two phases: Phase 1 will address CSO Outfalls 45, 51, 52, 53, and 68, and be completed by 2010; Phase 2 will address CSO Outfalls 61, 62, 64, and 54, and be completed by 2013.
5	Pond Storage & Dewatering	Improvements to CSO Pond 1 to allow storage of combined sewer overflow with subsequent dewatering to WPCP.	When combined with the Parallel Interceptor and Morton Street solution, all CSOs tributary to the Parallel Interceptor, plus CSO 48 and 57, plus Outfalls 002/003	Provide storage capacity of approximately 95 MG.	Achieve 4 overflow events from Ponds[7]	Optimization of existing facilities to allow interim dewatering - 2008 Bid Year for Full Dewatering Capability - 2011 Achievement of Full Operation - 2013
6	CSSCIP - Basins Tributary to PI[4]	Partial separation projects identified as cost-effective components of the Combined Sewer System Capacity Improvements Program.	4, 5, 11, 12, 13, 17, 18, 19, 20, 21, 23, 24, 26, 27, 28, 29, 32, 33, 36, 39, 50, 55, 60 (Note: CSSCIP work associated with Outfalls 17, 26, 27, 28, 33, and 36 already completed as of 2007)	Storm drains designed as per Fort Wayne Stormwater Standards. Sanitary sewers designed as per Fort Wayne Sanitary Standards and Ten State Standards.	Partial separation of sewers to address basement flooding concerns and reduce local CSOs.	The CSSCIP Program began in 1999 and typically addresses two to three combined sewer subbasins per calendar year. Remaining CSSCIP work under this Control Measure will be initiated in 2012 and completed in 2018.
7	Satellite Storage at St. Joseph River CSOs	Satellite storage facilities	45, 51, 53, 68	Provide storage volume of: CSO 45: 0.04 MG CSO 51: 0.76 MG CSO 53: 0.65 MG CSO 68: 1.17 MG	Achieve 1 overflow event[7]	Bid Year (first facility) - 2016 Achievement of Full Operation (final facility) - 2019
8	Satellite Disinfection at St. Joseph River CSOs[8]	Satellite disinfection facility	52	Provide peak disinfection treatment rate of 5.0 MGD[12]	Achieve 1 overflow event[7]; provide treatment to meet NPDES effluent limits for Satellite Disinfection for all other discharge events.[13]	Bid Year - 2013 Achievement of Full Operation - 2014
9	Satellite Disinfection[8]	Satellite disinfection facilities	54, 61, 62	Provide peak disinfection treatment rate of: [12] CSO 54: 1.2 MGD CSO 61: 8.4 MGD CSO 62: 5.8 MGD	Achieve 1 overflow event[7]; provide treatment to meet NPDES effluent limits for Satellite Disinfection for all other discharge events.[13]	Bid Year (first facility) - 2018 Achievement of Full Operation (final facility) - 2021
10	Morton Street/O10101 Reroute	Re-route overflow pump station discharge to CSO Pond 1.	48	Provide peak pumping capacity equal to highest annual flow rate in "typical year."	Achieve 0 overflow events[7]	Bid Year - 2019 Achievement of Full Operation - 2019
11	Wayne Street Parallel Interceptor	Parallel interceptor to capture combined sewer overflows for conveyance to WPCP/CSO Ponds. Begins near CSO 13 (K06298) at western end and discharges into the treatment complex at/near the overflow to the CSO Ponds (Regulator Q06057).	11, 12, 13, 23, 24, 26, 27, 28, 29, 32, 33, 36, 39, 50, 55, 60	Provide approximate instantaneous peak flow rate of 376 MGD at downstream end[9].	Achieve 4 overflow events[7]	Bid Year - 2020 Achievement of Full Operation - 2022

Table 4.2.4.1
CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

	CSO Control Measure[1]	Description[2]	CSOs Controlled (By Overflow Permit ID)	Design Criteria[2]	Performance Criteria	Critical Milestones[3]
12	St. Marys Parallel Interceptor	Parallel interceptor to capture combined sewer overflows for conveyance to WPCP/CSO Ponds. Begins near CSO 21 (K19044) at southern end and discharges into the Wayne Street Parallel Interceptor.	4, 5, 17, 18, 19, 20, 21	Provide approximate instantaneous peak flowrate of 176 MGD at downstream end[9].	Achieve 4 overflow events[7]	Bid Year - 2023 Achievement of Full Operation - 2025
13	Late Floatables Control	Overflow-specific solids and floatables controls[6].	All CSOs for which floatables not addressed through other facilities	CSO-specific; provide instantaneous peak floatables control rate equal to highest annual flow rate in "typical year."	Capture most coarse solids and floatables; design target is to remove one-half-inch diameter and larger solids and floatables[10].	Bid Year (first facility) - 2020 Achievement of Full Operation (final facility) - 2025
14	Satellite Storage	Satellite storage facility	64	Provide storage volume of 0.23 MG	Achieve 4 overflow events[7]	Bid Year - 2025 Achievement of Full Operation - 2025
15	CSO Pond High Rate Treatment[11]	Enhanced High Rate Clarification facility, typically referred to by the trade names DensaDeg or ACTIFLO.	When combined with the Parallel Interceptor and Morton Street solution, all CSOs tributary to the Parallel Interceptor plus CSO 48.	TBD	Achieve 4 overflow events[7]	TBD

