

CITY OF FORT WAYNE, INDIANA
USE ATTAINABILITY ANALYSIS: RECREATIONAL USE
ST. MARYS RIVER, ST. JOSEPH RIVER, AND MAUMEE RIVER

USE ATTAINABILITY ANALYSIS

1 Introduction

1.1 Purpose and Objectives

Several waters within and downstream of the City of Fort Wayne, Indiana, are impacted under wet weather conditions by overflows from the century-old combined sewer system that serves the older part of the City. The waters include segments more specifically identified below of the Maumee River, the St. Joseph River, the St. Marys River, Baldwin Ditch, Harvester Drain, Spy Run Creek, and Natural Drain #4. A revision to the full body contact recreation use designation set by Indiana water quality standards for the CSO-impacted waters is requested by the City such that the CSO wet weather limited use subcategory that is conditionally available under Indiana law may be applied. The requested revision to the recreational use designation of the impacted waters is predicated upon the substantial and widespread economic and social impact that would be incurred by the community of Fort Wayne if full compliance with the designated use and associated water quality criteria were required. As will be shown, the City's Long-term Control Plan for installation of CSO controls will bring the impacted waters quite close to full water quality-based compliance and the proposed revision to the current designated recreational use will actually affect the waters in question only a few times annually.

A long-term CSO control plan (LTCP) to address the water quality impacts of the City's combined sewer overflows (CSOs) was submitted to the Indiana Department of Environmental Management (IDEM) and was approved by the agency in December 2007.¹ The key elements of the approved LTCP have been made obligations of a federal Consent Decree approved by order of the U.S. District Court for the Northern District of Indiana entered in Case No. 2:07-cv-00445-PPS-APR on or about April 1, 2008.

The selected CSO Control Measures in the City's approved LTCP will achieve a high level of control for the remaining CSOs in the City's combined sewer system at a capital cost of over \$340 Million² and the expenditure of many more millions of dollars in additional annual operations and maintenance expenses and debt service costs. When fully implemented, the LTCP will reduce the number of overflow events for the City's CSO outfalls from as high as 20 to 71 annual events³ in the "typical year" to a maximum of 4 annual overflow events for which it

¹ U.S.EPA concurrence with the City's LTCP, as approved by IDEM, was stated in the Consent Decree at the time of its lodging with the federal district court in late December 2007.

² This figure includes the capital cost component of recent improvements to the headworks and primary treatment units of the City's Water Pollution Control Plant, which will facilitate improved capability to handle higher wet weather flow rates.

³ The 19 CSO regulators with highest activation rates in the City's combined sewer system range from 20 to 71 annual overflow events in the "typical year". The "typical year" is an artificial construct that is intended to

will not be feasible to treat excess CSO flows to meet currently applicable water quality criteria for water-based recreation. Moreover, CSO discharges to the St. Joseph River, the City's highest quality waterway, will be markedly reduced under the LTCP such that only a single annual overflow event in the "typical year" will occur for which it will not be feasible to treat excess CSO flows to meet water quality criteria for full body contact recreation. This represents an exemplary level of control for previously uncontrolled wet weather discharges of combined sewage to the City's CSO-impacted waterways.⁴

Notwithstanding these impressive control levels, which go beyond the point of diminishing returns from a cost-effectiveness perspective, the CSO Control Measures specified by the LTCP will not, as alluded to above, achieve compliance with Indiana's water quality standards for water-based recreation under relatively severe wet weather conditions occurring up to four times in a "typical" year for the St. Marys and Maumee rivers and once in a typical year on the St. Joseph River. The City submits, as documented in its LTCP and as further documented in this use attainability analysis (UAA), that further improvements in water quality of its CSO-impacted waters cannot be achieved without the expenditure of funds beyond that which is affordable by the City. Thus, although the City's LTCP will achieve much at high cost to the City and its ratepayers, the City will not be able to comply at all times with the Clean Water Act's water quality requirements unless the current recreational use designation for the City's CSO-impacted waters can be revised on a site-specific basis to reflect the capabilities of the approved LTCP.

The City's LTCP is in fact predicated upon a proposed revision in the designated recreational use for the City's urban waterways to Indiana's CSO wet weather limited use subcategory. To obtain approval for this revision in designated recreational use for the City's CSO-impacted waterways, it will be necessary for the City to establish eligibility for and perform a Use Attainability Analysis (UAA) that justifies the revision consistent with relevant federal and state law.

This document describes federal and state requirements associated with a UAA, presents the City's proposed UAA for consideration by state and federal agencies, and requests approval by those agencies 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. These waterways ("CSO-impacted Waterways") specifically include the following:

- St. Marys River (from its junction with Natural Drain #4 near Tillman Road, to the confluence with St. Joseph River)
- Natural Drain #4 (from CSO Outfall 054 near the intersection of Hollis Lane and Mercer Avenue, to its junction with the St. Marys River)

represent those annual precipitation events that have the highest probability of occurrence in any year, based on statistical evaluation of 48 years of precipitation records for the Fort Wayne area. Appendix A to this UAA provides a detailed description of the derivation of the "typical year" for purposes of LTCP development by the City.

⁴ A brief description of the CSO control measures selected in the LTCP will be provided in a later section.

- St. Joseph River (from CSO Outfall 052, located immediately south of Coliseum Blvd., near N. Anthony Boulevard, to the confluence with St. Marys River)
- Spy Run Creek (from CSO Outfall 036, located north of W. State Street along Eastbrook /Westbrook Drive, to its junction with the St. Marys River south of 4th Street)
- Baldwin Ditch (from CSO Outfalls 061 and 062 near the intersection of E. State Street and Barnhart Avenue, to its junction with the Maumee River near CSO Ponds 1 and 2)
- Harvester Drain (from CSO Outfall 064 to its junction with the Maumee River)
- Maumee River (from its origin at the confluence of the St. Marys and St. Joseph Rivers in the City of Fort Wayne to the boundary between the states of Indiana and Ohio).

For clarity of further reference to these waterbodies, the parenthetically identified reaches represent those portions of the waterbodies which are projected to experience *E. coli* in excess of the bacteriological criteria to protect full-body recreational use solely as a result of a limited number of uncontrolled CSO discharges which statistically would occur in the “typical year” notwithstanding the full implementation of the City’s LTCP. Therefore, these same reaches are proposed to be addressed by a rulemaking of the Indiana Water Pollution Control Board to apply the CSO Wet Weather Limited Use designation in lieu of the current full-body contact recreation designation during wet weather conditions. The extent of the reaches identified above that are projected to be impacted by CSO discharges after implementation of the LTCP is determined for all waterbodies except the Maumee River as follows: the upstream point of beginning is marked by the location of the first CSO that will remain after LTCP implementation. The downstream endpoint for each reach is the point of confluence with a larger waterbody still within the area of the City’s combined sewer system.⁵ For the Maumee River, which begins within the area of the combined sewer system, the downstream endpoint has been determined by a one-dimensional water quality model described in Appendix B.

As will be explained and supported, Fort Wayne’s UAA rests upon the following basis:

- Substantial and widespread social and economic impacts would be caused by a requirement to implement controls beyond those contained in the City’s LTCP as approved by IDEM and U.S. EPA.

The conclusion of this UAA is that the currently designated recreational use is not attainable and is not an existing use in the City’s CSO-impacted waterways during and for a short period of time following wet weather events that exceed the high level of CSO control provided for in the LTCP. The remainder of this UAA provides the specific rationale and summarizes the factual support for this conclusion.

⁵ Available data collected by the City shows these waterbodies to exhibit substandard *E. coli* values throughout their respective segments during more substantial wet weather events.

1.2 General Regulatory Requirements for UAAs

Federal water quality regulations⁶ describe the purpose of a UAA to be as follows: a UAA provides the informational base upon which a State may demonstrate that attaining a designated use in a waterbody is not feasible so as to justify removing the designated use or establishing subcategories of the use which require less stringent criteria. The specific grounds on which the infeasibility of attaining a designated use may be demonstrated include:

- (1) Naturally occurring pollutant concentrations prevent the attainment of the use; or
- (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; or
- (3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
- (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; or
- (5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
- (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.

