EXECUTIVE SUMMARY

ES.1. Background and Planning Approach

The City of Toledo is located in northwest Ohio, at the mouth of the Maumee River and the western shore of Lake Erie. A city of over 300,000 people, Toledo is partially served by a combined sewer system. This report constitutes the City's Long Term Control Plan (LTCP) for controlling the remaining combined sewer overflow (CSO) discharges.

On December 16, 2002, Judge James G. Carr, U.S. District Court entered a Consent Decree between USEPA, Ohio EPA and the City of Toledo that had been under negotiation for an extended period. The Combined Sewer Overflow (CSO) LTCP is a requirement of the Consent Decree. The basis for the LTCP includes the Consent Decree, the CSO Control Policy (1994) and guidance documents, and the Clean Water Act and its implementing regulations and the NPDES Permit. The Consent Decree identifies the requirement to develop a Long Term CSO Control Plan which would be implemented by August 31, 2016.

The Consent Decree defines certain minimum requirements for the development of the LTCP, which are consistent with the requirements of the CSO Control Policy. Specifically, the LTCP should do the following:

- Perform cost vs. effectiveness and cost vs. benefit analyses for a range of alternatives for eliminating or reducing and treating CSOs. Alternatives to be considered include: no action, complete sewer separation, separation of specific portions of the combined system, various sizes of storage basins or tunnels at locations throughout the collection system, construction of treatment facilities for providing primary treatment or advanced primary treatment to CSO discharges, construction of disinfection/dechlorination facilities, construction of facilities to remove floatables, construction of relief sewers, relocation of CSOs, industrial flow controls, or combinations of the above.

- Evaluate the above for a range of sizes that will reduce the number of untreated discharges down to a range of events per outfall: such as 0, 1-3, 4-7, 8-12
- Determine project costs for each alternative including capital, operation and maintenance and overall life cycle costs
- Evaluation of the water quality impacts for each alternative
- Evaluation of the WWTP flows relative to each alternative
- Development of knee of the curve analysis for the range of options
- Evaluation of financial capacity to fund the proposed improvements
- Development of a prioritized implementation plan

ES.2. Existing Conditions

Existing conditions in the City of Toledo include both condition of the waterways and of the wastewater collection and treatment system.

ES.2.1. Collection System and WWTP Description

The City of Toledo's collection system serves approximately 340,000 people in 120 square miles of tributary area in the City of Toledo, as well as all or portions of Sylvania Township, Ottawa Hills, Springfield Township, Washington Township, and Wood County. The tributary area includes multiple land use types, with residential and commercial being predominate on a land area basis. All sewage flow generated in the collection system is tributary to the Bay View WWTP. There are three primary interceptor systems tributary to the WWTP: Ten Mile Creek/Ottawa River, Westside, and Eastside. Generally, the collection system is comprised of combined sewer systems in the downtown area, and separate sewer systems in the outlying portions of the service area.

There are a total of 33 permitted CSO discharge locations in the City of Toledo. Twenty-nine are CSO regulator discharge points, two are CSO tunnel overflow locations, one is a combined CSO tunnel/regulator overflow and one is an interceptor relief point. The permitted outfalls identified in the City's NPDES permit are summarized in Table ES.1. In most of the combined areas, the sanitary and stormwater drainage areas differ because within combined areas there are portions that have been partially separated.

Table ES.1: NPDES Permitted CSO Outfalls

Outfall Number	Name	Receiving Water	Type of Outfall	Sanitary Area (ac)	Storm Area (ac)
4	Paine	East Side Maumee River	CSO Overflow	377	302
5	Dearborn	East Side Maumee River	CSO Overflow	597	474
6	Main	East Side Maumee River	CSO Overflow	153	153
7	Nevada	East Side Maumee River	CSO Overflow	581	581
8	Fassett	East Side Maumee River	CSO Overflow	95	95
9	Oakdale	East Side Maumee River	CSO Overflow	614	563
11	Eastside PS Overflow	East Side Maumee River	Interceptor Relief	NA[3]	NA[3]
23	Columbus	West Side Maumee River	CSO Overflow	737	125
24	Galena	West Side Maumee River	CSO Overflow	39	44
25	Ash	West Side Maumee River	CSO Overflow	82	106
26	Magnolia	West Side Maumee River	CSO Overflow	161	125
27	Locust	West Side Maumee River	CSO Overflow	164	146
28	Jackson	West Side Maumee River	CSO Overflow	423	425
29	Adams	West Side Maumee River	CSO Overflow	256	256
30	Jefferson[1]	West Side Maumee River	CSO Overflow	420	421
31	Bostwick[1]	West Side Maumee River	CSO Overflow		
32	Williams	West Side Maumee River	CSO Overflow	80	0[2]
33	Maumee	West Side Maumee River	CSO Overflow	388	376
42	Erie	Swan Creek	CSO Overflow	50	36
43	Hamilton/Swan Creek North Tunnel	Swan Creek	CSO/Tunnel Overflow	345	315
45	Ewing	Swan Creek	CSO Overflow	323	302
46	Hawley	Swan Creek	CSO Overflow	535	448
47	Junction	Swan Creek	CSO Overflow	843	855
48	Hillside	Swan Creek	CSO Overflow	209	116
50	Highland	Swan Creek	CSO Overflow	279	153
61	Lagrange	Ottawa River	CSO Overflow	548	128
62	Windermere	Ottawa River	CSO Overflow	915	890
63	Devilbiss	Ottawa River	CSO Overflow	258	77
64	Lockwood	Ottawa River	CSO Overflow	735	655
65	Ayers	Ottawa River	CSO Overflow	301	301
67	Monroe	Ottawa River	CSO Overflow	772	182
68	Downtown Tunnel	West Side Maumee River	Tunnel Overflow	NA[3]	NA[3]
69	Swan Creek South Tunnel	Swan Creek	Tunnel Overflow	NA[3]	NA[3]
Totals				11280	8652

Note 1: Tributary area for Jefferson and Bostwick regulators are interconnected
Note 2: Private sources from commercial properties remain tributary to Williams
Note 3: Area is identified with the individual CSO regulator.

The frequency, duration, and volume of overflow events reported by the hydraulic model for the five-year simulation period are summarized in Table ES.2. The results are tabulated for the entire simulation period including both recreation season and non-recreation season. In general, the annual frequency, volume, and duration of CSOs increase with annual rainfall volume.

Table ES.2: Summary of CSO Discharge Events for the City of Toledo

Year	Total Rainfall[1] (in)	Frequency[2]	Duration[2] (hr)	Overflow Volume[2] (MG)
1997	36.1	35	1,285	892
1998	32.1	28	1,934	868
1999	27.3	35	677	258
2000	37.1	39	1,120	704
2001	33.3	30	1,492	400
5-Year Avg	33.1	34	1,302	624

1 Toledo Express Airport rainfall data
2 Results are based on 2003 collection system conditions and operations; an event is defined as an occurrence of overflow in the City separated by at least 48 hours of no discharge

Frequency, volume and duration of discharge are shown pictorially in Figure ES.1 through Figure ES.3.

Each receiving waterway was considered as a distinct entity independent of the other watersheds. Table ES.3 provides average annual CSO discharge information for each of the waterways. The Swan Creek combined sewer area is controlled by tunnel systems. This is evident in the decreased frequency, duration, and volume of CSO events as compared to the Maumee River and Ottawa River.