Footnotes:

(1) Upon full implementation, the CSO Control Measures listed in Table 4.2.4.1 are expected to result in 4 CSO events on the St. Marys and Maumee Rivers and 1 CSO event on the St. Joseph River in a "typical year," as evaluated in accordance with footnote 5 (note: Outfall 48 on the Maumee River will be controlled to 0 CSO events in a "typical year"). Either a revision to Indiana's current water quality standards or some other legal mechanism is necessary to authorize overflows due to storms exceeding those levels of control. In Chapter 5 of the LTCP, the City of Fort Wayne is requesting a revision to the applicable water quality criteria consistent with this level of control through the establishment of a CSO wet-weather limited use subcategory supported by a Use Attainability Analysis (UAA). The design and construction of CSO Control Measures 1, 2, 4, 6, and 10 are not dependent on the level of control ultimately determined, and therefore the City will implement CSO Control Measures 1, 2, 4, 6, and 10 according to the terms and schedules set forth in this Table.

(2) The Description and Design Criteria are based upon LTCP-level planning estimates and may be subject to revision during facility planning and design. One of the conditions of Description and Design Criteria, applicable to all of the facilities set forth in this Table 4.2.4.1, is that the specific facility will be designed in accordance with good engineering practice to ensure that corresponding facility-specific, river-specific, and system-wide Performance Criteria will be achieved.

(3) The term "Bid Year" means "Completion of the Bidding Process."

(4) The CSO Control Measure is not expected to achieve target activation levels on its own, but will work in conjunction with other CSO Control Measures at the specified CSO outfalls to achieve the performance goals.

(5) With all units in service, peak WPCP capacity of 85 mgd can be maintained for over 24 hours.

(6) Implementation of floatables control using industry-standard technologies (e.g., baffles, in-line netting, mechanical screens, passive screens, vortex separators) is contingent on IDEM interpretation of setback requirements. The City's proposed floatables control program assumes that these typical, industry-standard control technologies will continue to not be subject to setback requirements.

(7) CSO Control Measure will be designed to achieve Performance Criteria of 4 CSO events for the St. Marys and Maumee Rivers and 1 CSO event for the St. Joseph River in a "typical year." (Note: Outfall 48 on the Maumee River will be controlled to 0 CSO events in a "typical year"). "Typical year" performance, and achievement of Performance Criteria, is based on average annual statistics over a representative five-year period. The method to assess "typical year" performance over a typical 5-year period will be selected from the options presented in Section 4.6 of Appendix 4 (Post-Construction Monitoring).

(8) The preferred CSO Control Measure for these CSOs is Satellite Disinfection based on the technology screening and selection process conducted by the City. The City will proceed as described in Section 4.6 of Appendix 4 to conduct a Satellite Disinfection Pilot Study if it ultimately elects to construct one or more Satellite Disinfection facilities. Alternatively, the City may elect to construct Satellite Storage facilities that will achieve the same Level of Control. The City will construct Satellite Storage facilities in lieu of Satellite Disinfection facilities if it comes to acquire, by January 1, 2010, the wastewater collection and treatment systems currently owned or operated by Utility Center, Inc. (a/k/a AquaSource or Aqua Indiana, Inc.) and connected to the Main Aboite and Midwest wastewater treatment facilities (for which the State has issued NPDES Permit Nos. IN0035378 and IN0042391).

(9) The stated downstream end capacity is the largest capacity required by the referenced Parallel Interceptor. Capacity will decrease, and the parallel interceptor pipe diameter will decrease, in upstream sections due to lower peak flows. This is consistent with standard engineering practice for a pipe that accepts incremental flows from its upstream end to its downstream end. Capacity requirements at interim locations along the Parallel Interceptor are presented in Section 3.3.

(10) Design target of removing one-half-inch and larger solids and floatables will be confirmed or modified based on results of pilot floatables control program (CSO Control Measure 3).

(11) The completed LTCP analysis indicates that the Pond Storage & Dewatering (CSO Control Measure 3) will reduce Pond activations to 4 overflow events per "typical year." Therefore, the CSO Pond EHRC/HRT facility will be constructed only if required to achieve the agreed-upon performance criteria for the Maumee River, i.e. 4 overflow events per "typical year," following completion of CSO Control Measures 5, 11, and 12.