40 CFR § 131.10 (g).

A UAA is defined by federal regulations as “a structured scientific assessment of the factors affecting the attainment of the use, which may include physical, chemical, biological, and economic factors as described in § 131.10(g).”⁷

1.3 EPA and Indiana Policies Support the Coordination of LTCP Development with Review of the Potential Appropriateness of Water Quality Standard Revisions

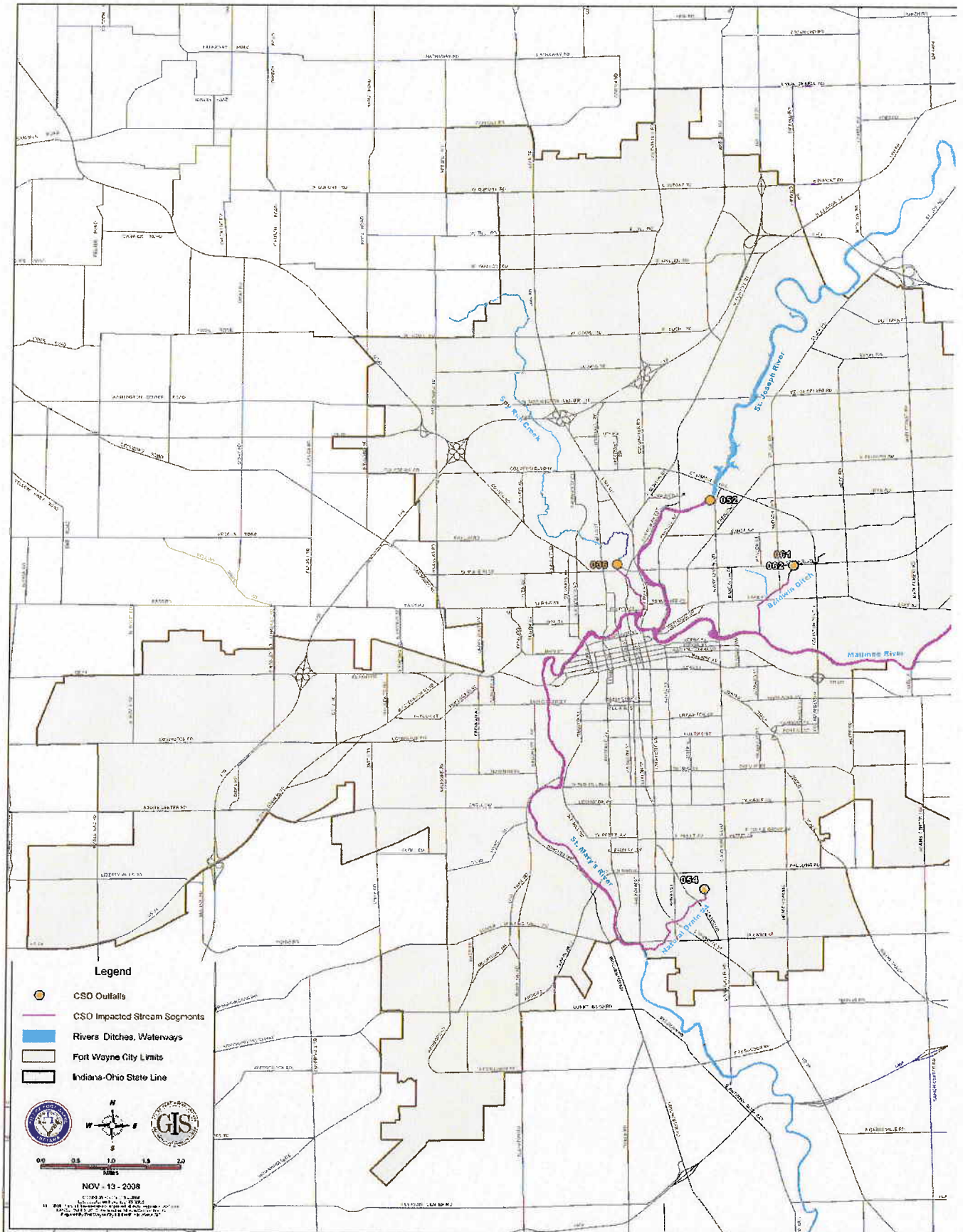
1.3.1 EPA Policy and Guidance

EPA’s Combined Sewer Overflow (CSO) Control Policy⁸ states that one of its key elements is the “development of the long-term plan ...[in coordination] with the review and appropriate revision of water quality standards and implementation procedures on CSO-impacted waters to

⁶ See 40 CFR 131.10(g) and 40 CFR 131.10(j)(2).

⁷ 40 CFR 131.3(g).

⁸ 59 *Federal Register* 18688, April 19, 1994



ensure that the long-term controls will be sufficient to meet water quality standards.” As part of the analysis, “States should evaluate whether the designated use could be attained if CSO control were implemented.”⁹ In 2002, the EPA published further national guidance on coordinating the development of CSO long-term control plans with water quality standards reviews.¹⁰ This guidance recognizes the unique relationship between CSOs, designated uses and water quality standards in CSO-impacted water bodies. In this document, EPA calls for a water quality standards review to be conducted in conjunction with LTCP development and specifies that appropriate and attainable standards should be established for CSO-impacted waters.

1.3.2 State Policy

Indiana law is reflective of EPA’s regulation and guidance. During its 2005 session, the Indiana legislature enacted P.L. 54-2005, also known as Senate Enrolled Act (SEA) 620. Among other provisions, this legislation establishes:

- A CSO Wet Weather Limited Use subcategory of recreational use for CSO impacted waters with an approved long-term control plan; and
- A requirement for the Indiana Water Pollution Control Board to adopt rules to implement the new recreational use subcategory.

Under the state rule implementing SEA 620, the CSO wet weather limited use subcategory may be applied to the CSO-impacted waterbodies of a CSO community if the following actions occur: (i) the proposed revision to the designated use as supported by a UAA is approved by IDEM and adopted as a rule amendment by the Indiana Water Pollution Control Board; (ii) EPA approves the state rulemaking, on the basis of the UAA supporting the change in use designation, in accordance with 40 CFR 131.10, 4 CFR 131.20, and 40 CFR 131.21; and (iii) a CSO LTCP based on the adoption of the CSO wet weather limited use has been approved by IDEM and incorporated into the community’s NPDES permit. The water quality-based requirements for the CSO wet-weather limited use subcategory’s application to a particular waterbody are determined through the approved CSO LTCP.

2 Current Recreational Standards Applicable to Waters Impacted by the City’s CSOs

All surface waters within Indiana’s portion of the Great Lakes drainage basin, including the receiving waters for the City’s CSOs, are designated for full-body contact recreation by the water quality standards for such waters adopted by the Indiana Water Pollution Control Board. 327 IAC 2-1.5-5(a)(1). The following numeric water quality criteria for *E. coli* are established by these water quality standards to support the designated recreational use during the annual recreational season of April through October:

⁹ *Id.*, at III.B, paragraph 2

¹⁰ Guidance: Coordinating CSO Long Term Control Planning with Water Quality Standards Reviews; EPA Document #833R01002, July 2001.

- Geometric mean of 125 colony-forming units per 100 milliliters (cfu/100 mL) based upon five equally spaced samples taken in a one-month period.
- Single sample maximum of 235 cfu/100 mL.

327 IAC 2-1.5-8(e)(2).

These bacteriological water quality criteria are intended to protect full-body immersion contact (such as occurs during swimming and some other water recreational activities) from unreasonable risk of disease. The water quality standards apply these criteria to all waters, whether or not they are officially designated as public swimming areas and whether or not any particular water body is reasonably suited for full-body contact recreation. While appropriate for some waters during certain periods, this designation clearly is not attainable in all waters, under all conditions.

Many Indiana water bodies have not and do not currently meet the *E. coli* criteria specified for full-body contact recreation swimming all the time – especially during and following wet weather events. For example, in its 2006 Water Assessment Report, IDEM listed more than 7,620 miles (67.5%) of evaluated stream miles as not attaining the recreational use due to excessive bacteria levels.¹¹ Those portions of the St. Mary's River, St. Joseph River and Maumee River affected by the City's CSOs are included in this list of non-attaining waterways.

3 Determination of Existing Use

As stated above, the City's LTCP is predicated on the revision of the currently applicable use designation of full body contact recreation for the City's CSO-impacted waterways to allow application of Indiana's CSO Wet Weather Limited Use Subcategory during wet weather conditions exceeding the level of control to be provided through implementation of the LTCP.

Under federal regulations at 40 CFR 131.10(g), a water body's designated use cannot be removed (or revised to a less protective level) if it is an "existing use." An "existing use" is defined at 40 CFR 131.3(e) as a "use *actually attained* in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." (Emphasis added.)

For reasons summarized in this section, the City has concluded, in accordance with IDEM guidance on existing use determinations,¹² that no existing recreational uses in the City's CSO-impacted waterways will be removed by the application of the CSO Wet Weather Limited Use Subcategory to those waterways.