Table ES.3: Summary of CSO Discharge Events per Watershed

Watershed	Frequency[1] (per year)	Duration[1] (hr/yr)	Overflow Volume[1] (MG/yr)
Maumee River	33	770	374
Ottawa River	26	405	164
Swan Creek	11	126	86
Totals, City-wide	33	770	624

1 Based on results averaged during the 5-year simulation period under 2003 collection system conditions and operations

Figure ES.1: Simulated Annual Average CSO Frequency

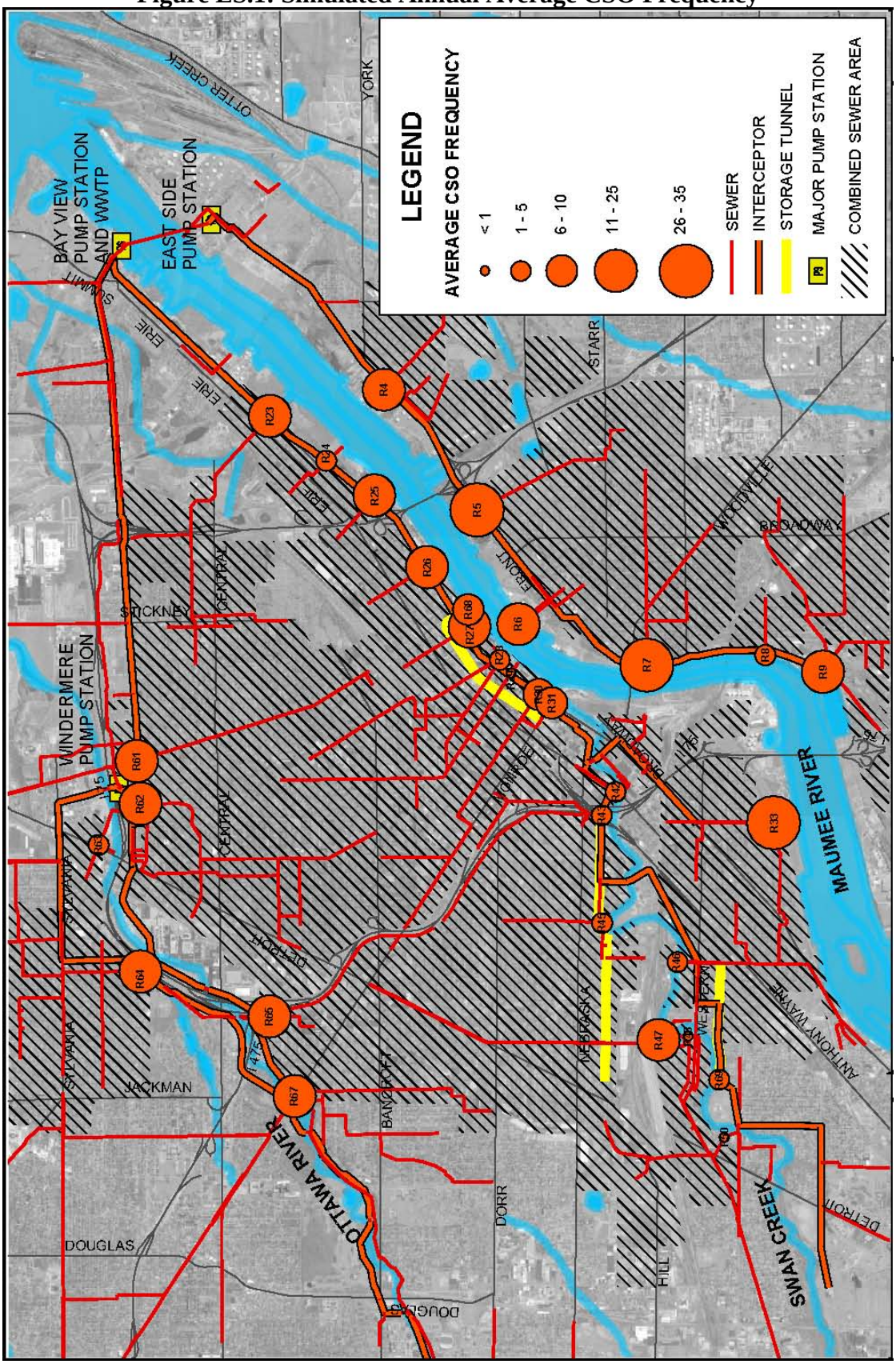


Figure ES.2: Simulated Annual Average CSO Duration

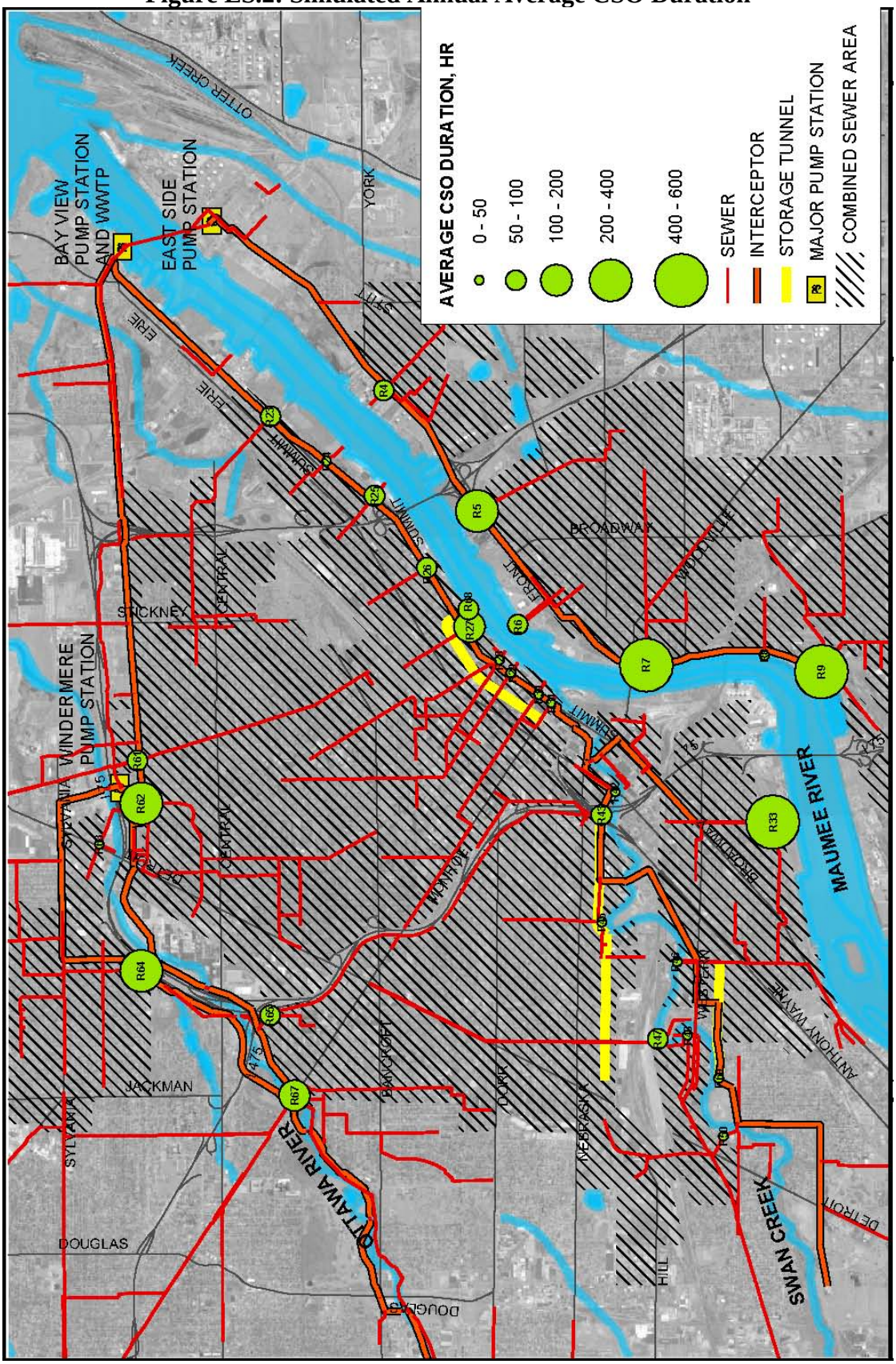
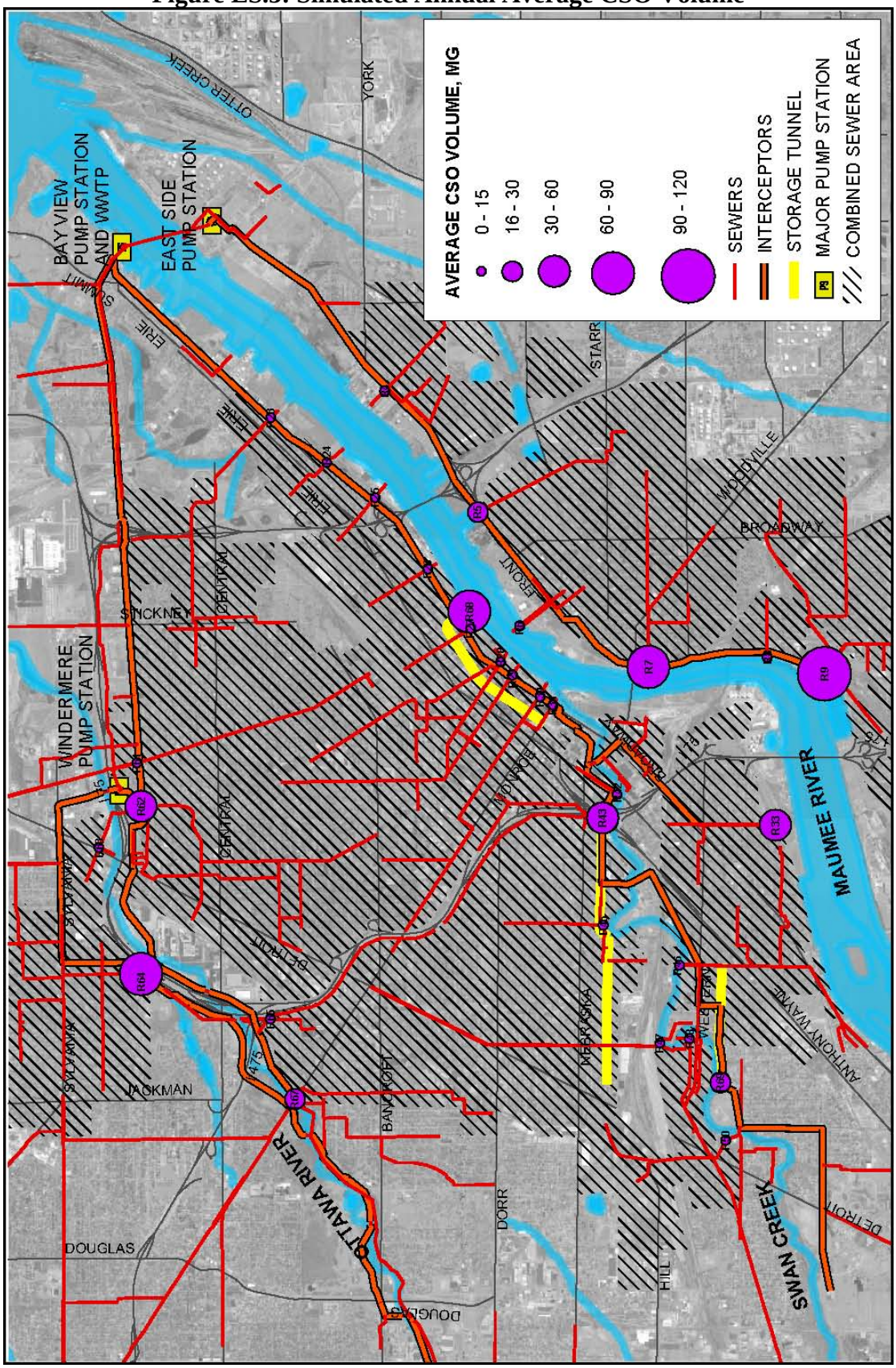