(12) Required disinfection protocol and associated effluent limits for flows up to and including the peak flowrate shall be defined as noted in Section 4.6 of Appendix 4.

(13) If Satellite Disinfection technology is utilized, NPDES effluent limits shall be as noted in Section 4.6 of Appendix 4.

Table 4.6.2.1
Post-Construction Monitoring for CSO Control Measures by River Watershed

Watershed	CSO Control Measure[1]		CSOs Controlled (By Overflow Permit ID)	Monitoring Data[2]		Typical Year Performance[2]		Overflow Frequency Performance Criteria Achieved (Yes/No)[4]	Comments
				CSO Volume (MG)	Overflow Frequency By Watershed	CSO Volume (MG)	Overflow Frequency By Watershed[3]		
St. Joseph River	7	Satellite Storage at St. Joseph River CSOs	45, 51, 53, 68						
	8	Satellite Disinfection at St. Joseph River CSOs[5]	52						
Maumee River	5	Pond Storage & Dewatering	57, plus Outfalls 002/003						
	10	Morton Street/O10101 Reroute	48						
	11	Wayne Street Parallel Interceptor	11, 12, 13, 23, 24, 26, 27, 28, 29, 32, 33, 36, 39, 50, 55, 60						
	14	Satellite Storage	64						
	9	Satellite Disinfection[5]	61, 62						
St. Marys River	12	St. Marys Parallel Interceptor	4, 5, 17, 18, 19, 20, 21						
	9	Satellite Disinfection[5]	54						

Footnotes:

(1) CSO Control Measures are listed in LTCP Table 4.2.4.1 along with Achievement of Full Operation (AFO) dates. Note that additional CSO Control Measures, not specific to a particular river watershed, will also be implemented (as outlined in Table 4.2.4.1).

(2) The monitoring period duration, and method to assess Typical Year Performance, will be selected from the options presented in Section 4.6.4.

(3) Typical Year Performance Criteria of 1 overflow event (for the St. Joseph River) or 4 overflow events (for the Maumee and St. Marys Rivers) is based on average annual statistics over a representative five-year period. The method to assess "typical year" performance over a typical 5-year period will be selected from the options presented in Section 4.6.4.

(4) Milestone reports on the achievement of performance criteria will be prepared for each watershed, as described in Section 4.6.6.

(5) The preferred CSO Control Measure for these CSOs is Satellite Disinfection based on the technology screening and selection process conducted by the City. The City will proceed as described in Section 4.6 to conduct a Satellite Disinfection Pilot Study if it ultimately elects to construct one or more Satellite Disinfection facilities. Alternatively, the City may elect to construct Satellite Storage facilities.