¹¹ These data tend to be consistent with U.S. EPA's statement, "The bacteria standard is one of the most commonly violated water quality standards in terms of both the number of water bodies and stream miles impaired." See *National Management Measures to Control Nonpoint Source Pollution from Urban Areas*. (U.S. EPA 2005.)

¹² *Application of Existing Use Concept in Conducting Use Attainability Analyses for Long Term Control Plan Communities for Primary Contact Recreational Uses*, IDEM Nonrule Policy Document No. Water-014, April 11, 2008 ("*IDEM Existing Use Guidance*").

3.1 Identification of Existing Uses

The proposed CSO Wet Weather Limited Use Subcategory, if approved, will only be applicable to the City's CSO-impacted waterways during wet weather conditions which exceed the level of CSO controls provided for in the LTCP.¹³ Consequently, the existing use determination by the City focuses only on the nature of existing uses in the pertinent waterways during wet weather conditions. To identify existing recreational uses during such wet weather conditions, the *IDEM Existing Use Guidance* prescribes that CSO communities "should describe the kind(s) and extent of recreation that has typically occurred during periods of CSO-impact to the waterbody and the water quality associated with the recreation during such periods."

Recreational Activities. A review was conducted by the City of its CSO-impacted waterways during the 2005 recreational season to document recreational activities. The results of its review, as summarized in the Recreational Uses component of its Sensitive Areas Report provided to IDEM and EPA in July 2005,¹⁴ indicated that recreational activities involving or approaching full-body contact with area rivers within CSO-impacted reaches have been virtually non-existent. No information was obtained during this review or from surveys taken of City residents indicating any occurrence of such activities in the CSO-impacted waterways during or soon after storm events.¹⁵ The following table summarizes observations by City Water Resources staff during weekly inspections along each of the three main waterways during the spring, summer and early fall of 2005.

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¹³ Thus, the CSO Wet Water Limited Use Subcategory would be in effect only rarely, given that the City is obligated by its approved LTCP to allow untreated CSO discharges to the St. Marys River and/or the Maumee River for only 4 storm events in a typical year and to the St. Joseph River for only 1 storm event in a typical year.

¹⁴ See Appendix C, *Recreational Use Report*, City of Fort Wayne Utilities, July 7, 2005.

¹⁵ Given that sunny, dry weather is more conducive to recreational activity, the lack of primary contact recreation on the impacted rivers during favorable conditions supports the likelihood that such recreational activities do not occur during or following storm events.

Table 3.1-1

Observed Recreational Uses of CSO-Impacted Waterways				
May – October 2005				
St. Joseph River				
	Activity	Frequency Observed	Number of Users	Weather
	Fishing from side of river	3	11	Sunny, warm
	Children playing along streambank	1	3	Sunny, warm
	Jet skiing	1	2	Sunny
St. Marys River				
	Fishing – mostly from bank	6*	11	Sunny to partly cloudy
	Boating	Weekly at two locations	4	Sunny to varied conditions
	Canoeing	1	1	Sunny
	Children playing along streambank	Weekly at 3 locations	2-4 on each occasion	Varying conditions
Maumee River				
	Fishing from bank or bridge at 3 locations	Various times over summer	1-4 at 2 locations 1-10 at 1 location	Variied conditions Warm and dry
	Fishing from bank at Anthony St.	1	4	Sunny
	Boating at 2 locations	1	2 at each location	Sunny

* Fishing at one location by 2 to 4 individuals was observed once per week.

Water Quality of CSO-impacted Waters. A characterization of the water quality of the City's CSO-impacted waterways is summarized in Chapter 2 of the LTCP. The bacteriological quality during wet weather, as shown by the collected data, indicates that the St. Marys River, St. Joseph River, and Maumee River rather consistently fail to meet applicable water quality standards for full-body contact recreation during wet weather events. Wet weather sampling data collected by Malcolm Pirnie in 1996 and summarized on Table 2.5.3.3 of the LTCP indicates that during the four sampled rain events every grab sample collected for analysis exceeded the full-body contact recreation single sample *E. coli* limit of 235 cfu/100 ml. In addition, wet weather sampling data collected by the City in 2005 and summarized in Section 2.5.3.1 of the LTCP indicates that average *E. coli* concentrations for two rain events far exceeded the full-body contact recreation single sample *E. coli* limit. *E. coli* concentration averages for the two rain events ranged from 1,116 cfu/100 ml to 70,608 cfu/100 ml. While the averaged *E. coli* concentrations cannot be directly compared to the single sample maximum or geometric mean *E. coli* standards, the high averages obtained during the 2005 wet weather sampling indicate that a significant number of samples contained *E. coli* concentrations exceeding the single sample limit of 235 cfu/100 ml.

Longer Term Evaluation of Bacteriological Quality of CSO-Impacted Waterways. To more fully evaluate the attainment status of the City's CSO-impacted waterways from 1975 through

the present, fecal coliform and *E. coli* data were obtained from fixed-station sampling activities conducted on these water bodies. Surface water grab samples from segments of the St. Mary's River, the St. Joseph River, and the Maumee River in and near the City have been analyzed by the IDEM and its predecessor agency for concentrations of indicator bacteria on an approximately monthly or bi-monthly basis from 1975 through 2006. Bacterial concentration data for the three rivers in and near the City resulting from this stream sampling activity was obtained from the following sources: 1975 through 1990, from the Legacy STORET Database, United States Environmental Protection Agency, <http://www.epa.gov/storpubl/legacy>; 1991 through 2000, from the IDEM's Assessment Information Management System (AIMS) Database; and 2001 through 2006, from the City's river sampling program. The raw data for bacterial indicator organisms collated from each of these sources are provided in Appendices D, E, and F.

The data obtained from the fixed-station sampling events were limited for several reasons. First, because the fixed-station sampling data was not collected with the frequency required to derive monthly geometric means, the data was compared to full-body contact recreation single sample criteria. Samples collected from 1975 through 1988 were analyzed by the agency for fecal coliform and compared to the full-body contact recreation maximum limit of 400 cfu/100 ml. 330 IAC 1-1-6(e) (1988 Ed.). Samples collected from 1988 through 2006 were analyzed for *E. coli* and compared to the full-body contact recreation single sample limit for *E. coli* of 235 cfu/100 ml. Second, data from sampling stations upstream of the City's CSOs were excluded from analysis and presentation. Third, variations in the available data due to conditions such as rainfall events or low river flow volumes could not be addressed because the data did not provide any information regarding the meteorological conditions or river flows during sampling events.¹⁶

Finally, the locations of sampling stations were not consistent in all cases from 1975 through 2006. Stations were added and removed during this time period for the Maumee River so that precise locational comparison of data from the same sampling points in that river is not possible over the entire period. These limitations, however, do not preclude useful qualitative conclusions from being drawn concerning attainment status of these rivers over the pertinent timeframe, as discussed below.

Due to the limitations of the fixed-station sampling data, the general attainment status of the rivers from 1975 through 2006 was determined through comparison of the number of samples exceeding applicable full-body contact recreation single sample limits to the total number of samples collected from each of five sampling stations on the three principal waterways. It would be expected that, if the water quality in the St. Mary's River, St. Joseph River, and Maumee River were increasingly impaired over time, the percentage of samples collected exceeding the applicable full-body contact single sample limit would correspondingly show a trending increase over the time period from 1975 through 2006. Such a hypothetical trending increase is not reflected in the data, however. If anything, the data, particularly the data from 2001 to 2006, show a trending to lower bacterial concentrations. In order to minimize the impact of years with small sample sizes or atypical meteorological conditions, as well as to provide greater assurance

¹⁶ It may be reasonably inferred that the individual samples with low bacterial content correspond to dry weather conditions while samples with high concentrations of indicator bacteria correspond to wet weather conditions. However, it has not been possible to readily correlate the water quality data with meteorological conditions.

that the data for each time segment would contain precipitation-related results, data from each river sampling station was combined into data sets corresponding to decade periods consisting of the latter half of the 1970's, the 1980's, the 1990's, and 2001-2006. The percentages of samples with bacterial content exceeding applicable recreational criteria for each river sampling station are summarized in Table 3.1-2.