Figure ES.3: Simulated Annual Average CSO Volume



The ability of the collection system to capture wet weather flow was evaluated. Currently, the collection system captures and treats approximately 79 percent of the wet weather volume generated in the combined sewer area, as shown in Table ES.4.

Table ES.4: Summary of Average Combined Sewer Volumes Generated per Watershed

Watershed	Wet Weather Volume[1] (MG/yr)	Overflow Volume[1] (MG/yr)	Treated Volume[1] (MG/yr)	Percent of Wet Weather Volume to Treatment
Maumee River	1,321	373.7	948	71.7%
Ottawa River	657	163.5	494	75.1%
Swan Creek	938	86.3	852	90.8%
Totals	2,916	623.5	2294	78.7%

1 Based on results averaged during the 5-year simulation period under 2003 collection system conditions and operations

The City of Toledo constructed three CSO Control Tunnels between 1988 and 1993. The tunnels include the Downtown Tunnel (controls a number of Maumee River overflows in the Downtown area), the Swan Creek North Tunnel and the Swan Creek South Tunnel (both on Swan Creek). These tunnels were constructed to provide storage of CSO discharge from the first flush of combined runoff. The tributary stormwater area to the tunnels is approximately 3,500 acres, representing 40% of the total combined area in the City. The tunnels provide 19.6 million gallons of storage. Basic data regarding the tunnels as constructed is identified in Table ES.5.

Table ES.5: CSO Control Facilities

CSO Control Phase	Tunnel Location	Receiving Stream	Tunnel Length (ft)	Storage Volume		Tributary Reg.	Tributary Area (Acres)
				(MG)	(in)[1]		
1[3] and 2	Downtown	Maumee River	5,374	5.75	0.17	27, 28, 29, 30, 31	1,248
3 and 4	Swan Creek North (Downstream)	Swan Creek	4,110	4.40	0.24	42, 43, 45, 47	1,508
5	Swan Creek North (Upstream)	Swan Creek	4,880	5.23	NA[2]	NA[2]	NA[2]
6 and 7	Swan Creek South	Swan Creek	3,925	4.20	0.21	46, 48, 50	717
		Totals	18,289	19.6	0.18		3,473

1 Volume expressed as equivalent inches over the stormwater service area
2 Interconnected with CSO Phase 3 and 4; volume over drainage area calculated for CSO Phase 3, 4 and 5
3 Refers to the Tunnel construction contract completed in the early 1990s and is not related to Phase 1 (Consent Decree required WWTP improvements) of the alternatives development process.

The tunnels were designed based on a level of control agreed upon by the OEPA and the City of Toledo using a cost/benefit analysis approach. The tunnels were constructed before publication of the 1994 EPA CSO Control Policy, which resulted in design criteria with a level of control that is not directly comparable to the 1994 EPA Policy. The basis of design objective for each tunnel was to capture runoff associated with smaller storm events, reduce the frequency of overflow events, reduce the discharge of floatables, and to reduce the pollutant mass loading to receiving water bodies.

ES.2.2. Waterways Impacted by CSO Discharges

There are three waterways in the City of Toledo that receive discharge from CSOs. These are the Ottawa River (also known as Ten Mile Creek in portions of the headwaters), Maumee River, and Swan Creek. The Ottawa River discharges into Maumee Bay and Lake Erie, and Swan Creek discharges into the Maumee River which ultimately discharges into Maumee Bay and Lake Erie. Several other creeks and streams flow through the City of Toledo, but are not impacted by CSOs.

The Ottawa River is located in the northern portion of the City. At its downstream end it is used for recreational boating and associated activities. Further upstream is an area adjacent to former landfills, where bottom sediments are contaminated. Yet further upstream is the area of CSO discharges. The physical river location has been shifted when the interstate system was constructed. Areas upstream of CSO discharges are more natural in configuration, but are impacted by various pollution sources.

Water quality in the Ottawa River is impacted by high bacteria levels and occasional low dissolved oxygen levels. Bacteria standards are exceeded both upstream of the City's CSOs and in the CSO reach. Bacteria standards are much better in the downstream recreational areas of the river, where mixing with Lake Erie waters occurs.

The Maumee River is a major waterway, one of the largest rivers feeding the Great Lakes. The tributary area for this river extends west to Fort Wayne, Indiana. The portion of the Maumee River in Toledo has been physically modified to accommodate the major

shipping activity that occurs at the Port of Toledo. Public uses of the waterway in this vicinity include fishing, crew and passive exposure to the waterway.

The Maumee River has water quality limitations related to high nutrient levels and high amounts of sediment. The majority of these impacts are directly related to agricultural land uses upstream of the City of Toledo. The waterway generally meets existing bacteria water quality standards, and dissolved oxygen levels are generally (but not always) above standards.

Swan Creek is a small urban stream with extremely limited public access in areas of CSO discharge. Like the Ottawa River, it has high bacterial levels, which is equally true of areas upstream of CSO discharges as well as downstream of CSO discharges. Dissolved oxygen levels on the Swan Creek are also depleted during warm, low flow periods. The CSO impacts on the waterway have been significantly reduced by the implementation of CSO storage tunnels to contain excess flows.

Table ES.6: Maximum Frequency of Exceedence of Fecal Coliform Criteria, Rolling 30-Day Periods, Typical Recreation Season (% of Periods)

Location	Ottawa River	Maumee River	Swan Creek
Geomean Criterion			
CSO reach or downstream	81%	0%	97%
Overall	90%	0%	92%
Maximum Criterion			
CSO reach or downstream	95%	14%	98%
Overall	99%	14%	100%

Note: There are no bathing beaches on Ottawa River, Maumee River or Swan Creek within or downstream the City of Toledo.