Table 4.6.3.1
CSO and Stream Monitoring

Site ID	Location	Receiving Stream	Rationale	Real-time Discharge	Intermittent Water Quality	Monitoring Frequency	Monitoring Protocols
1	Mayhew Road Bridge	St. Joseph	Located upstream of the City service area, representing St. Joseph River water quality without any effects of Fort Wayne urban sources. This location provides an indicator of water quality conditions and loads entering City waterways from upstream watersheds.		X	Monthly on a year-round basis; weekly from April 1 to October 31	pH, Dissolved Oxygen, temperature, *E. coli*, Ammonia-Nitrogen, Total Phosphorus, Total Suspended Solids. In addition, monthly sample only - Cadmium, Copper, Lead & Zinc.
2	Tennessee Avenue Bridge	St. Joseph	Located downstream of St. Joseph River CSOs and prior to confluence with the Maumee River, repesenting the cumulative impact of CSO and other urban sources. This location will be used to track the impact of St. Joseph River CSO controls.		X	Monthly on a year-round basis; weekly from April 1 to October 31	pH, Dissolved Oxygen, temperature, *E. coli*, Ammonia-Nitrogen, Total Phosphorus, Total Suspended Solids. In addition, monthly sample only - Cadmium, Copper, Lead & Zinc.
3	Ferguson Road Bridge	St. Marys	Located upstream of the City service area, representing St. Marys River water quality without any effects of Fort Wayne urban sources. This location provides an indicator of water quality conditions and loads entering City waterways from upstream watersheds.		X	Monthly on a year-round basis; weekly from April 1 to October 31	pH, Dissolved Oxygen, temperature, *E. coli*, Ammonia-Nitrogen, Total Phosphorus, Total Suspended Solids. In addition, monthly sample only - Cadmium, Copper, Lead & Zinc.
4	Spy Run Bridge	St. Marys	Located downstream of St. Marys River CSOs and prior to confluence with the Maumee River, repesenting the cumulative impact of CSO and other urban sources. This location will be used to track the impact of St. Marys River CSO controls.		X	Monthly on a year-round basis; weekly from April 1 to October 31	pH, Dissolved Oxygen, temperature, *E. coli*, Ammonia-Nitrogen, Total Phosphorus, Total Suspended Solids. In addition, monthly sample only - Cadmium, Copper, Lead & Zinc.
5	Anthony Boulevard Bridge	Maumee	Located downstream of St. Joseph River and St. Marys River CSOs, and upstream of the WPCP and Pond discharges. This location will be used to track the impact of all upstream CSOs (under current and improved conditions) independent of WPCP and CSO Pond improvements.		X	Monthly on a year-round basis; weekly from April 1 to October 31	pH, Dissolved Oxygen, temperature, *E. coli*, Ammonia-Nitrogen, Total Phosphorus, Total Suspended Solids. In addition, monthly sample only - Cadmium, Copper, Lead & Zinc.
6	Landin Road Bridge	Maumee	Located downstream of Fort Wayne to evaluate the cumulative impact of all CSO Control Measures in the City.		X	Monthly on a year-round basis; weekly from April 1 to October 31	pH, Dissolved Oxygen, temperature, *E. coli*, Ammonia-Nitrogen, Total Phosphorus, Total Suspended Solids. In addition, monthly sample only - Cadmium, Copper, Lead & Zinc.
USGS-1	Anthony Boulevard Bridge	Maumee	USGS Gauging Station #04182900			Continuous	Water stage
USGS-2	Coliseum Boulevard Bridge	Maumee	USGS Gauging Station #04182950	X		Continuous	River flow, water stage
USGS-3	Landin Road Bridge	Maumee	USGS Gauging Station #04183000	X		Continuous	River flow, water stage
USGS-4	Latitude 41°10'38" Longitude 85°03'21"	St. Joseph	USGS Gauging Station #04180500	X		Continuous	River flow, water stage
USGS-5	Anthony Extended Bridge	St. Marys	USGS Gauging Station #04182000	X		Continuous	River flow, water stage
Outfall 003	CSO Pond 1	Maumee	Currently a permitted discharge, but not active; potential future discharge point	X		Continuous	Post-construction monitoring will be via new equipment installed as part of LTCP improvements.
Outfall 002	CSO Pond 2	Maumee	Monitoring required per NPDES permit	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
Outfall 001	WPCP Discharge	Maumee	Monitoring required per NPDES permit	X	X	Daily/Continuous	Per NPDES Permit
CSO 004	Rolling Mills regulator	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)

Table 4.6.3.1
CSO and Stream Monitoring

Site ID	Location	Receiving Stream	Rationale	Real-time Discharge	Intermittent Water Quality	Monitoring Frequency	Monitoring Protocols
CSO 005	Foster Park at swing bridge	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 011	Nebraska Pump Station	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Pump run time meters used to estimate flow (onset, duration, and volume of overflow)
CSO 013	Wayne and Nelson	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity of influent (onset, duration of overflow) plus weir equation
CSO 017	Wildwood and Wildmere	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 018	Broadway and Rudisill	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 019	Broadway and Rudisill	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 020	Harman Road	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 021	Century Court	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 023	Jackson and Superior	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 024	Ewing and Superior (east manhole)	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 025	Ewing and Superior (west manhole)	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 026	Third Street Pump Station	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 028	Glasgow Pump Station	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Pump run time meters used to estimate flow (onset, duration, and volume of overflow)
CSO 029	Barr and Superior/Clinton and Superior	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 032	Superior and Wayne	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 033	Third Street Pump Station	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Pump run time meters used to estimate flow (onset, duration, and volume of overflow)
CSO 036	Westbrook	Spy Run (into St. Marys)	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 039	Wayne and Hanna	Maumee	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 044	Spy Run extended and Dalgreen	St. Joseph	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 045	250 feet east of Spy Run extended and Dalgreen	St. Joseph	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 048	Morton Street Pump Station	Maumee	Monitored CSO for City monthly reporting requirements	X		Continuous	Pump run time meters used to estimate flow (onset, duration, and volume of overflow)
CSO 050	Coombs @ CAJ Foods	Maumee	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 051	3420 Woodrow Avenue	St. Joseph	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)