**Table 3.1-2
 Exceedances of Applicable Bacteriological Standards
 for Full Body Contact Recreation from 1975 to 2006**

Percent of Samples Exceeding Applicable Maximum Criterion				
	1975-80	1981-1990	1991-2000	2001-2006
	Fecal coliform	Fecal Coliform	<i>E. coli</i>	<i>E. coli</i>
St. Joseph River @ Tennessee Avenue	32.4% (37)*	38.8% (85)	43.1% (102)	30.0% (183)
St. Marys River @ Spy Run	ND	77.8% (27)	75.5% (102)	65.4% (182)
Maumee River @ Anthony Blvd.	65.4% (55)	71.4% (56)	ND	54.4% (180)
Maumee River @ Landin Road	ND	ND	59.7% (77)	59.0% (183)
Maumee River @ State Road 101	62.0% (50)	54.1% (85)	60.2% (108)	ND

ND – no data

*Parenthetical figure states the number of samples in the data set

Fecal coliform exceedances estimated by comparison to a maximum value of 400 cfu/100 ml

E. coli exceedances based on a maximum value of 235 cfu/100 ml

As indicated by Table 3.1-2, all three rivers produced a significant percentage of samples exceeding applicable full-body contact recreation single sample limits for each time interval. In addition, though not discernible from the above table, the data for each sampling station rather consistently showed exceedances of the bacterial criteria from year to year. The river sampling data obtained from 1975 through 2006 indicate that all three rivers (and all sampling stations) have consistently failed to meet the full-body contact recreation criteria in significant numbers of samples. Some variations are shown to have occurred among the three waterways in the percentage of bacterial exceedances, as may be expected based on differences in the number of CSOs discharging, and the relative volumes of combined sewage discharged, to each waterway. Based on this information, it can be generally concluded that the water quality in those portions of the St. Marys River, St. Joseph River, and Maumee River routinely impacted by Fort Wayne's CSO discharges has consistently failed to attain bacteriological criteria for full-body contact recreational use since at least 1975 and that there has been no significant change in water quality related to recreational use from 1975 through 2006, other than slight improvements in this decade.

From the foregoing information, it may be further concluded, as a general matter, that the existing recreational use for these CSO-impacted waterways during wet weather conditions can

be characterized as “rare-to-no primary contact recreation occurring in waters that do not attain water quality criteria supporting primary contact recreational use.”

A different conceptual approach for displaying the bacterial quality of the CSO-impacted waterways over time is illustrated in Figures 3.1-1 through 3.1-5. These figures display the results of a statistical analysis of the data for indicator bacteria concentration for each waterway for each decade since the mid-1970's. These figures provide the 5th, 25th, 50th, 75th, and 95th percentiles and the mean of the data set for indicator bacteria concentrations for each sampling station for each waterway for each decade period.¹⁷ Thus, this method of data depiction, known as a “box and whiskers” format, provides a visual display of the spread, as well as the concentration, of the data set. The raw data set for each graph displayed in these figures are provided in Appendices G through K.

The sampling locations from which the bacterial data are derived are each within the CSO-impacted segments of the waterways. One sampling station is located within each of the CSO-impacted segments of the St. Marys River and St. Joseph River. Three sampling stations are located on the Maumee River. It bears mention that the data sets for these figures include bacterial concentrations corresponding to all weather conditions; it was not feasible to attempt to segregate data deriving from wet weather from data associated with dry weather.¹⁸ However, the overall data set for each sampling location will include data from wet weather conditions such that the impacts of CSO discharges on bacterial quality of the waters will be reflected in the full data set. Since each data set displayed in a box and whiskers graph in these figures represents a decade (or a substantial fraction), the data set can be assumed to include representative influences of CSO discharges.

Turning to a consideration of the substance of the figures (which appear on succeeding pages), the following overall observations can be made. As a general matter, the instream bacterial concentrations at each sampling location have remained relatively constant over the entire period of evaluation, spanning the mid-1970's to 2006. This is particularly evident when focusing on the darker box of each graph, representing the 25th through 75th percentiles of the data. The constancy of the data is most pronounced for the St. Joseph River and the State Road 101 sampling station for the Maumee River, but the trend characterizes each sampling location's data. Secondly, the data consistently show, for each sampling location, that the most recent decade is slightly lower in bacterial concentrations than earlier decades. This corroborates that bacterial quality of the CSO-impacted waterways relating to recreational use has remained relatively consistent since the mid-1970's and appears to have improved slightly, as might be expected, with increasing attention over time to measures intended to produce water quality improvement.

¹⁷ For each graphic display for a particular sampling station and time period, the minimum bacterial concentration is indicated by the left endpoint or “tail” of the graph, while the maximum concentration is found at the right endpoint. The left leading edge of the light gray box represents the 5th percentile of the data, the left leading edge of the smaller dark gray box displays the 25th percentile, the line running through the dark gray box indicates the median of the data, the right leading edge of the dark gray box provides the 75th percentile, and finally, the right leading edge of the light gray box is the 95th percentile for the data set.

¹⁸ There were no readily accessible records available to the City of contemporaneous meteorological records from which weather conditions could be correlated to the sampling results for each of the sampling locations on a particular day of water quality sampling.

Figure 3.1-1
Variability of Historical Bacterial Data
St. Joseph River at Tennessee Ave., Fort Wayne, Indiana

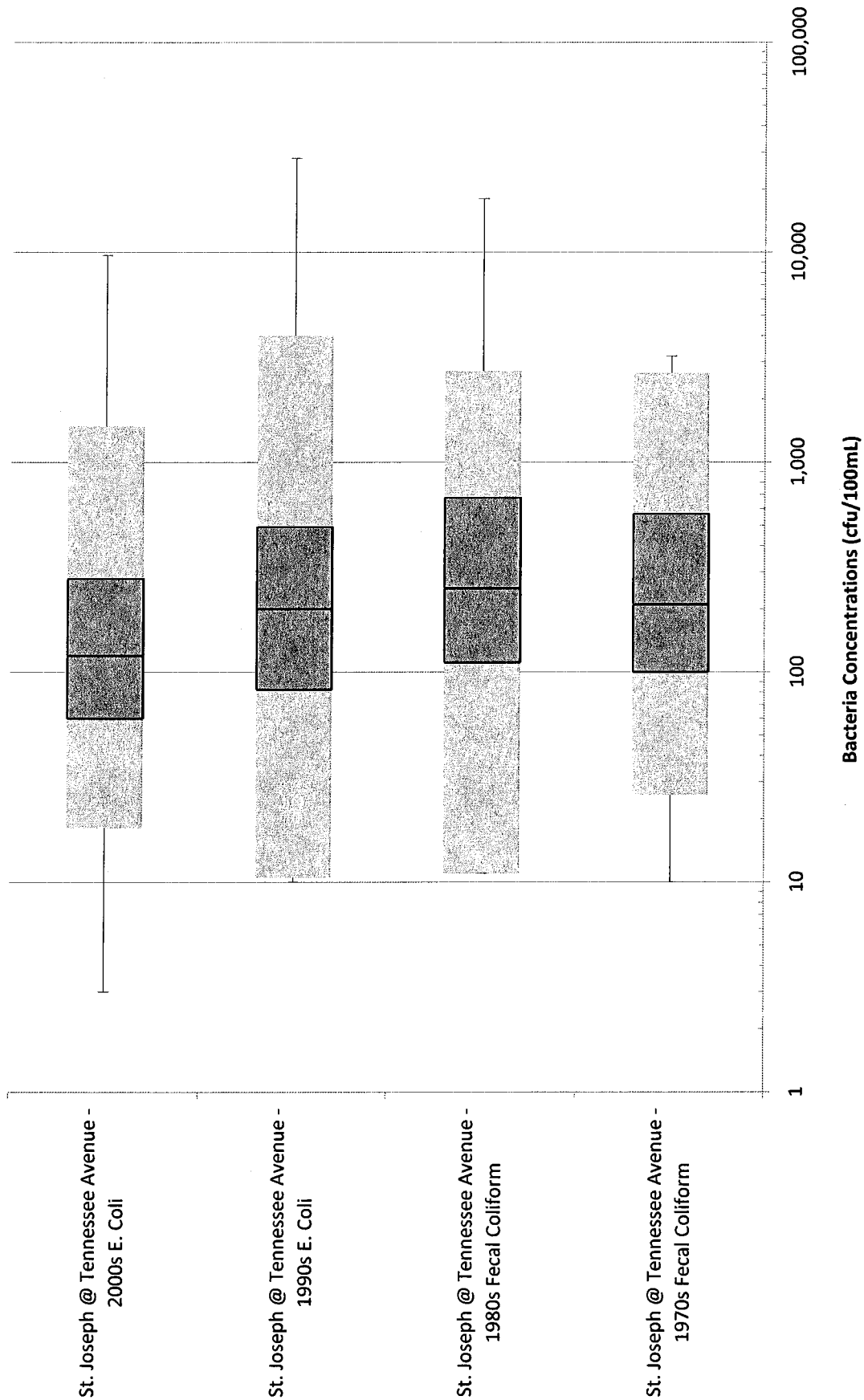


Figure 3.1-2
Variability of Historical Bacterial Data
St. Marys River at Spy Run, Fort Wayne, Indiana