Table ES.7: Time Not Meeting Dissolved Oxygen Standard, Typical Year (Days)

Location	Ottawa River	Maumee River	Swan Creek
CSO reach or downstream	26	5	15
Upstream	26	5	15

ES.3. Bay View WWTP

The Bay View WWTP is located near the mouth of the Maumee River at Lake Erie. The WWTP serves approximately 340,000 treating an average of approximately 70 MGD. The existing preliminary treatment capacity is 263 MGD firm and 305 MGD installed (grit basins plus swirl concentrators). The existing firm secondary treatment capacity is 195 MGD. During periods of high flow, some flow does not receive secondary treatment (secondary bypass). During extreme flow peaks, some flow is bypassed receiving little treatment. Under the terms of the Consent Decree, the WWTP will have additional facilities installed to increase the maximum treatment capacity. Table ES.8 provides a summary of Bay View WWTP process capacities through the plant for current and future conditions, as indicated in the Consent Decree.

Table ES.8: Bay View WWTP Process Capacity

Process Element	Current Firm Capacity (MGD)	Future Firm Capacity(MGD)
Influent Pumping (Bay View, East Side, Windermere, Point Place)	336	408
Grit, Skimming, and Swirls (Preliminary Treatment)	263	358
Primary Treatment	189	189
Wet Weather Treatment (Ballasted Flocculation)	0	Up to 185
Secondary Treatment	195	195
Equalization	0 MG	No less than 60 MG[1]

Source: Bay View WWTP O&M Plan, March 2003
1 – Requirement of the Consent Decree

During facilities planning work for wet weather facilities at the WWTP, the sizing of certain facilities was evaluated. The Consent Decree called for an equalization basin with a capacity of no less than 60 MG to capture and store peak wastewater flows and return the stored wastewater for treatment at the Bay View WWTP. The Consent Decree also required the construction of Final Clarifier #13, with the expectation that construction of this clarifier would be required in order to treat 195 MGD through secondary.

Based on the updated analysis, the City and EPA agreed that the construction of the equalization basin could proceed in phases, with an initial 25 MG phase which is currently under construction and implementation of the remaining 35 MG of equalization to be evaluated in the context of the overall LTCP.

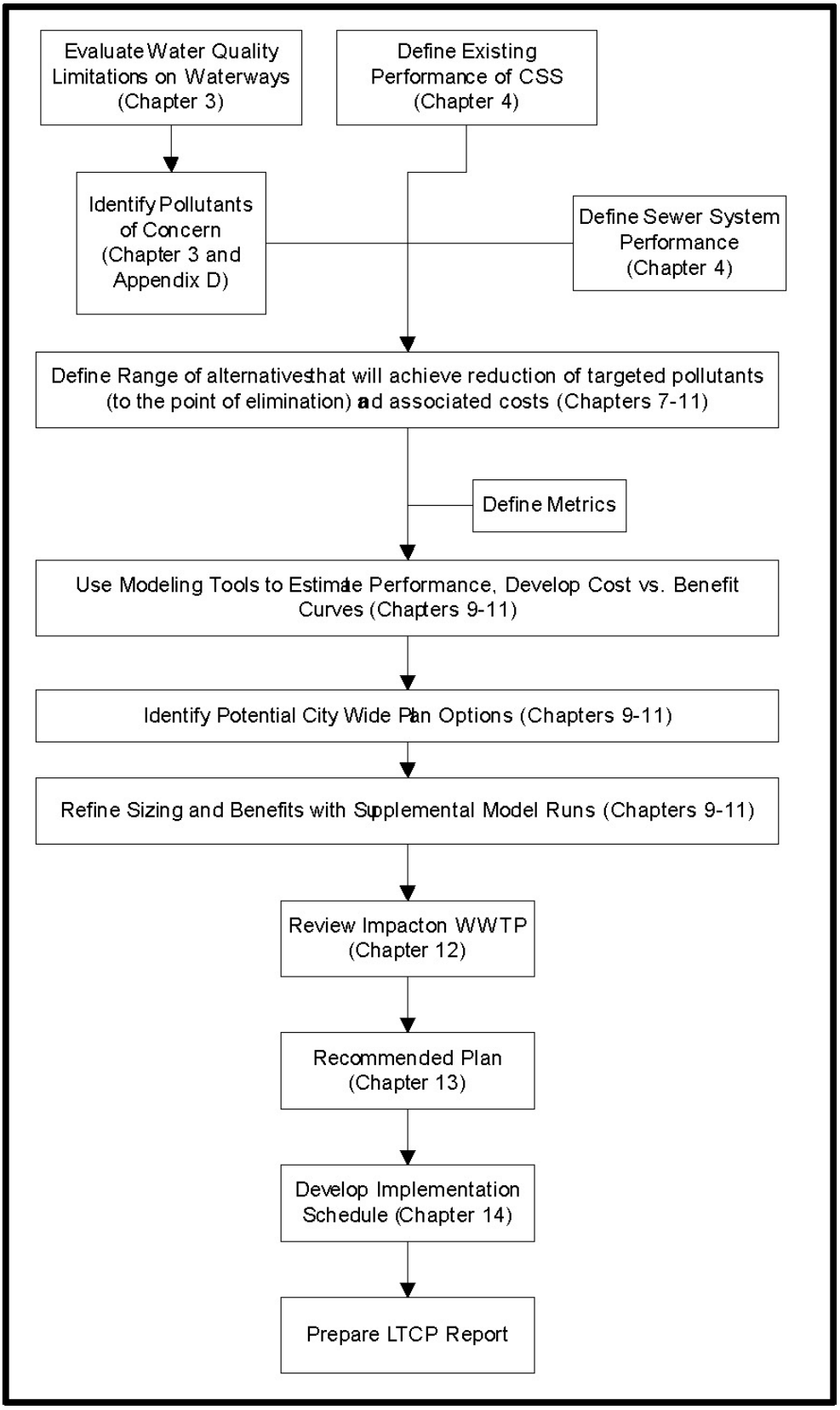
Subsequent to Bay View WWTP facility planning, analyses was performed to determine the maximum equalization storage volume possible without risking washout of the secondary process. Washout would be due to extended periods of high flows with low F/M ratios. The Wet Weather Facility operates by conveying flows to the ballasted flocculation facility prior to storage in the EQ Basin. The ballasted flocculation process significantly reduces the amount of BOD available for the biological secondary process. It was determined that 35 MG of EQ Basin storage was the maximum amount possible without risking washout of the secondary treatment process.

ES.4. CSO Control Alternatives Development

Alternatives were developed from a range of CSO technologies. The technology for CSO control examined a wide range of alternatives including system optimization measures such as in-system storage, flow rerouting, SSES and inflow reduction and hydraulic improvements to the tunnels. Long range alternatives examined storage, treatment, sewer separation and increased flow to treatment. All long range alternatives addressed floatables control.

Alternatives were examined based on site specific characteristics including existing sewer system configuration, land availability, proximity to other outfalls and potential other projects in the area. Figure ES.4 shows the general process used to develop and evaluate alternatives.

Figure ES.4: Schematic for Evaluating CSO Control Alternatives



ES.4.1.Preferred Alternative

The initial development of a level of control was based on meeting all of the following criteria consistent with the Consent Decree and EPA CSO Policy:

- Eliminate water quality standards exceedances that are caused by CSO discharge.
- Control overflow frequency to between 4 – 6 untreated discharges per year
- Implement the level of control that provides the greatest benefit at the least cost.

The alternative that met all of the above criteria was identified as the Preferred Alternative and is summarized in Table ES.9.

Table ES.9: Summary of the Preferred Alternative with WWTP Improvements

Project Location or Type	Description	Amount of New Storage (mg)[1]	Cost ($M)
Ottawa River	Separation, transport and storage projects to reduce overflow frequency to 4 times per year or less	11.6	74.5
East Side Maumee	Separation, transport and storage projects to reduce overflow frequency to 6 times per year or less	7.4	68.1
West Side Maumee	Separation, transport, storage and tunnel optimization projects to reduce overflow frequency to 6 times per year or less	5.7	52.2
Swan Creek	Separation, transport, storage and tunnel optimization projects to reduce overflow frequency to 5 times per year or less	0.8	17.6
	Preferred Alternative Total	**25.5**	**212.4**
WWTP	10 MG of Equalization Storage and Final Clarifier #13	10	21.6
	Preferred Alternative with WWTP Improvements Total	**35.5**	**234**

1 – Includes storage volume associated with basin storage, pipeline storage and conveyance sewers connecting CSO outfalls to a CSO control facility.

ES.4.2.Evaluation of WWTP Improvements vs. Additional CSO Control

An evaluation was performed to compare the potential benefits of the deferred WWTP facilities (additional of equalization storage and additional Final Clarifier #13) with the benefits that could be achieve if those resources were expended in the collection system rather than at the WWTP.