Table 4.6.3.1
CSO and Stream Monitoring

Site ID	Location	Receiving Stream	Rationale	Real-time Discharge	Intermittent Water Quality	Monitoring Frequency	Monitoring Protocols
CSO 052	Crescent and Springfield/Concordia H.S. parking lot	St. Joseph	Monitored CSO for City monthly reporting requirements	X	X[(1)]	Continuous	Flow, level, velocity (onset, duration, and volume of overflow). Effluent parameters per NPDES Permit. [(2)]
CSO 053	1124 St. Joseph River Drive	St. Joseph	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 054	Smith and Belmont	Natural Drain No. 4 (into St. Marys)	Monitored CSO for City monthly reporting requirements	X	X[(1)]	Continuous	Flow, level, velocity (onset, duration, and volume of overflow). Effluent parameters per NPDES Permit. [(2)]
CSO 055	Anthony and Wayne	Maumee	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 056	Brown Street Pump Station	St. Marys	Monitored CSO for City monthly reporting requirements	X		Continuous	Pump run time meters used to estimate flow (onset, duration, and volume of overflow)
CSO 057	Wayne and Glascow/WPCP in front of headworks	Maumee	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 058	East of WPCP	Maumee	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 060	Formerly Farrell Gas (east of Omin Source offices)	Un-named ditch (to Maumee)	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 061	Coliseum and State	Baldwin Ditch (to Maumee)	Monitored CSO for City monthly reporting requirements	X	X[(1)]	Continuous	Flow, level, velocity (onset, duration, and volume of overflow). Effluent parameters per NPDES Permit. [(2)]
CSO 062	State and Laverne	Baldwin Ditch (to Maumee)	Monitored CSO for City monthly reporting requirements	X	X[(1)]	Continuous	Flow, level, velocity (onset, duration, and volume of overflow). Effluent parameters per NPDES Permit. [(2)]
CSO 064	Pontiac	Un-named ditch (to Maumee)	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 068	Glazier and North Side Drive	St. Joseph	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity (onset, duration, and volume of overflow)
CSO 080	Alley beside 2316 Kensington/alley beside 1815 E. State Boulevard	Baldwin Ditch (to Maumee)	Monitored CSO for City monthly reporting requirements	X		Continuous	Flow, level, velocity of influent (onset, duration of overflow) plus weir equation

(1) Intermittent Water Quality monitoring required only if Satellite Disinfection technology constructed.

(2) If Satellite Disinfection technology is utilized, NPDES effluent limits shall be as noted in Section 4.6.

Table 4.6.6.1

PCMP Reporting Schedule

Watershed	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
St. Joseph River	AFO	M	MR									
Maumee River				AFO	M	MR						
St. Marys/Maumee River System							AFO	M	MR			
Full System								Continued activation monitoring and instream sampling				
												FR

AFO	Achievement of Full Operation
M	12-month activation monitoring period for Model-Based Approach to assessing compliance with Performance Criteria in Table 4.2.4.1
MR	Milestone Report
FR	Final Report

