1 Section One – Purpose and Intent of CSO LTCP

1.1 Project Overview

1.1.1 Background Information

The City of Terre Haute has completed this Combined Sewer Overflow Long-Term Control Plan (CSO LTCP) document in accordance with previous and updated regulatory requirements described in Section 1.2. The CSO LTCP describes the control measures that would reduce the frequency and volume of combined sewer overflows and improve water quality all of which were evaluated and selected by the City of Terre Haute during the LTCP development.

This CSO LTCP is subject to review by the Indiana Department of Environmental Management (IDEM) and the United States Environmental Protection Agency (USEPA). The recommended improvements and implementation schedule will eventually be incorporated into a new National Pollutant Discharge Elimination System (NPDES) permit that will be issued to the City after the approval of the plan by IDEM. This section provides information about the regulatory requirements that the City and its technical team considered during the planning effort and which must be satisfied as well as the project approach utilized in the development of the CSO LTCP.

1.2 Regulatory Requirements

1.2.1 Water Quality Standards

The Indiana Water Pollution Control Board has established water quality standards for Indiana waterways. These standards, which have been approved by the federal government, serve as the legal basis for permit requirements under the 1972 Federal Clean Water Act (CWA). Water quality standards include "uses" designated by the state for each water body. Uses for a water body might include recreation, public water supply, industrial use, and irrigation. Water quality standards include pollution criteria to protect those uses and other policies designed to protect water quality. All Indiana waters are designated for aquatic life and full body contact recreation (often referred to as "fishable and swimmable").

To meet the full body recreation standard, the maximum concentration of bacteria allowed in Indiana waters is 235 colonies E coli/100 ml. of water. There is an allowance for up to 10% of

samples to exceed this standard as described in 327 IAC 2-1-6(d). This standard will likely be exceeded with any CSO discharge or with storm water runoff in urban and suburban areas. The State also has a 30-day geometric mean criterion of 125 cfu/100 ml but because CSO discharges are intermittent, this standard is not as restrictive as the "single sample maximum" criterion of 235 cfu/100 ml. The State has numeric criteria for other parameters and these were used with existing data to determine the pollutants of concern in the City's CSOs (see Section 2).

1.2.2 NPDES Permit Requirements

The U.S. Environmental Protection Agency (EPA) issued a National Combined Sewer Overflow Control Strategy in 1989 (EPA, 1989). This Strategy reaffirmed that CSOs are point source discharges subject to National Pollutant Discharge Elimination System (NPDES) permit requirements. This Strategy was expanded and updated, resulting in the National CSO Control Policy published in 1994 (EPA, 1994). The Indiana Department of Environmental Management (IDEM) adopted the State's Combined Sewer Overflow Strategy in 1996, based on the National CSO Strategy and Policy (IDEM, 1996). These three documents comprise the backbone for the site-specific NPDES permit requirements for Combined Sewer Systems (CSS) in the State of Indiana.

The Federal and State CSO policies are divided into two phases. Phase I focuses on implementation of technology-based requirements referred to as the Nine Minimum Controls (NMCs). The NMCs were developed to provide low-cost measures that could be implemented to reduce the magnitude, frequency and duration of CSOs. The City of Terre Haute satisfied this requirement with the development and submission of the CSO Operational Plan to IDEM. This document was last updated in 2006. Section 11 of this report will explain the necessary changes to the CSO Operational Plan as a result of the acceptance and implementation of this CSO LTCP.

Phase II of the federal and state CSO policies focus on meeting water quality based standards if the Phase I actions were found to be inadequate. The CSO control policies emphasize four key principles to ensure that CSO controls are cost-effective and meet the requirements of the CWA described as follows:

- Provide clear levels of control that would meet appropriate health and environmental objectives.
- Provide sufficient flexibility to municipalities, especially those that are financially disadvantaged, to consider the site-specific nature of CSOs and to determine the most cost-effective means of reducing pollutants and meeting CWA objectives and requirements.
- Allow a phased approach for implementation of CSO controls considering a community's financial capability.
- Review and revise, as appropriate, water quality standards and their implementation procedures when developing long-term CSO control plans to reflect the site-specific wet weather impacts of CSOs.

1.2.3 City of Terre Haute NPDES Permit

CSOs are point source discharges and are subject to NPDES permit requirements. They are not subject to "limits based" parameters or secondary treatment requirements that are applicable to POTWs (EPA). The City of Terre Haute was issued its Phase II requirements in its NPDES permit in March of 1999. "Attachment A" of this permit outlines the Phase II requirements. The current NPDES permit is provided in Appendix 1-1. By permit requirements, Terre Haute was required to prepare a Stream Reach Characterization and Evaluation Report (SRCER) and a Long-Term Control Plan (LTCP).