The goal of the LTCP is to provide at least as much pollutant removal and total wet weather flow through secondary treatment as would be achieved through the facilities prescribed in the Consent Decree. To this end, the following comparison was made:

- Option 1: Implement the Preferred Alternative and construct Clarifier #13 and an additional 10 MG of equalization storage at the WWTP
- Option 2: Provide additional storage in the collection system over and above the storage included in the Preferred Alternative and not construct Clarifier #13 and 10 MG of equalization storage at the WWTP.

The analysis determined that Option 1 (the addition of 10 MG of equalization storage and Clarifier #13 at the WWTP) would reduce the annual CBOD and TSS pollutant load by approximately 400 lb/yr and 1,700 lb/yr, respectively. Due to the dilute nature of the wastewater during the periods when these facilities would be in operation, the difficulties in sustaining the biomass during prolonged high flow conditions and the relatively small frequency at which these facilities would be used, the incremental benefit of the WWTP facilities was relatively small. The cost to construct Clarifier #13 and an additional 10MG of equalization basin storage is approximately $22 million. Results are summarized in Table ES.10.

Option 2 includes providing larger storage volumes in the collection system at proposed CSO facilities. CSO storage volumes identified in the Preferred Alternative totals 25.5 (not including 10 MG at the WWTP). Each CSO facility was re-examined to determine if additional volume could be provided to provide a higher level of pollutant removal and CSO control. Storage was added to the Preferred Alternative, bringing the total CSO storage volume up to 32.5 MG. The CBOD and TSS removal associated with increasing the CSO storage volume is approximately 15,200 lb/yr and 29,000 lb/yr, respectively. The additional cost to provide the larger storage volumes and other improvements associated with the Recommended Plan is approximately $43 million. Results are summarized in Table ES.10.

Table ES.10: Comparison of Combined Collection System/ WWTP Benefits

	Option 1 – Preferred Alternative w/ WWTP improvements[2]		**Option 2 – Preferred Alternative with increased storage[3]**	
Pollutant	BOD (lb/yr)	TSS (lb/yr)	BOD (lb/yr)	TSS (lb/yr)
Reduction in Pollutant Load[1]	395	1,641	15,219	29,011
Cost increase from the Preferred Alternative	$21,600,000		$43,300,000	
Cost for pollutant removal ($/lb)	$54,700	$13,100	$2,850	$1,500

1 – Reductions compared to the baseline condition of Phase I improvements at the WWTP (25 MG of EQ and 185 MGD Wet Weather Facility) and implementation of the Preferred Alternative level of CSO control.
2 – WWTP improvements include the addition of 10 MG of EQ storage and Final Clarifier #13.
3 – Option 2 does not include providing the additional 10 MG of EQ storage and Clarifier #13

The results summarized in Table ES.10 indicate that it is more cost effective and beneficial to provide implement Option 2 as opposed to Option 1. Option 2 has a lower overall cost, lower cost per unit of pollutant removed and provides a higher level of pollutant removal as compared to Option 1. Since it is more cost effective and beneficial, Option 2 is being pursued as the Recommended Long Term CSO Control Plan presented here forth in this document.

ES.5. Recommended Plan

The Recommended Plan includes control measures specific to each of the CSO regulators. The following summarizes the general CSO control approach by watershed. Table ES.11 presents a summary of the CSO control projects and associated costs for the Recommended Plan. Figure ES.5 provides a schematic of the Recommended Plan.

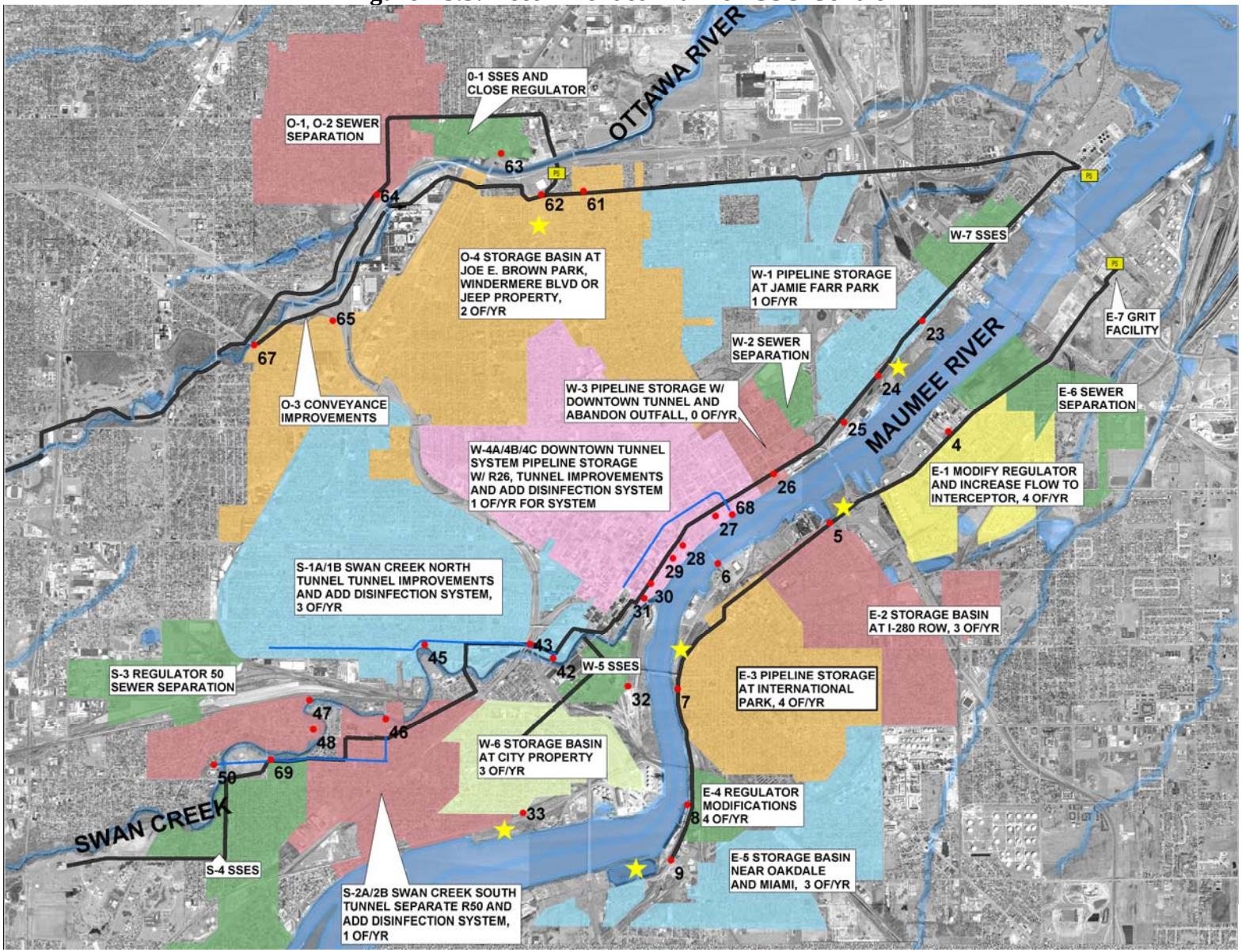
- Ottawa River – Inflow reduction, sewer separation and CSO storage (basin).
- Maumee River East – Inflow reduction and CSO storage (basin and pipeline).
- Maumee River West – Inflow Reduction, sewer separation CSO storage (basin and pipeline) and disinfection of tunnel discharges.
- Swan Creek – inflow reduction, sewer separation and disinfection of tunnel discharges.

Table ES.11: Summary of the Recommended Long Term CSO Control Plan

Project Location or Type	Description	Amount of New Storage (mg)[2]	Cost ($M)
Early Action Projects	Inflow reduction projects throughout the sewer system, that will result in additional interceptor and wastewater treatment capacity for wet weather flows from other areas.	0.0	$18.0[1]
Ottawa River	Separation, transport and storage projects to reduce overflow frequency to 2 times per year or less	15.6	$81.3
East Side Maumee	Storage projects to reduce overflow frequency to 4 or less per year	10.6	$78.8
West Side Maumee	Storage for currently uncontrolled outfalls, tunnel modification and improvements, addition of tunnel disinfection system. All west side overflows would be controlled to achieve 4 or fewer untreated overflows per year	6.4	$63.7
Swan Creek	Tunnel optimization to reduce volume and frequency of discharge, addition of tunnel disinfection system to achieve 3 or fewer untreated overflows per year	0.8	$31.9
	Total	**32.5**	**$255.7**

1 – Costs are accounted for in the watershed areas and are not figured into the total.
2 – Includes storage volume associated with basin storage, pipeline storage and conveyance sewers connecting CSO outfalls to a CSO control facility.