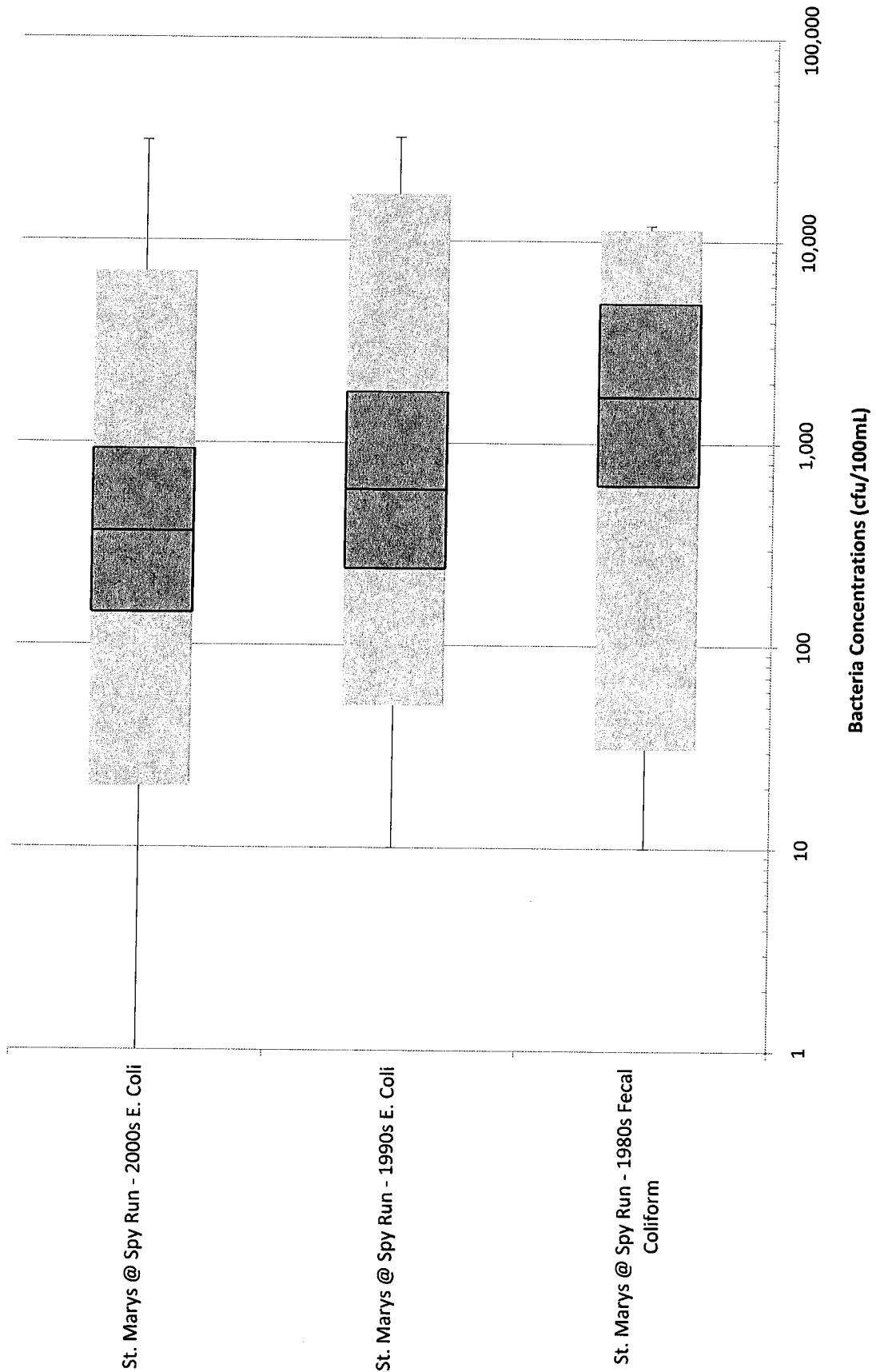


Figure 3.1-3
Variability of Historical Bacterial Data
Maumee River at Anthony Blvd., Fort Wayne, Indiana

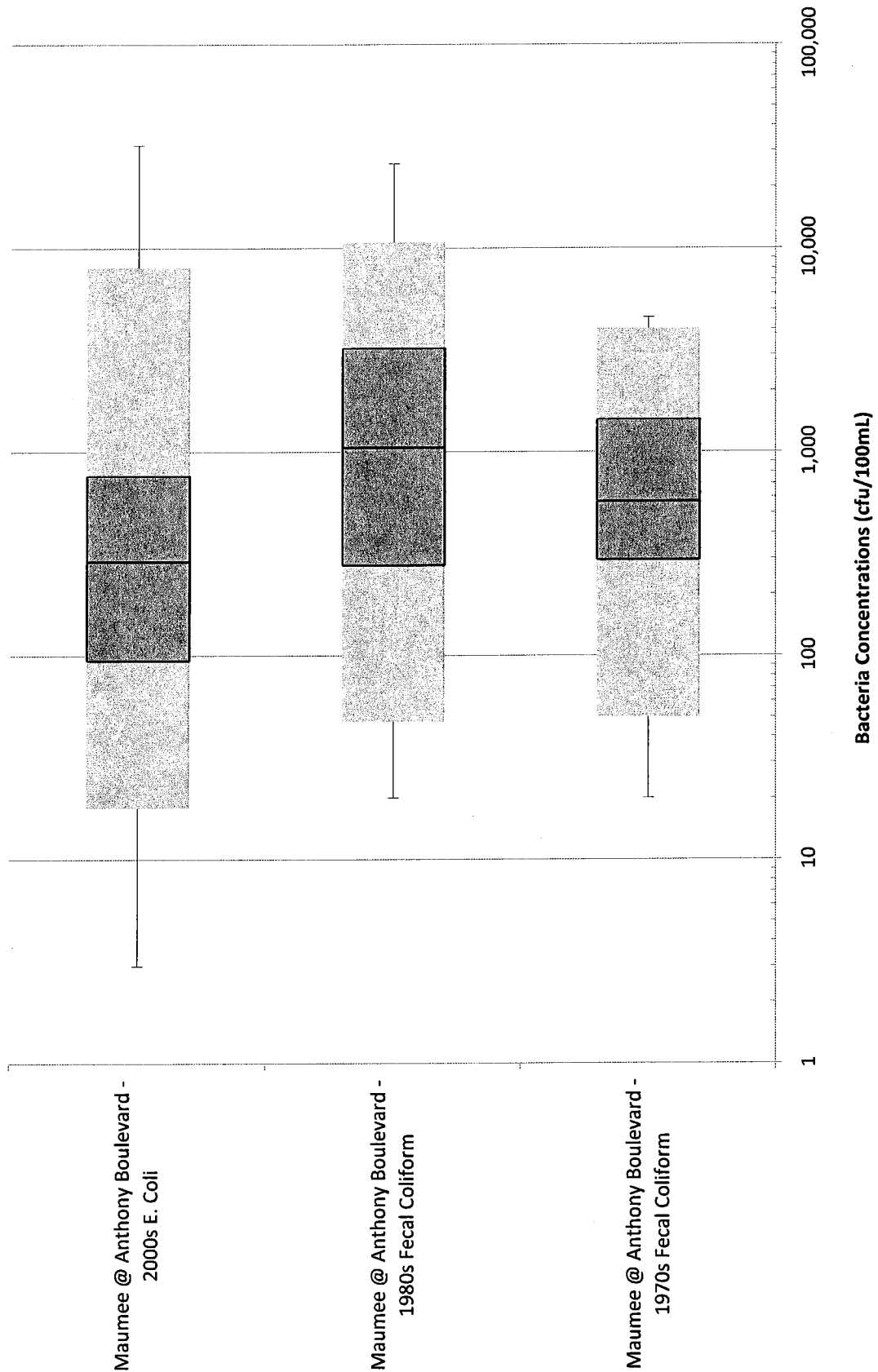


Figure 3.1-4
Variability of Historical Bacterial Data
Maumee River at Landin Road, Fort Wayne, Indiana