FIGURES

Figure 4.2.1.1
St. Joseph River CSOs

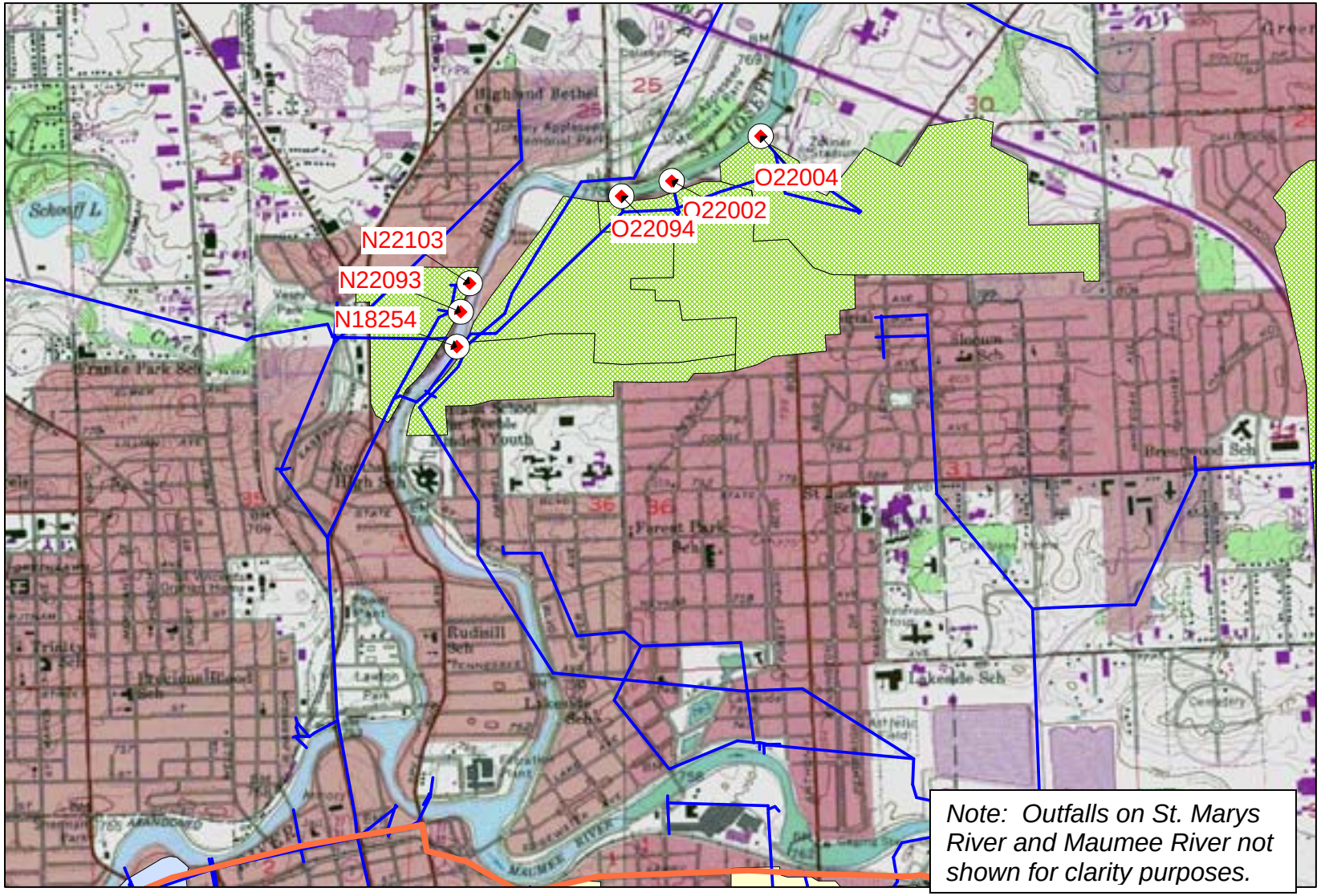