Figure ES.5: Recommended Plan for CSO Control



ES.5.1. Ottawa River

Table ES.12 provides details for projects within the Ottawa River system as discussed in Chapter 13 – Recommended Plan.

Table ES.12: Ottawa River Projects in the Recommended Plan

Project Identifier	Project Description	Cost ($M)
O-1	Study of the Lockwood (64) and Devilbiss (63) regulator tributary areas. Objective: identify work required to completely separate the tributary areas, remove inflow sources from the existing sanitary. Project is part of the Bennett Area SSES	$3.0
O-2	Lockwood and Devilbiss sewer separation. Work includes extension of sanitary and storm sewer as needed to accomplish separation. Regulators would be abandoned. Private inflow sources would be removed (by property owner). May include replacement of some sanitary sewer lines on Sylvania and Berdan. May include stormwater quality ponds at the outlet. May be implemented in several contracts or projects as determined by the study (project O-1). Follow-up project certification effort to confirm all inflow sources removed.	$15.1
O-3	Monroe (67) and Ayers (65) collector sewer study; design and construction. Rehabilitate or replace the sewer on the south side of the Ottawa River from Monroe to Ayers. Add new overflow location with floatables control and backwater protection. Abandon existing outfalls. Alternative will create 0.3 MG of pipeline storage/conveyance and make use of 1.1 MG of pipeline storage/conveyance.	$6.9
O-4	Ottawa River South Storage Facility. Project includes pre-study; design; construction; and post-construction evaluation of storage facility to limit discharge frequency, volume and pollutant load from outfalls 61, 62, 65, and 67. Facility would be located in Joe E. Brown Park or the Windermere right of way with approximate storage volume of 14 MG. Alternative creates approximately 0.2 MG of pipeline storage /conveyance from Regulator 61 to the facility. Pre-study will establish actual volume required based on flow monitoring in the Ten Mile Creek system after projects O-1 to O-3 have been implemented. An influent pump station is assumed to be part of the project, as well as collector sewers.	$56.3
	Total	**$81.30**

ES.5.2.Maumee River

Table ES.13 provides further details for projects within the Maumee River Eastside system as discussed in Chapter 13 – Recommended Plan.

Table ES.13: Maumee River Eastside Projects in the Recommended Plan

Project Identifier	Project Description	Cost ($M)
E-1	Modification to the Paine (4) regulator and return line to allow increased transport of CSO flows to the Eastside Interceptor. Limited sewer separation in portions of the Paine CSO tributary area to reduce incidence of basement backup and reduce CSO tributary area. Addition of floatables control and backwater protection to the discharge.	$1.4
E-2	Dearborn (5) Storage Facility. Project includes pre-study; design; construction; and post-construction evaluation of storage facility to limit discharge frequency, volume and pollutant load from outfall 5. Facility would be located in the I-280/ Front Street interchange area with approximate storage volume of 1.6 MG. Flow to the basin is anticipated to be gravity influent and gravity discharge. Basin is expected to operate in a first flush configuration, although flow through is a potential. Floatables control for all discharge would be provided.	$15.1
E-3	International Park Pipeline Storage Facility. Project includes pre-study; design; construction; and post-construction evaluation of pipeline storage facility to limit discharge frequency, volume and pollutant load from outfalls 6 and 7. Facility would be located in International Park (probably along the eastern border) and would consist of one or dual box culverts to provide storage. Approximate storage volume of 4.9 MG would be provided. Flow to the pipeline storage facility basin is anticipated to be gravity influent and gravity or pumped dewatering. Pipeline storage would operate in a first flush configuration, with any discharge occurring at existing overflow locations. Regulator and return line modifications will be provided at existing outfalls with floatables control and backwater prevention added at these locations.	$18.6
E-4	Modification to the Fassett (8) regulator and return line to allow increased transport of CSO flows to the east side interceptor. Addition of floatables control and backwater protection to the discharge.	$1.3
E-5	Oakdale (9) Storage Facility. Project includes pre-study; design; construction; and post-construction evaluation of storage facility to limit discharge frequency, volume and pollutant load from outfall 9. Facility would be located at the existing Pilkington lagoon site with approximate storage volume of 3.9 MG. Alternative creates 0.2 MG of storage pipeline/conveyance from Regulator 09 to the facility. Flow to the basin is anticipated to be gravity influent and gravity discharge. Basin is expected to operate in a first flush configuration, although flow through is a potential. Floatables control for all discharge would be provided.	$24.6
E-6	Wheeling Area sewer separation. The Wheeling area is combined but not controlled by a regulator. The size of the area is limited. The Wheeling area sewer separation project (identified in Chapter 8) would reduce the wet weather flow directed to the East Side Interceptor.	$3.9
E-7	East Side Grit Facility	$13.9
	Totals	**$78.8**

Table ES.14 provides further details for projects within the Maumee River Westside system as discussed in Chapter 13 – Recommended Plan.

Table ES.14: Maumee River Westside Projects in the Recommended Plan

Project Identifier	Project Description	Cost ($M)
W-1	Pipeline Storage Facility adjacent to Jamie Farr Park. Project includes pre-study; design; construction; and post-construction evaluation of pipeline storage facility to limit discharge frequency, volume and pollutant load from outfalls 23 through 25. Facility would be located adjacent to the Maumee River near Jamie Farr Park and would consist of a single pipeline. Approximate storage volume of 0.4 MG would be provided. Flow to the pipeline storage facility basin is anticipated to be gravity influent and gravity or pumped dewatering. The CSOs would be consolidated so that the outfall from the discharges would be located near the existing CSO 23 discharge. Regulator and return line modifications will be provided at existing locations with floatables control and backwater prevention added at the overflow from the pipeline storage system.	$9.0
W-2	Ash to Interceptor sewer separation project. This project (identified in Chapter 8) would separate the combined area that is directly tributary to the interceptor at Ash.	$7.2
W-3	Pipeline Storage Facility extending from the Galena (26) CSO to the existing downtown tunnel. Project includes pre-study; design; construction; and post-construction evaluation of pipeline storage facility to limit discharge frequency, volume and pollutant load from outfall 26 and the existing downtown tunnel. An approximate storage volume of 2.2 MG would be provided. Facility would be located in the existing Water Street right of way (extended to Galena). The outfall from CSO 26 would be eliminated. Regulator and return line modifications will be provided.	$6.6
W-4a	Downtown Tunnel Optimization. This project (discussed in chapter 8) includes modifications to the existing Downtown Tunnel and associated regulators in order to reduce overflow frequency and volume and provide enhancement of the existing tunnel system operation. Specific project elements include: addition of in-system storage devices upstream of regulators 28, 29, 30 and 31 (providing approximately 1.0 MG of additional storage), modifying the regulator associated with CSO 27 (to better direct flow to the tunnel system), clean the tunnel of accumulated sediment, add floatables control and backwater protection to remaining CSO discharges, improve monitoring, and improve other tunnel operational characteristics. In addition localized sewer system modifications to enable elimination of the overflow location at Madison and the Maumee River would be implemented.	$8.9
W-4b	Tunnel Assessment and Disinfection Study. Following implementation of the Tunnel Optimization projects, an assessment of the remaining overflow volume and frequency would be performed. In addition, this study would include pilot evaluation of disinfection of CSO tunnel discharges. The results of this study would be used to finalize the scope and projected benefits of the proposed Tunnel Disinfection projects.	$1.4
W-4c	Downtown Tunnel Disinfection System. Add sodium hypochlorite disinfection facility feeding disinfectant to existing drop shafts. Add dechlorination facilities at discharge from tunnel.	$7.6
W-5	William and Knapp Area SSES, inflow removal and Regulator 32 abandonment. This project (discussed in Chapter 8) would investigate steps necessary to eliminate CSO 32. This area previously was separated but private inflow was not addressed. The regulator remains open and may discharge.	$1.6

Project Identifier	Project Description	Cost ($M)
W-6	Maumee (33) Storage Facility. Project includes pre-study; design; construction; and post-construction evaluation of storage facility to limit discharge frequency, volume and pollutant load from outfall 33. Facility would be located on existing City property located near Pleasant Street at Maumee River with approximate storage volume of 2.6 MG. Flow to the basin is anticipated to be gravity influent and gravity discharge. Alternative creates approximately 0.2 MG of pipeline storage/conveyance from Regulator 33 to the storage basin. Basin is expected to operate in a flow through configuration. Floatables control for all discharges would be provided. The existing outfall would be eliminated.	$20.1
W-7	New York Area SSES. This project includes SSES projects and inflow reduction projects in formerly separated areas. The regulators for these areas were removed, but no specific assessment of the remaining wet weather flows was conducted. The projects identified include: New York (old 22).	$1.3
	Totals	**$63.7**

ES.5.3.Swan Creek

Table ES.15 provides further details for projects within the Swan Creek system as discussed in Chapter 13 – Recommended Plan.