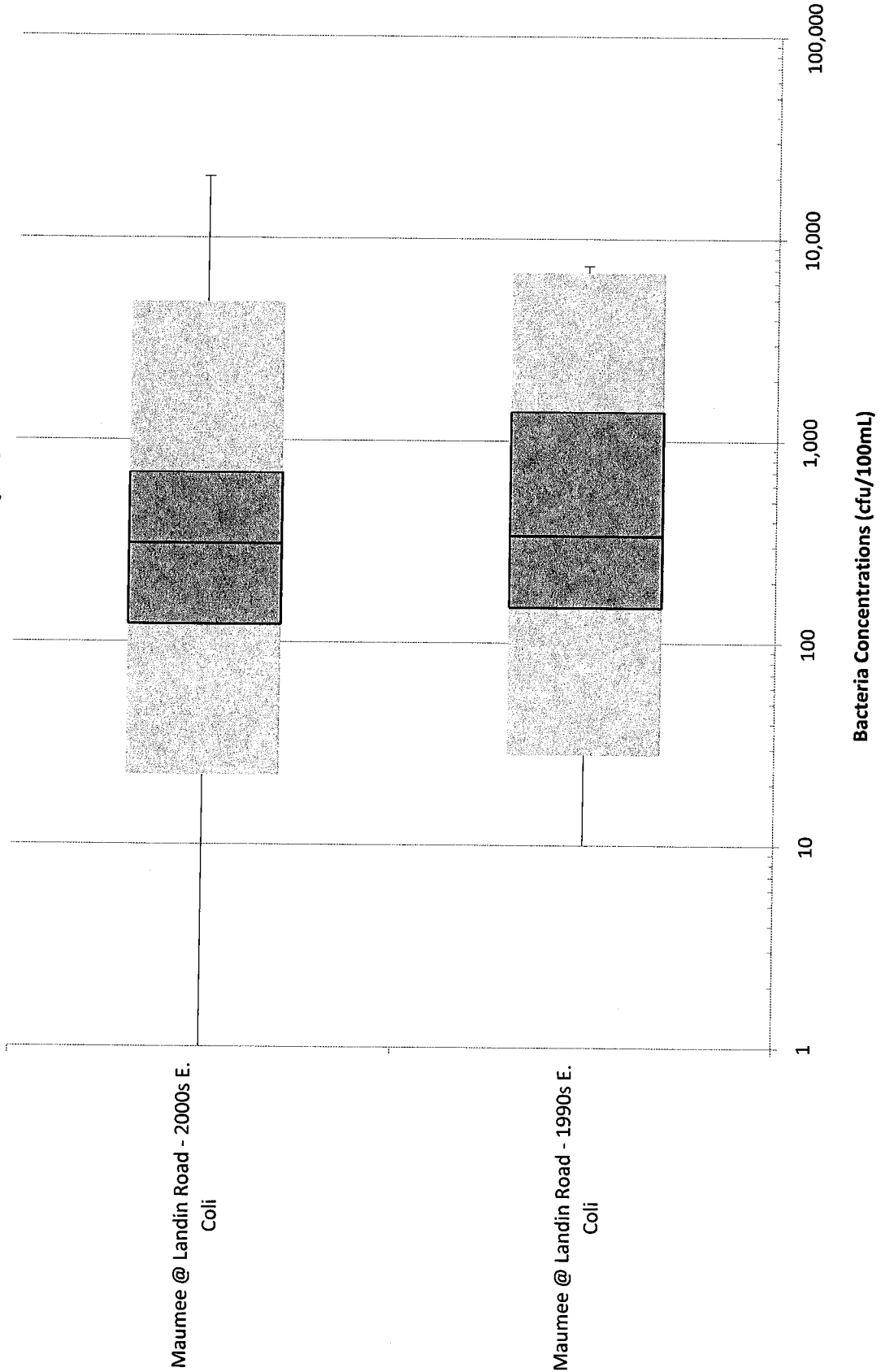
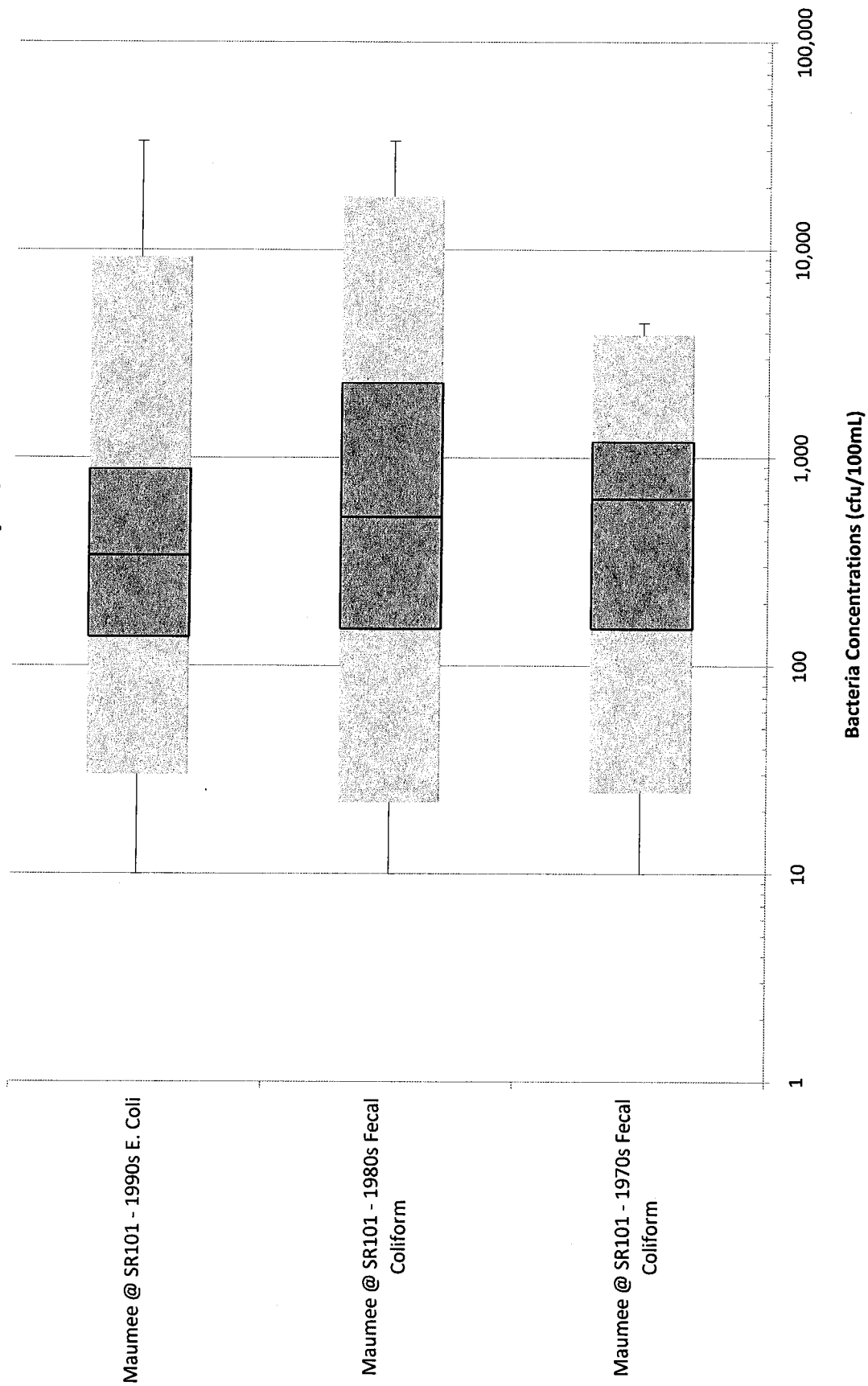


Figure 3.1-5
Variability of Historical Bacterial Data
Maumee River at SR101, Fort Wayne, Indiana



The conclusions drawn from the review of fixed station monitoring data are consistent with what would be expected from the facts relating to the City's combined sewer system. Historical records indicate that the combined sewer system dates to the early part of the 20th century. The service area of the combined sewer system – the central portion of the City – has been built out since long before the 1970s and the basic configuration, sizing and extent of the combined sewer system has been unchanged since well before the 1970s as well. With a stable residential customer base and a stable sewer infrastructure, it would be expected that the frequency and volume of CSO discharges would be consistent over time, taking into account the various factors discussed above which create short term variations. From this, it is reasonable to conclude that the average nature and extent of the impairment of bacteriological water quality would remain rather invariant over time.