The SRCER is intended to establish a "baseline" condition of the water quality of the receiving streams after implementation of the NMCs, prior to the implementation of any long-term control measures. Within the SRCER, it is to be determined if the currently permitted CSOs impact the receiving stream segments in Terre Haute. The City submitted its SRCER to IDEM in October of 2000.

The LTCP is to include the following minimum elements as defined by EPA's CSO Control Policy:

1. Characterization, Monitoring, and Modeling of the CSS;
2. Consideration of Sensitive Areas;
3. Evaluation of Alternatives;
4. Cost/Performance Considerations;

5. Revising the CSO Operational Plan;
6. Maximizing Treatment at the WWTP;
7. Use Attainability Analysis (if applicable)
8. Development of an Implementation Schedule;
9. Development of a Post Construction Compliance Monitoring Program; and
10. Public Participation.

These elements can be modified to meet Terre Haute's unique conditions. The permit requires that the City meet with IDEM early and frequently through the study to coordinate the development of the LTCP. At these meetings, IDEM and the City should agree on the data, information, and analysis needed to support the development of the LTCP. The City met with IDEM early in the LTCP development to discuss the project approach and then later in the project at milestone stages to discuss project status and findings. The permit also requires the LTCP to assess the City's financial capability to implement CSO controls to meet water quality standards.

Lastly, the permit requires the LTCP to include monitoring and modeling activities to characterize the impact of CSOs on each stream, and targets environmentally sensitive areas. The plan incorporates community input in identifying priority areas and selecting the long-term CSO controls.

Terre Haute's original and revised LTCP incorporates all of the above requirements.

1.2.4 Senate Bill 431 and LTCP Guidance

Senate Enrolled Act 431 (SEA 431), signed by Governor Frank O'Bannon in March of 2000, established the circumstances under which a long-term control plan meets the state's water quality goals for wet weather overflows. As codified in IC 13-18-3-2.3, the law requires that a long-term control plan fulfills the water quality goals of the state if:

- The plan provides for the implementation of cost-effective control alternatives that will attain water quality standards or maximize the extent to which water quality standards will be attained if they are not otherwise attainable;

- The plan provides, at a minimum, for the capture for treatment of the sewer system's "first flush," which carries solids that have settled in pipes between wet weather events or that have washed off of streets and parking lots at the beginning of a storm;
- The plan is reviewed periodically; and
- Additional, cost-effective controls are implemented as necessary, pursuant to the reviewed and updated plan.

SEA 431 required IDEM to provide guidance to explain the requirements of the use attainability analysis and the LTCP. IDEM released this guidance in September of 2001. SEA 431, EPA and IDEM policies and guidance require an evaluation of a reasonable range of control alternatives for various levels of controls (design storms). Cost-effectiveness are to be used as a guide for consideration of the controls. Sensitive areas and financial capability are also to be included in the evaluation of alternatives.

The appropriate level of CSO control must be defined based on water quality data, system performance modeling, and economic factors. These factors may support the revision of existing water quality standards.

SEA 431 requires municipalities to maximize treatment of wet weather flows at the treatment plant as part of the LTCP. Maximizing the use of existing wastewater treatment facilities to treat wet weather flow is a cost-effective way to reduce the magnitude, frequency, and duration of CSOs, which flow untreated into receiving waters. The municipality must submit documentation in the LTCP demonstrating a diligent effort to evaluate alternatives for increasing flow to the POTW.

1.2.5 Updated IDEM Policy Requirements (Current Standards - 2006)

Current IDEM and EPA policy requirements include some previous regulatory requirements along with newer directives as summarized below. A range of alternatives should be developed including "No Action", complete elimination of all CSO impacts and a range of alternatives at varying numbers of overflow events per year. The alternatives are developed for a "typical year" of rainfall for the City of Terre Haute.

IDEM has approved the "typical year" of rainfall. They have also approved the design storm of 1.56 inches of rain in 17 hours. This is the equivalent of an event which would result in on average, 4 overflows per year per outfall.

Alternatives eliminating all overflows are deemed unaffordable considering other wastewater utility needs. However, several options and alternatives were evaluated and will be explained further in this document.

If total elimination of CSO impacts is considered to cause widespread economic and social hardship, the community must determine the point at which implementation of CSO controls would no longer cause widespread impacts (See Section 8). If water quality standards are not able to be met, the community can apply for relief of standards through the Use Attainability Analysis as described in the following section (See Section 9).