Table ES.15: Swan Creek Projects in the Recommended Plan

Project Identifier	Project Description	Cost ($M)
S-1a	Swan North Tunnel Optimization. This project (discussed in chapter 8) includes modifications to the existing Swan North Tunnel and associated regulators in order to reduce overflow frequency and volume and provide enhancement of the existing tunnel system operation. Specific project elements include: addition of in-system storage devices upstream of regulators 43 and 47 (providing approximately 0.8 MG of additional storage), modifying the sewers associated with CSO 47 (to better direct flow to the tunnel system), clean the tunnel of accumulated sediment, add floatables control and backwater protection to remaining CSO discharges, improve monitoring, and improve other tunnel operational characteristics.	$6.0
S-1b	Swan North Tunnel Disinfection System. Add sodium hypochlorite disinfection facility feeding disinfectant to existing drop shafts. Add dechlorination facilities at discharge from tunnel.	$9.9
S-2a	Swan South Tunnel Optimization. This project (discussed in chapter 8) includes modifications to the existing Swan South Tunnel to control the discharge of floatables and improve operation of the tunnel system. Work would include: cleaning the tunnel of accumulated sediment, addition of floatables control and backwater protection to remaining CSO discharges, improved monitoring, and improvement of other tunnel operational characteristics.	$2.9
S-2b	Swan South Tunnel Disinfection System. Add sodium hypochlorite disinfection facility feeding disinfectant to existing drop shafts. Add dechlorination facilities at discharge from tunnel.	$4.4
S - 3	Highland (Reg. 50) sewer separation. The separation of the area tributary to regulator 50 would be implemented in order to reduce the total tributary area to the	$4.7

Project Identifier	Project Description	Cost ($M)
	Swan South Tunnel system, hence increasing the percentage of volume captured by the tunnel system for this tributary area.	
S-4	Woodsdale SSES and inflow reduction project. This project includes SSES projects and inflow reduction projects in formerly separated areas. The regulators for these areas were removed, but no specific assessment of the remaining wet weather flows was conducted. The projects identified include the Woodsdale area (old Regulator 49)	$4.0
	Total	$31.9

ES.6. Benefits of the Recommended Plan

The benefits associated with CSO control are end of pipe type benefits (frequency, volume and duration) and in-stream water quality benefits. Table ES.16 through Table ES.18 present the average annual or typical year end of pipe benefits for the three watershed systems for the following three conditions:

- 2003 – represents existing conditions as characterized in 2003 with the Flow Characterization Study, Water Quality Study and Hydraulic Model reports. The 2003 (or existing) Conditions includes the three CSO storage tunnels constructed in the early 1990s.
- Phase 1 –represents the predicted state of the collection system after the Consent Decree required WWTP improvements have been implemented. These improvements include the grit facility, ballasted flocculation facility (185 mgd), equalization basin (25 MG), influent pumping improvements and a new effluent pumping station.
- Recommended Plan – represents the predicted benefits after the Recommended Plan has been implemented. Includes all Phase 1 improvements.

The Recommended Plan provides CSO controls to significantly reduce the volume of untreated overflow and mass pollutant loading to the Ottawa River, Maumee River and Swan Creek. The total untreated overflow volume is reduced from 624 MG to 69 MG (89% removal) with volume reductions for each watershed ranging from 89% to 94%. The overall CBOD and TSS pollutant loads are both reduced by approximately 77%.

Table ES.16: Ottawa River Projects - End of Pipe Benefits

Conditions	Percent Capture[2]	Frequency of Untreated Overflow	Untreated Volume (mg)	Treated Volume (mg)	CBOD (ton/yr)	Fecal Coliform (M#/yr)	TSS (ton/yr)
2003[1]	75%	26	164	0.0	77	5.3 E+09	139
Phase 1[1]	81%	25	123	0.0	44	4.6 E+09	117
Recommended Plan[1]	97%	2	14	0.0	5	3.8 E+08	10

1 – Includes all outfalls in the Ottawa River system.
2 – Percent of wet weather volume sent to the WWTP.

Table ES.17: Maumee River Projects - End of Pipe Benefits

Conditions	Percent Capture[2]	Frequency of Untreated Overflow	Untreated Volume (mg)	Treated Volume (mg)	CBOD (ton/yr)	Fecal Coliform (M#/yr)	TSS (ton/yr)
2003[1]	72%	33	374	0.0	122	1.2 E+10	316
Phase 1[1]	76%	32	316	0.0	109	1.1 E+10	271
Recommended Plan[1]	89%	4	50	47	26	10.9 E+08	58

1 – Includes all outfalls in the Maumee River system.
2 – Percent of wet weather volume sent to the WWTP.

Table ES.18: Swan Creek Projects - End of Pipe Benefits

Conditions	Percent Capture[2]	Frequency of Untreated Overflow	Untreated Volume (mg)	Treated Volume (mg)	CBOD (ton/yr)	Fecal Coliform (M#/yr)	TSS (ton/yr)
2003[1]	91%	11	86	0	22	1.9 E+09	56
Phase 1[1]	89%	11	105	0	34	2.6 E+09	73
Recommended Plan[1]	92%	3	5	73	19	3.0 E+08	49

1 – Includes all outfalls in the Swan Creek system.
2 – Percent of wet weather volume sent to the WWTP.

Table ES.19 through Table ES.21 present the Recommended Plan in-stream water quality benefits. Under existing background conditions, the Ottawa River and Swan Creek exceed fecal coliform water quality standards and all three waterbodies exceed the DO water quality standards. Under the reduced background condition, the three waterbodies meet the fecal coliform and DO water quality standards, except for Ottawa River which exceeds the DO standard one day per average year.

In general, the Ottawa River and Swan Creek will not meet water quality standards regardless of the level of CSO control provided. This is due to the high background

concentrations coming into the City. With the Recommended Plan, Maumee River meets the bacteria water quality standards criteria and has one (1) day of DO violation per year with existing background conditions. Under reduced background conditions (e.g. a TMDL has been implemented), the Recommended Plan controls CSO discharge to a level at which all three water bodies meet water quality standards for bacteria and DO. The lone exception is Ottawa River which will have one (1) day of DO violation per year.

Table ES.19: Ottawa River Projects – Water Quality Benefits

Project Identifier	Fecal Coliform (% of rolling 30-day periods exceeding criteria, typical recreation season, downstream of CSOs)				Dissolved Oxygen (Days of violation, typical year, downstream of CSOs)	
	Geomean criterion		Maximum criterion (upper 90th percentile)			
	Existing background	Reduced background	Existing background	Reduced background	Existing background	Reduced background
2003	81%	1%	95%	49%	26	6
Phase I	81%	1%	95%	49%	14	2
Recommended Plan	78%	0%	93%	0%	10	1

Table ES.20: Maumee River Projects – Water Quality Benefits

Project Identifier	Fecal Coliform (% of 30-day periods exceeding criteria, typical recreation season, downstream of CSOs)				Dissolved Oxygen (Days of violation, typical year, downstream of CSOs)	
	Geomean criterion		Maximum criterion (upper 90th percentile)			
	Existing background	Reduced background	Existing background	Reduced background	Existing background	Reduced background
2003	0%	0%	14%	4%	5	0
Phase I	0%	0%	13%	4%	5	0
Recommended Plan	0%	0%	0%	0%	1	0

Table ES.21: Swan Creek Projects – Water Quality Benefits

Project Identifier	Fecal Coliform (% of 30-day periods exceeding criteria, typical recreation season, downstream of CSOs)				Dissolved Oxygen (Days of violation, typical year, downstream of CSOs)	
	Geomean criterion		Maximum criterion (upper 90th percentile)			
	Existing background	Reduced background	Existing background	Reduced background	Existing background	Reduced background
2003	97%	0%	98%	2%	15	0
Phase I	97%	0%	98%	2%	15	0
Recommended Plan	97%	0%	98%	0%	10	0

ES.7. Implementation Requirements and Schedule

The Consent Decree calls for an implementation schedule with all controls in place by 2016. A schedule has been developed that meets this requirement.