Conclusion. From the foregoing information, it can be readily concluded that the existing recreational use of the City's CSO-impacted waterways associated with wet weather conditions can be summarized as: full-body contact recreational activities have been almost non-existent on the CSO-impacted waterways, especially during wet weather conditions; however, to the extent any full-body contact recreation has occurred in these waterways, it has occurred in waters whose quality characteristically is impaired for recreational use under wet weather conditions, with fecal coliform or, more recently, *E. coli* levels substantially exceeding bacteriological criteria for full-body contact recreation. Given the manner in which Indiana NPDES regulations apply the bacteriological criteria for recreational use directly as end-of-pipe limits so that no mixing zone is allowed,¹⁹ essentially every untreated CSO discharge will result in exceedances of the recreationally-based water quality criteria for *E. coli*. The areal extent and duration of the *E. coli* exceedance resulting from a CSO discharge event will vary with a number of factors, including the severity of a specific storm event, the near-term history of precipitation activity preceding that event, the typical volume/flow rate of discharge from a particular CSO for such conditions, and the receiving stream flow corresponding to such conditions. While recognizing this variability, the description of the CSO-impacted waterways provided above in Section 1.1 provides a reasonable worst-case description of the extent of substandard bacterial quality in these waters during wet weather conditions of a typical year.

3.2 Revision of the Recreational Use Designation for the City's CSO-impacted Waterways Will Not Remove Existing Uses

As previously referenced, federal water quality regulations do not allow the revision of a designated use through the UAA process to the extent that the revision would remove an existing use.²⁰

The *IDEM Existing Use Guidance* provides that, for a CSO community in which the existing use of a CSO-impacted waterbody during wet weather is determined to be certain recreational activities that have occurred under impacted, or substandard, water quality conditions, the reclassification of the waterbody to the CSO wet weather limited use subcategory would not be

¹⁹ 327 IAC 5-2-11.4(d)(2).

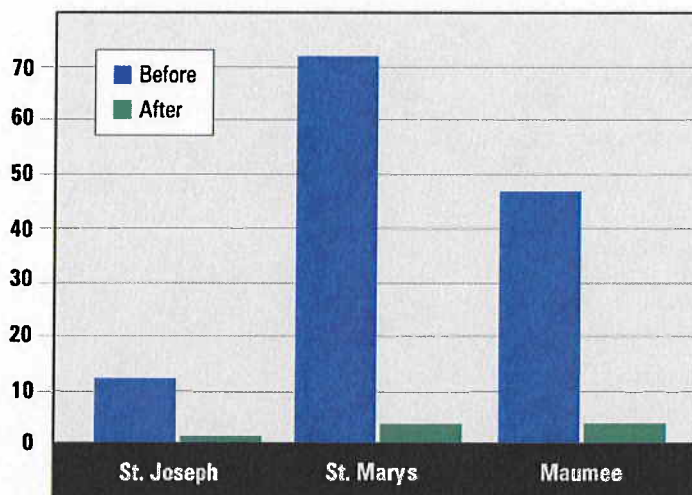
²⁰ 40 CFR 131.10(h)(1).

expected to remove the existing use. This conclusion derives from the point that the water quality of the impacted waterbodies during the periods in which the CSO wet weather limited use subcategory would apply is that which results from full implementation of the community's LTCP. The *Guidance's* conclusion is pertinent to Fort Wayne's CSO-impacted Waterways since the existing recreational use of each of these waterbodies has been identified as limited recreational activities occurring under impaired bacteriological water quality.

That the conclusion indicated by the Guidance is valid in Fort Wayne's case is evident from the information provided at the beginning of this Section describing the water quality benefits of implementation of the City's LTCP. For the 19 CSO regulators with highest activation rates, full implementation of the LTCP will reduce the number of overflow events for which currently applicable water quality criteria for recreational use would not be projected to be met in the "typical year" from a range of 20 to 71 annual events to a maximum of one annual overflow event per typical year for the 6 CSOs discharging to the St. Joseph River and a maximum of 4 annual events with respect to CSOs discharging to the other impacted waterways.²¹ The reduction in overflow frequency for each of the three major CSO-impacted waterways to be realized from LTCP implementation is graphically shown in Figure 3.2-1 below.

Figure 3.2-1

Annual Overflow Frequency in a Typical Year



²¹ Determining whether an actual CSO event that occurs after implementation of the LTCP would be expected, consistent with the installed CSO controls, will not be a simple matter. It is problematic to attempt to evaluate individual CSO events in isolation; events must be considered within the context of the typical year to determine whether the event would be among the predicted few annual overflow events. As explained in the Post-Construction Monitoring Plan (Section 4.6.4.1) for the LTCP, the City has developed a model-based method to assess the performance of their control program following implementation of the LTCP. Under this assessment approach, the City will use its hydraulic sewer system model to run a continuous simulation for a representative five-year period agreed to with IDEM and U.S. EPA to determine whether the City has achieved the Performance Criteria for the LTCP. This analytical approach will provide a basis for determining the types of wet-weather conditions that are expected to cause a CSO event after LTCP implementation.

Clearly, the existing use represented by the impacts of 20 to 71 annual overflow events will not be removed or restricted by a reduction to 4 annual overflow events (or even one) under similar precipitation conditions. Much to the contrary, the number of annual hours in which the CSO discharges produce substandard bacterial quality under typical year conditions will be markedly reduced through performance of the LTCP. Model projections indicate that the LTCP improvements will reduce hours of CSO discharges from approximately 500 hours per typical year under existing CSS conditions to 30 hours per year (and only 6 hours per year on the St. Joseph River) after LTCP implementation (a reduction in annual CSO discharge hours of 94%). Thus, rather clearly, existing uses of the City's CSO-impacted waterways will be improved upon, rather than removed, concurrently with application of the CSO wet weather limited use subcategory.

In summary, the existing recreational uses of Fort Wayne's CSO-impacted Waterways during wet weather conditions that produce CSO discharges are seen to be limited recreational activities occurring in substandard water quality. Moreover, these existing uses will not be removed or adversely affected by the proposed revision of the designated use by which the CSO wet weather limited use subcategory would be applied during four annual periods of wet weather impact and substandard *E. coli* quality.

Consequently, the existing uses of the City's impacted waterways do not pose an obstacle to consideration of this UAA.

4 Attaining the Current Recreational Designated Use Is Not Feasible During Wet Weather Conditions

This section marshals and explains the documentation why attainment of the current designated use of full-body contact recreation is not feasible in the City's CSO-impacted waters during certain wet weather conditions. More specifically, this designated use cannot be feasibly attained during those wet weather conditions which exceed the capability of the additional CSO control measures that can be installed by the City without causing substantial and widespread economic and social impact. As a consequence, relief from the current designated use and the accompanying *E. coli* water quality criteria is warranted during such wet weather conditions. The City proposes, as a result, that the CSO wet weather limited use subcategory provided under Indiana law be approved under federal and state law for application to the City's CSO-impacted waters as the highest attainable use during such circumstances.²²

4.1 Reasons for Infeasibility of Attainment of Full-body Contact Recreation During Specified Wet Weather Conditions

Revision of the recreational use for the City's CSO-impacted waters during the referenced wet weather conditions and application of the CSO wet weather limited use subcategory is supported by the following, sixth factor provided in 40 CFR Sec. 131.10(g):

²² However, even if the CSO wet weather limited use subcategory were not available as a possible designated use refinement, the current designated recreational use can and should be appropriately removed during the wet weather conditions referenced above and an *ad hoc* alternative use established for those conditions under 40 CFR 131.10(g).

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

The applicability of this factor is discussed in more detail below.

4.2 Naturally Occurring Pollutant Concentrations

Before proceeding to an evaluation of the substantial and widespread economic and social impact factor, brief comments concerning the naturally-occurring factor may be in order. In is difficult to question that naturally-occurring *E. coli* contributes to exceedances of the bacterial criteria set by Indiana law for protection of full-body recreational use in the City's CSO-impacted waters during wet weather conditions. Mammalian and avian wildlife exist in the vicinity of Fort Wayne and, as most are aware, venture increasingly into suburban and even urban areas. *E. coli* from fecal droppings of wildlife will be mobilized by storm runoff and will impact area waterways, just as do those of domestic pets and livestock.

The extensive effects of anthropogenic impacts in the Fort Wayne vicinity make it increasingly difficult to distinguish the effects of wildlife from those of animals associated with human activity with respect to *E. coli* inputs to area waterways. While there may be sophisticated scientific investigative methods available to identify and distinguish *E. coli* of wildlife origin from those of domesticated animals, such methods would be beyond the capability of the current effort. Moreover, the increasingly overlapping ranges of habitation of wildlife and domesticated animals pose an additional obstacle to attempts to assess separately the contributions of each to the *E. coli* loading to area waterways during wet weather events.