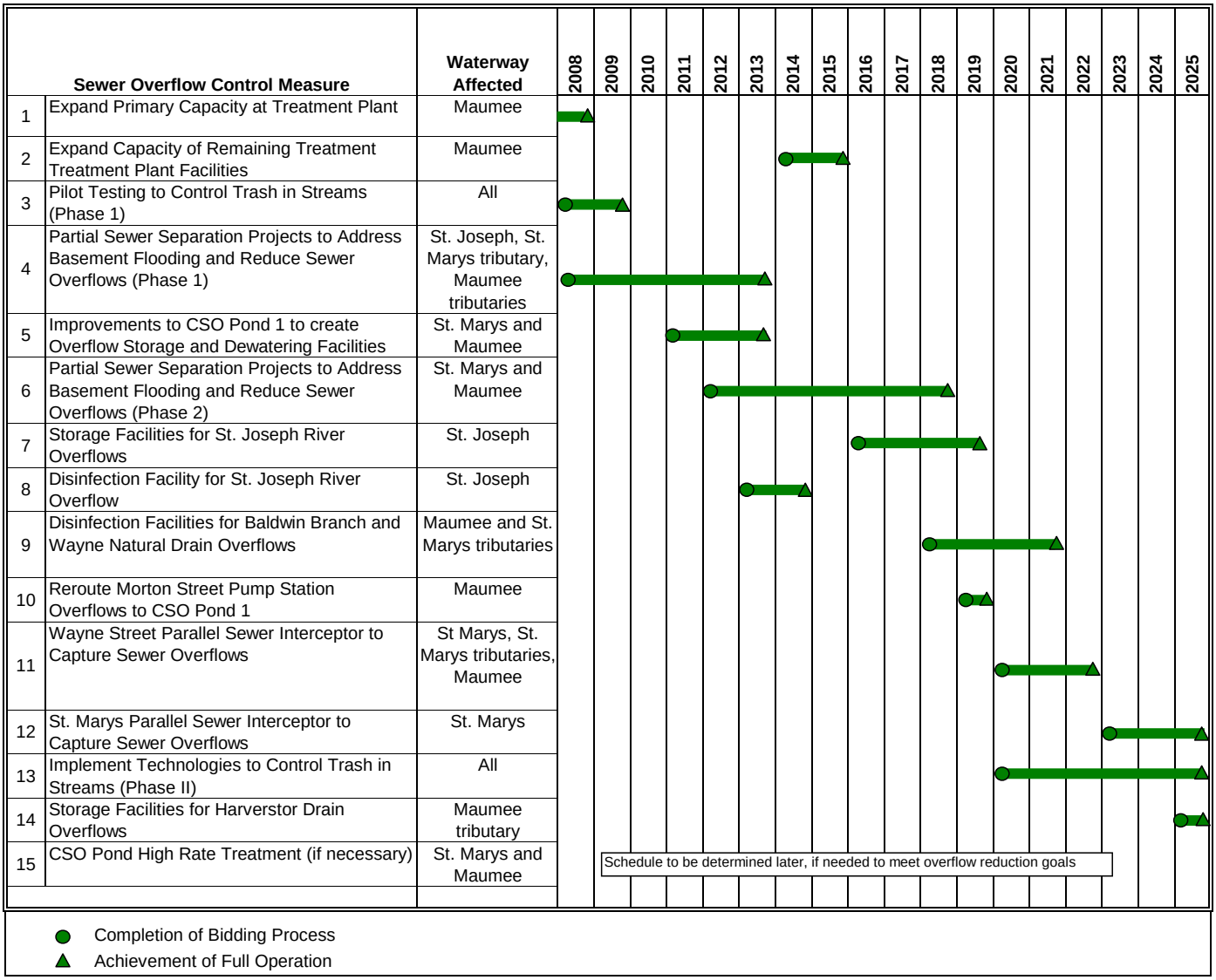
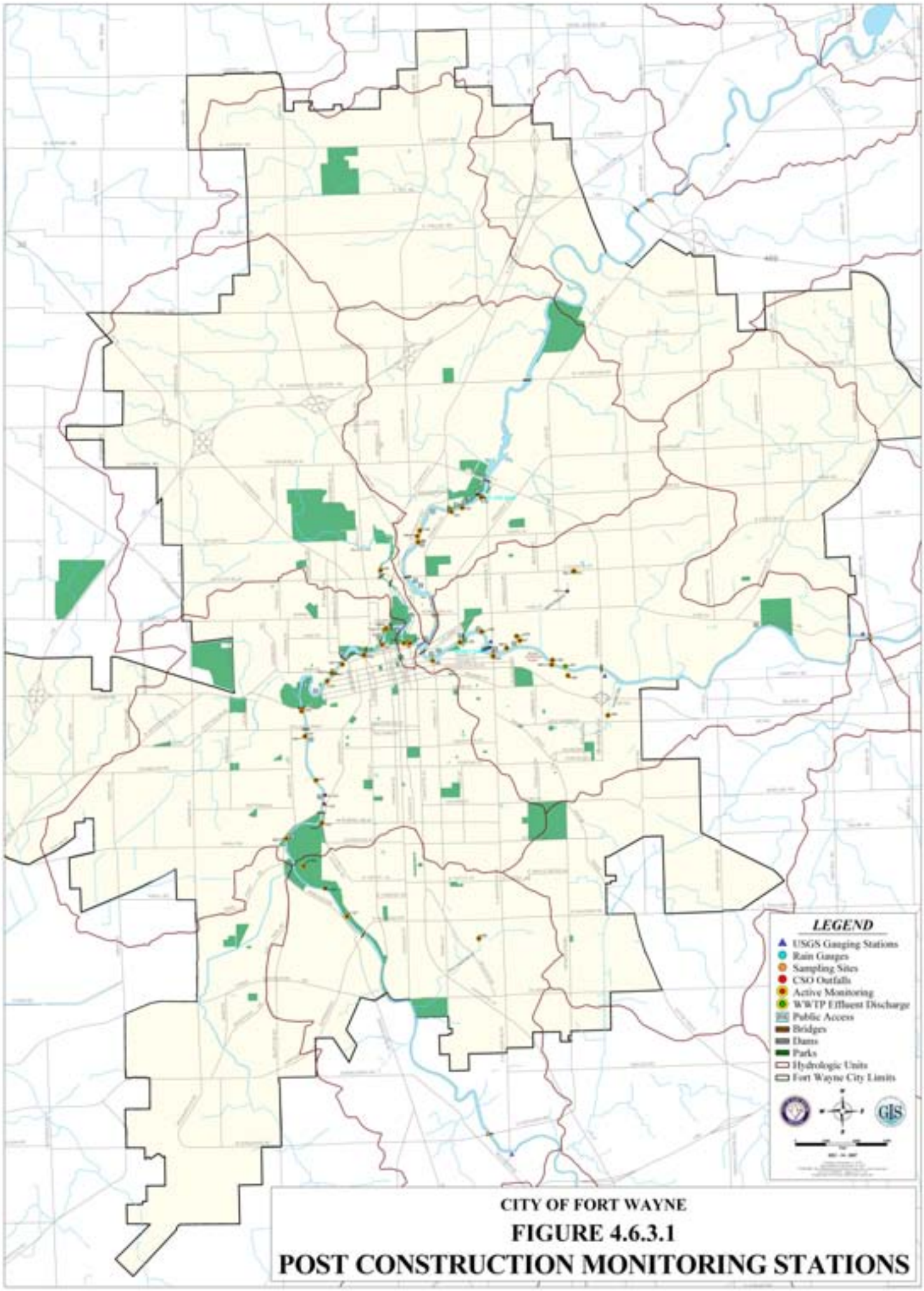