1.2.6 Use Attainability Analysis

A Use Attainability Analysis (UAA) is a structured scientific assessment of the factors affecting the attainment of uses that are specified in Section 101(a)(2) of the Clean Water Act. IDEM recognizes that in many instances, a community will not be able to afford the total elimination of all impacts from CSOs. They recommend that if a community cannot afford to eliminate all of its CSOs, or demonstrate CSO control at regulatory accepted level, then that community should conduct a UAA. This UAA should demonstrate that attaining the use is not feasible due to one or more of the following six factors listed in 40 C.F.R. § 131.10 (g):

(1) Naturally occurring pollutant concentrations prevent the attainment of the use

(2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met

(3) Human caused conditions or sources of pollution prevention cannot be remedied or would cause more environmental damage to correct than to leave in place

(4) Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in attainment of the use

(5) Physical conditions related to the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses

(6) Controls more stringent than those required by sections 301 (b) and 306 of the Act would result in substantial and widespread economic and social impact.

1.3 Project Approach

In accordance with the NPDES Permit, Attachment A, Terre Haute met with IDEM in May 2001, early in the development of the original LTCP with IDEM, to present the project approach. IDEM was given the Project Plan and Sampling and Flow Monitoring Work Plan documents at the meeting.

The initial approach used to evaluate CSO long-term control alternatives is described as follows:

- Select a design storm at the anticipated knee-of-the-curve for the evaluation of alternatives. Storm E (0.818 inches) was selected as the design storm. (The percent capture for Storm E level of control was approximately 83%.)
- Identify feasible CSO control technologies that are specific to Terre Haute.
- Develop three integrated CSO control alternatives to capture and treat a Storm E level of control. Each alternative included feasible CSO control technologies specific to each CSO, and other technologies identified by the City and the Citizen Advisory Committee (CAC) that would satisfy infrastructure needs and would reduce CSO impacts on the Wabash River.
- Develop the three integrated alternatives for Storms D, F, and G level of control. The cost and performance for Storm D, E, F and G were estimated to develop the cost/performance knee-of-the-curve.
- Develop options that are common to each alternative, which addressed CAC's comments on priority areas. The options reduce CSO discharges at priority sites, but do not reduce the total overflow volume to the river.
- Estimate the cost performance for complete sewer separation.

Due to the fact that IDEM never reviewed or approved the originally submitted plan, the City of Terre Haute decided to amend their project approach based on revised IDEM and EPA policy. Accordingly, the City and its consultants revised the plan to include measures to satisfy the updated IDEM policy requirements. The final revised project approach used to evaluate CSO long-term control alternatives is described as follows:

- Identify feasible CSO control technologies.
- Based on new collection system flow and rainfall data monitoring, calibrate and develop a SWMM model for evaluation of CSO system reaction to storm events and control alternatives
- Develop integrated CSO control alternatives to capture and treat typical year rainfall at various levels of control. Each alternative included feasible CSO control technologies specific to each CSO or combinations of CSOs, and other technologies identified by the City and the Citizen Advisory Committee (CAC) that would reduce CSO impacts on the Wabash River.
- Estimate the cost for each feasible CSO alternative and also for complete sewer separation.
- Evaluate each CSO alternative's performance using a "typical year" rainfall approach and calculate the associated costs.
- Perform an economic affordability evaluation and determine if a Use Attainability Analysis (UAA) will be performed

1.3.1 Project Team

The Terre Haute CSO LTCP team consisted of two groups:

- Consultants
- Technical Review Team

The primary project engineering consultant was Hannum, Wagle & Cline Engineering. The river modeling work was completed by Limno-Tech, Incorporated of Ann Arbor, Michigan, and the financial capabilities analysis and user rate work was performed by H.J. Umbaugh & Associates. Fred Andes of Barnes and Thornburg served as special legal counsel and advisor to the team.

The second group was the technical review team, which consisted of members of the City Wastewater Treatment Plant Staff, the City Engineering Staff and the Consultants.

A third group involved in the project was the Citizens Advisory Committee appointed by Mayor Duke Bennett. This group met five times during the CSO LTCP process and provided public review during the development of a recommended plan.

A the fourth part of the team included the City government groups (City Council, Board of Works and Sanitary District) that approved the recommended plan or will be responsible for adopting measures necessary for LTCP implementation.

The Citizens Advisory Committee and City Government Groups are described in more detail in Section 5 – "Public Participation".