When these points are considered in tandem with informal guidance from U.S. EPA, Region 5 indicating that the naturally occurring pollutant factor must be assessed under an analytical approach in which all anthropogenic impacts are figuratively stripped away, the ability to apply this factor is substantially diminished. While the City considers the impacts of naturally occurring *E. coli* to be a relevant and potentially significant aspect of the attainability of the recreationally-based water quality criteria in the relevant waterways, the practical obstacles to an evaluation of this factor lead the City to abandon it as a basis of this UAA.

4.3 Substantial and Widespread Economic and Social Impact

The sixth factor described by 40 CFR 131.10(g) as a potential basis for the infeasibility of attaining a designated use in a particular waterbody is that:

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

The City of Fort Wayne posits that, when the application of Indiana's designated use for full-body contact recreation to the City's CSO impacted waters is evaluated under this factor, a conclusion clearly emerges that it is not feasible to attain this designated use under all wet weather conditions which may occur. Furthermore, the analysis demonstrates that the extent of

CSO controls specified in the City's LTCP defines the limit of feasible water quality improvements under this factor (i.e., the highest attainable use). As a result, the City proposes that a revision of this full-body contact recreational designated use is warranted to relieve the City from the obligation to attain the designated use and associated bacterial standards in these waters under those wet weather conditions where attainment is infeasible. The following subsections explain the rationale for this position.

Before moving to a consideration of the specifics of the City's position, a preliminary observation is made concerning the scope of the sixth factor of 40 CFR 131.10(g). The reference to "controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act" has been consistently interpreted to mean controls more stringent than the technology-based requirements of the CWA. Any additional controls beyond the minimum technology-based requirements that would be needed to meet water quality-based requirements under the CWA are subject to evaluation under the sixth factor. The EPA's CSO Control Policy and other guidance identifies the Nine Minimum Controls as the minimum technology-based requirements of the CWA with respect to CSOs.²³

4.3.1 Substantial Economic and Social Impact

4.3.1.1 Background

The first step in determining whether a revision of Indiana's water quality standards relating to wet weather recreation on the City's CSO-impacted waters is warranted under the sixth factor of 40 CFR 131.10(g) is to assess whether implementation of the CSO control measures needed to comply with the existing water quality standards under such conditions would result in a substantial economic and social impact on the City Wastewater Utility's ratepayers. Fort Wayne's demonstration of this threshold fact is presented in section 4.3.1.2.1, below. Before setting out that analysis, however, a brief review of relevant EPA guidance on this topic is provided.

Evaluation of potential substantial economic and social impacts associated with the City's implementation of CSO control measures is informed generally by EPA's guidance for applying the sixth factor of 40 CFR 131.10(g) – the March 1995 Interim Economic Guidance for Water Quality Standards ("*Interim Economic Guidance*").²⁴ Although this guidance was developed for a much broader purpose of guiding determinations on proposed water quality standard revisions of all types, including standards for aquatic life habitat as well as those for water-based recreation, and for water quality impacts by industrial discharges as well as municipal discharges, the EPA continues to rely upon this document for general guidance in the more narrow context of prospective water quality standard revisions relating to municipal CSO impacts.²⁵ Much of the discussion of this section will follow the general framework of the *Interim Economic Guidance*.

²³ See *Coordinating CSO LTCPs and WQS Reviews, supra*, p. 9, Sec. II.1.B.

²⁴ EPA-823-B-95-002, U.S.EPA (March 1995). The basis of regulatory relief is described on Page 3 of this guidance that attaining a designated use would result in substantial and widespread economic and social impacts.

²⁵ See *Coordinating CSO LTCPs and WQS Reviews, supra*, App. IV, p. A-13.

EPA has also developed guidance for municipalities in preparing financial capability analyses for use in scheduling the implementation of LTCPs. This document, which is entitled *Combined Sewer Overflows - Guidance for Financial Capability Assessment and Schedule Development*,²⁶ referred to hereinafter as the EPA's "*Financial Capability Guidance*." Comparison of EPA's *Interim Economic Guidance* with the agency's *Financial Capability Guidance* shows that the *Financial Capability Guidance* is essentially equivalent to that portion of the *Interim Economic Guidance* addressing whether attainment of a designated use would cause a "substantial economic and social impact". For this reason, the substantial economic and social impact analysis provided under this Draft UAA will rely in large part on the City's Financial Capability Analysis which has been prepared as a part of its LTCP and is generally consistent with EPA's *Financial Capability Guidance*. Section 3.5 of the City's LTCP contains the financial capability analysis ("FCA") for the LTCP.²⁷

4.3.1.2 *Municipal Preliminary Screener*

A key indicator in the substantial economic impact analysis, also commonly referred to as the affordability analysis, is the ratio, shown as a percentage, of cost per household of the selected LTCP controls and other wastewater collection and treatment activities to median household income. This indicator is referred to in the *Interim Economic Guidance* as the "Municipal Preliminary Screener" ("MPS").²⁸

The MPS is used principally, according to the *Interim Economic Guidance*, to quickly identify those municipal projects that are clearly not expected to cause a substantial economic impact. Under the *Interim Economic Guidance*, an MPS value of 1.0 % or less is considered to represent a low or little economic impact and to pose virtually no likelihood of presenting a substantial economic impact. For such projects the analysis is terminated; hence the indicator is referred to as a "screening" indicator since it is used to identify and screen out, or eliminate, projects with low economic impact.

4.3.1.2.1 *Municipal Preliminary Screener Value for CSO Compliance with Existing Water Quality Standards*

A threshold question under the analysis of the sixth UAA factor is whether compliance by the City's CSO discharges with existing water quality standards for recreational use is feasible, or affordable. Under the demonstration approach taken by the City, full compliance with existing WQS would be achieved only by a level of control that allowed no CSO discharges to occur without adequate treatment or other control for even the most severe storms. This level of control could be approximated, although its costs are underestimated, by a level of control of zero discharges without adequate treatment in the "typical year". A preliminary estimate of the

²⁶ U.S. EPA (February 1997).

²⁷ The City's financial capability – or affordability – analysis was prepared in collaboration with the Community Research Institute (CRI) at Indiana University – Purdue University, Fort Wayne, Indiana. The FCA is attached to this UAA as Appendix L.

²⁸ In the *Financial Capability Guidance*, this factor is referred to as the "Residential Indicator".

capital costs of this extreme level of control has been developed. Stated in 2005 dollars, the capital costs would be \$592.4 million.²⁹

Table 4.3-1 provides a breakdown of the capital costs of the major components of the CSO control measures projected for the full control scenario as discussed above.³⁰

Table 4.3-1

**Capital Costs for CSO Control Measures
 For Complete Capture and Control of CSOs**

Program Element	Full Control Costs (\$ millions, 2005)
Combined Sewer Capacity (partial sewer separation)	\$102.7
Interceptor Sewers	213.1
Satellite Storage/Treatment	30.3
Combined Sewer Overflow Pond Storage Improvements	170.5
Treatment Plant Improvements	75.8
<u>Total Cost</u>	<u>592.4</u>

(All cost estimates based on 2005 dollar value and Typical Year conditions)

When the capital cost estimate of \$592.4 million for the zero overflow level of control is appropriately amortized and its debt service costs combined with estimates of additional O&M costs for the CSO controls and added to existing wastewater collection and treatment utility costs as well as the amortized capital costs and operating costs for other wastewater and collection system projects that are expected over the next 18 – 20 years, the total costs of wastewater collection and treatment can be determined.

Considering capital costs alone, the total capital needed by the City of Fort Wayne over the life of the LTCP is estimated at nearly \$1.05 billion (2005 dollars) to achieve full control and fulfill

²⁹ Another approach for achieving full compliance by CSOs with existing WQS would be to completely separate the existing combined sewer system into separate sanitary and storm sewers. The City has developed preliminary capital costs for a complete separation which, when translated to 2005 dollars, total \$544 million. This capital cost projection underestimates, though, the total costs of water quality compliance since it does not take into account the fact that a sewer separation would greatly increase the area of the City which contributes storm water to the separate storm sewer system and would consequently be expected to cause a substantial increase in the costs of the City's stormwater management program over current projections or, alternatively, a substantial increase in pollution, including bacterial pollution, conveyed from the separate stormwater sewer system to the area waterways currently impacted by CSOs. For these reasons, the analysis for water quality compliance will focus on the level of control representing zero discharges from CSOs in the typical year.

³⁰ These capital cost projections, which were derived as part of the overall feasibility analysis of the City's LTCP, are considered preliminary cost estimates that would correspond to Class 4 of the Association for the Advancement of Cost Engineering International (AACE). The most accurate estimates in this Class are expected to range from approximately -15% to +20%, while less accurate estimates in this Class could vary from approximately -30% to +50%. See Appendix M for a more complete description of the AACE Classification System for Cost Estimating.