Figure 4.4.1.1

LTCP Implementation Schedule





CITY OF FORT WAYNE

FIGURE 4.6.3.1

POST CONSTRUCTION MONITORING STATIONS

ATTACHMENT 1

CITY OF FORT WAYNE
CSO SATELLITE DISINFECTION PILOT STUDY

1 Introduction

As part of its CSO LTCP implementation process, Fort Wayne shall carry out a study to provide information regarding the effectiveness of the CSO disinfection technology proposed by Fort Wayne for four of its CSOs. Fort Wayne shall carry out this study at the proposed satellite disinfection facility to be constructed at CSO 052 located on the lower St. Joseph River. This study shall be carried out over the course of 18 months, following the attainment of full operation of the referenced satellite CSO disinfection facility. The results of such sampling shall not be used to determine compliance with water quality standards unless the State has by that time adopted standards for these specific pathogens.

2 Sampling

Sampling will be carried out for a total of 5 overflow events for all parameters except for *Cryptosporidium* and *Giardia* which shall be carried out for a total of 3 overflow events. Samples shall be collected just prior to entrance of the wastewater into the treatment unit ("influent"), and after the wastewater has been treated ("effluent"), before it enters the receiving water. All effluent samples shall be collected in duplicate, so as to accommodate the pretreatment procedure described below. All bacteria and viral samples shall be de-chlorinated upon collection, and all samples shall be collected, preserved and handled in accordance with 40 CFR Part 136, and other applicable USEPA guidance.

Grab sample collection during each event will span the time during which the subject control facility is active, beginning as soon as possible after the overflow begins. Samples will then be collected every two hours during the overflow, up to a maximum of five samples per event.

Collected samples will be prepared and analyzed for both conventional pollutants and specific pathogens as described below and as identified in Table 1.

2.1 Sampling Plan/QA/QC Procedures

Fort Wayne will develop appropriate, 40 CFR Part 136-compliant sample collection, storage, preservation, and handling procedures through consultation with the laboratories selected to conduct the analyses. These procedures will be incorporated into a Sampling Plan which will be submitted to EPA for approval one year prior to the date the basin will become operational. The sampling plan will also include the QA/QC procedures developed to insure the quality of the data to be generated. Fort Wayne's QA/QC plan shall be consistent with USEPA's current QAPP guidance document ("Guidance for Quality Assurance Project plans; EPA QA/G-5," December 2002).

3 Parameters and Analytical Procedures

The parameters and methods in Table 1 will be used during this study.

Table 1: Parameters and Analytical Methods	
Parameter	**Method**
Adenoviruses, types 40 and 41	Integrated cell culture (ICC) - real time PCR (EPA 815-B-04-001 - Quality Assurance/ Quality Control Guidance for Laboratories Performing PCR Analyses on Environmental Samples, October 2004)
Shigella	SM 9260 D
Enterococcus	EPA Method 1600: Membrane filter (EPA-821-R-02-022)
Salmonella	SM 9260 C
E. coli	*Escherichia coli* Detection - Membrane Filter Technique (EPA Method 1105)
Bacteroides fragilis bacteriophage	ISO 10705-4
flow volume (or rate)	Continuous measurement
water temperature and air temperature	Field measurement
pH	Field measurement
dissolved oxygen (DO)	Field measurement
turbidity	SM 2130 B
total suspended solids (TSS)	SM 2540 D
Cryptosporidium and *Giardia*	*Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA (EPA Method 1623)

One split of each effluent sample shall be pre-treated using either mechanical agitation or sonification to break up suspended solids particles and release entrapped organisms that might otherwise fail to enumerate during the above-listed analyses. As part of its sampling program, Fort Wayne shall carry out initial testing of raw CSO discharge to identify a mixing or sonification procedure that provides sufficient energy to

liberate entrapped organisms, but which does not provide sufficient energy to result in organism deactivation. In carrying this initial effluent testing, Fort Wayne shall utilize a series of split samples, and shall submit one set of splits to a range of energy levels. Fort Wayne shall then analyze both sets of split effluent samples for *E. Coli*, and shall note which energy level maximizes the increase in bacteria counts compared to the splits not receiving pretreatment. The resulting procedure shall identify both energy level and time of blending or sonification, and shall employ aseptic methods and conditions.

The City may propose alternate sample preparation or analytical procedures prior to preparing its sampling plan. The City will advise EPA of the alternative procedure(s) it wishes to use, and provide information regarding the nature of these procedures and the reason why alternative procedures are being requested, in order for EPA to determine if the alternative procedure will provide sufficient information to meet the needs of this study.

4 Reporting

The analytical results obtained for each sampling event shall be transmitted to EPA within 60 days of the completion of each sampling event. The report will contain:

- Date and time of sample collection.
- Status of the treatment unit, to include detailed flow information (i.e. event hydrograph) and a description of any operational issues that occurred during the event
- Detailed (15 minute) rainfall data for the event
- Antecedent rainfall - The amount of rainfall in the sewer basin on the two days prior to the overflow event will also be reported.
- Analytical results - Including copies of the actual laboratory reports.
- QA/QC results - Including copies of the laboratory QA/QC results; any discrepancies will be identified and explained by the City.
- Copies of completed chain of custody pages.

At the completion of the sampling period, the City of Fort Wayne shall submit a report that will include all of the above sampling, summarize the results of such sampling including sampling results for the non-pretreated split samples and the pre-treated split samples. Fort Wayne shall compare such samples to NPDES permit limits and, based on those results, recommend measures to be taken by the City to achieve effective disinfection as necessary to comply with defined, numeric water quality standards.