1.3.2 Project Goals

As the CSO LTCP process evolved, goals varied and were subsequently modified. The following general goals were originally established for the City of Terre Haute at the onset of the original plan:

1. Meet the IDEM requirements of the LTCP guidance and Senate Bill 431 and CSO related NPDES permit requirements.
2. Develop and select an alternative that meets the "first flush" capture criteria and the knee of the curve.
3. Add in options that eliminate overflows in the priority areas by re-routing the overflows downstream of the park.
4. Upgrade combined sewer overflow related transport and treatment facilities that are in significant need of upgrade regardless of which alternative and/or option is selected.
5. Select a plan that can be implemented in phases over a reasonable period of time.
6. Minimize the impact of implementing the selected plan on the sewer rates for the Terre Haute citizens, commercial and industrial community.

After the initial review of the plan by IDEM and the updated plan requirements for design storms were implemented, the following goals supplemented the original goals:

1. Meet the IDEM requirements of the LTCP guidance, Senate Bill 431, updated IDEM policy requirements and CSO related NPDES permit requirements and revise the plan as required by IDEM'S review and/or comments of the initial plan
2. Explore additional options that eliminate overflows in the priority areas at the first flush design event by selecting alternatives which address effects of overflows on these areas.
3. Select a plan that can be implemented in phases over a reasonable period of time.

4. Minimize the impact of implementing the selected plan on the sewer rates for the Terre Haute community taking into account CSO control and other utility needs.

1.3.3 Project Work Plan

Based on the project goals, the original project work plan consisted of the following activities, shown in their order of sequence:

- Collect data on the physical characteristics of the CSO system, Wabash River and the Wastewater Treatment Plant (WWTP).
- Capture water quality and quantity data by use of flow meters, rain gauges and a field sampling/testing data.
- Develop design storms based upon historical storm events.
- Model the CSO system and WWTP performance at the various design storm events and calibrate the model based on actual field data.
- Using the calibrated sewer system model, develop anticipated overflow volumes and durations for the design storm events. In the case of Terre Haute, the uncaptured overflow volume at the knee of the curve was approximately four million gallons, a small volume when compared to other CSO communities of similar size.
- Develop alternatives (three minimum) that utilize acceptable technologies to capture and treat combined sewer overflows to a design storm.
- Develop options to supplement the CSO control alternatives that re-locate the overflows of two, three or all four of the active CSO's in the Fairbanks Park area to a point downstream of this priority area.
- Develop and calibrate the river model to estimate the reduction in water quality impacts that will occur as a result of implementing CSO improvements at the various design storms.
- Develop a capital cost and operation, maintenance and replacement (O, M & R) costs for the alternatives at the various design storms.

- Utilizing the river model data and cost estimates develop a curve that indicates water quality improvements as they relate to capital and O, M & R cost improvements. Select the "knee" of this curve and determine if this point meets the IDEM CSO volume reduction guidelines.
- Determine if the total estimated project costs and O,M & R costs on a Present Worth Basis at the knee of the curve exceed or fall below the 2% equivalent affordable cost described in IDEM's guidance.
- Determine the reasonable CSO project implementation timeline based upon the estimated City financial capability index, IDEM standards and project team input.
- Develop a schedule that divides the recommended improvements into phases over the implementation timeline.
- Determine anticipated sewer rate increases for the typical homeowner in Terre Haute utilizing various financing options. As with the phasing of the Capital Cost Improvements and O, M & R increases, develop a plan to phase in the needed sewer rate increases over the implementation period.

The original work plan was implemented over an 11-month period while the study was being completed. Numerous meetings, conference calls, updating reports and draft review documents were developed and distributed among this Technical Review Group, Citizens Advisory Committee and City Government Groups by the Consultant Team throughout the process. All key decisions involved input from all parties of the team.

Over the past several years (primarily after 2006), the City of Terre Haute has completed additional research and modeling in order to revise and improve the original CSO LTCP. Additional system characterization data has been collected, hydraulic and water quality models were enhanced, a detailed evaluation of the initial alternatives was conducted resulting in the formulation of new alternatives for consideration, and consideration was given to changes in Indiana Water Quality Standards. After the initial review by IDEM, the work plan was modified to include the following:

- By means of new flow monitoring and a Storm Water Management Model (SWMM), develop anticipated overflow volumes and durations for the design storm events and calibrate the SWMM model based upon real time monitored data

- Conduct SWMM Model and River Model evaluation of screened alternatives at various levels of control
- Develop alternatives that utilize acceptable technologies to capture and eventually treat the typical year storm volumes.
- Develop capital and annual operating, maintenance, and replacement costs for the alternatives at the typical year rainfall.
- Determine if the total estimated project costs exceed the affordability limits.
- Determine, based on affordability, whether a UAA will be necessary, and if so, complete the UAA concurrent with the LTCP.
- Determine the reasonable CSO project implementation timeline based upon the calculated City financial capability index, IDEM standards and project team input.