The implementation schedule gives priority to projects that benefit the Ottawa River, optimize the existing system, and accomplish the largest volumetric reductions. However, since the schedule time frame covers less than eleven years, the projects sequence tends to be driven by interdependency of the projects and individual site constraints.

The overall implementation time frame also doesn't allow much contingency time for items outside of the City's control. Such impacts can be caused by permit delays, particularly with Corps of Engineers permits, which tend to have unpredictable schedules and are necessary for the waterfront type work associated with CSO programs. Other delays can result from property acquisition complexities and environmental remediation requirements at the various sites. EPA policy on implementation schedules is that they should be based on maximum feasible progress from a technical standpoint, unless financial considerations warrant a longer schedule. From the technical implementation perspective, an extension in the schedule is appropriate based on the complexity of various implementation requirements. The City will be proposing that EPA consider an extension in the schedule time frame.

ES.8. Public/Regulatory Involvement

The Toledo Waterways Initiative actively pursued both public and regulatory involvement throughout the LTCP development process. The input received from the Citizens Public Advisory Council (CPAC), made up of local leaders, including environmental groups and community representatives, was ongoing and supportive to the process. At the conclusion of the project, the CPAC endorsed the proposed plan, as documented in a letter dated December 14, 2005. Table ES.22 through Table ES.24 present a listing of meetings held to help to shape the Recommended Plan presented in this report. Table ES.22 provides information on open public meetings held to gather and disseminate information to the public regarding the LTCP and the Recommended Plan.

Table ES.22: LTCP Related Public Meetings

Meeting Number	Date	Purpose
#1	9/ 16/2004	This meeting was used to brief the public on the scope and purpose of the study and to obtain their general views on the study.
#2	11/18/2004	This meeting focused on updating the public on the development of the LTCP and obtaining public input and comments, all specific to the Ottawa River.
#3	1/ 24/2005	This meeting focused on updating the public on the development of the LTCP and obtaining public input and comment, all specific to the west side of the Maumee River and Swan Creek..
#4	2/ 10/2005	This meeting focused on updating the public on the development of the LTCP and obtaining public input and comment, all specific to the East side of the Maumee River.
#5	3/ 2/2005	This meeting was used to gain public input on potential combined sewer overflow control options and locations in the Ottawa River area.
#6	3/ 9/2005	This meeting was used to gain public input on potential combined sewer overflow control options and locations in the Maumee River and Swan Creek areas.
#7	11/9/2005	Present final control options to the public with tentative information on the proposed plan.

Table ES.23 provides information on CPAC meetings held to both gather and disseminate information to public representatives.

Table ES.23: Citizens Public Advisory Committee Meeting Summary

Date	Primary Topic
3/19/2003	Introduction to program
4/2/2003	Continued introduction to program
5/5/2003	Bay View Wastewater Treatment Plant Improvements
6/ 18/2003	Water Quality
8/25/2003	What is a Long Term Control Plan
9/22/2003	Point Place improvements
10/17/2003	Back-up power and co-generation
12/15/2003	Program update; explanation of Responsible Bidders Legislation; tools to understand CSO impacts
1/12/2004	Program update; explanation of flow characterization study, hydraulic sewer model, water quality study, water quality model
2/23/2004	Program update – Point Place, BVWWTP, equalization basin
4/19/2004	Waterway usage
6/2/2004	LTCP – introduction; CSOs; schedule
9/8/2004	Program update – River Road area; announced September public meeting for LTCP
10/25/2004	LTCP – discussed September public meeting, November public meeting
1/10/2005	LTCP – results of public meeting with Ottawa River area residents; explanation of control options
3/21/2005	LTCP – discussed potential sites for facilities; public meeting results
5/17/2005	LTCP – draft plan being prepared

Table ES.24 provides information on meeting held with USEPA and/or OEPA in regards to the LTCP, its development and selection of the Recommended Plan.

Table ES.24: Summary of Meetings with Regulatory Involvement

Location	Date	Attendees	Primary Topic
Chicago, IL	2/26/2003	City, USEPA, OEPA	Work plans and general program update
Toledo, OH	12/11/2003	City, OEPA	Review of Consent Decree and LTCP requirements
Columbus, OH	3/3/2004	City, OEPA	Review of Consent Decree and LTPC requirements
Conference Call	3/20/2004	City, USEPA, OEPA	Work plans
Conference Call	3/24/2004	City, USEPA, OEPA	Work plans
Toledo, OH	7/25/2004	City, USEPA, OEPA	Project update and planning framework
Chicago, IL	2/25/2005	City, USEPA, OEPA	Project update and methodology to LTCP development
Conference Call	3/3/2005	City, USEPA, OEPA	Flow Characterization Study, Water Quality Study and Hydraulic Model reports
Toledo, OH	5/13/2005	City, USEPA, OEPA	Project update, approach to LTCP development and range of alternatives
Toledo, OH	6/28/2005	City, USEPA, OEPA	LTCP development workshop
Toledo, OH	8/4/2005	City, USEPA, OEPA	LTCP development workshop
Conference Call	9/30/2005	City, USEPA, OEPA	Draft components to the LTCP
Conference Call		City, USEPA, OEPA	Preliminary comments from EPA on the draft LTCP

ES.9. Financial Capability Assessment

The City of Toledo performed a financial capability assessment consistent with the EPA guidance document. Based on the planned project size and implementation schedule, the anticipated wastewater rates as a percentage of median household income is projected to be 1.71% in 2016 at the conclusion of the program. During the duration of implementation wastewater rates are expected to increase by approximately 225%. This project, while it classifies as a "medium burden", is of real concern to the City of Toledo, for its impact not only on residential customers, but also on the commercial and manufacturing base.

ES.10. Conclusions

The Recommended Plan presented in this report was selected to meet the requirements set forth in the Consent Decree, Clean Water Act, USEPA and OEPA CSO Guidance Policies. The Recommended Plan must at the same time be (1) fiscally responsible such that the City is able to fund the program and not overburden the citizens and (2) provide a

cost effective solutions to limit the discharge of CSO related pollutants to the affected waterways. The City has shown a commitment to protecting the environment, by recommending a plan that provides an investment of $43.3 million more than the level of control necessary to achieve compliance with the presumptive and demonstrative aspects of USEPA CSO policy. This plan will reduce discharge from CSOs by over 89%, and will increase the capture of wet weather flow to over 92%. The City of Toledo is prepared to begin on implementation of the plan immediately upon approval of USEPA.

ES.11. 2009 Addendum to the December 2005 LTCP

This addendum is intended to summarize changes to the LTCP that have occurred as a result of negotiations with US and Ohio EPA since the submittal of the original plan. As part of these negotiations, both the scope of the LTCP and facilities at the WWTP have been discussed. This addendum is intended to document those changes to the plan that have occurred as a result of the negotiation process.

The revised plan reflects an additional commitment by the City of approximately $60 million toward CSO control, and it emphasizes solutions with highly predictable outcomes (storage, separation, source control) rather than solutions that rely on treatment technology that may be difficult to accomplish reliably. The 2009 LTCP includes a revised approach to evaluate the effectiveness of CSO control projects. Details of the post-construction evaluation process are presented in Section 15.6.1.

ES.11.1. Revised LTCP Projects and Beneficial Impacts (Update to Section ES.5 and ES.6)

The revised LTCP projects are described in this section. Additional detail is provided in the Addendum to Chapter 13. Table ES.25 provides a summary of revised LTCP projects and costs. Figure ES.6 provides a schematic of the revised Recommended Plan.

Table ES.25: Summary of the Recommended LTCP (Revised Table ES.11)

Project Location or Type	Description	Amount of New Storage (mg)[2]	Cost ($M)
Early Action Projects	Inflow reduction projects throughout the sewer system, that will result in additional interceptor and wastewater treatment capacity for wet weather flows from other areas.	0	$18.0
Ottawa River	Separation, transport and storage projects to reduce overflow frequency to 2 times in 5-years.	26.9	$99.7
East Side Maumee	Storage projects to reduce overflow frequency to 3 or less per year	11.8	$83.7
West Side Maumee	Tunnel optimization and storage projects to reduce overflow frequency to 3 or less per year	11.9	$92.6
Swan Creek	Tunnel optimization and storage projects to reduce overflow frequency to 4 or less per year	2.6	$39.7
	Total	**53.2**	**$315.7**

1 – Costs are accounted for in the watershed areas and are not figured into the total.
2 – Includes storage volume associated with basin storage, pipeline storage and conveyance sewers connecting CSO outfalls to a CSO control facility.

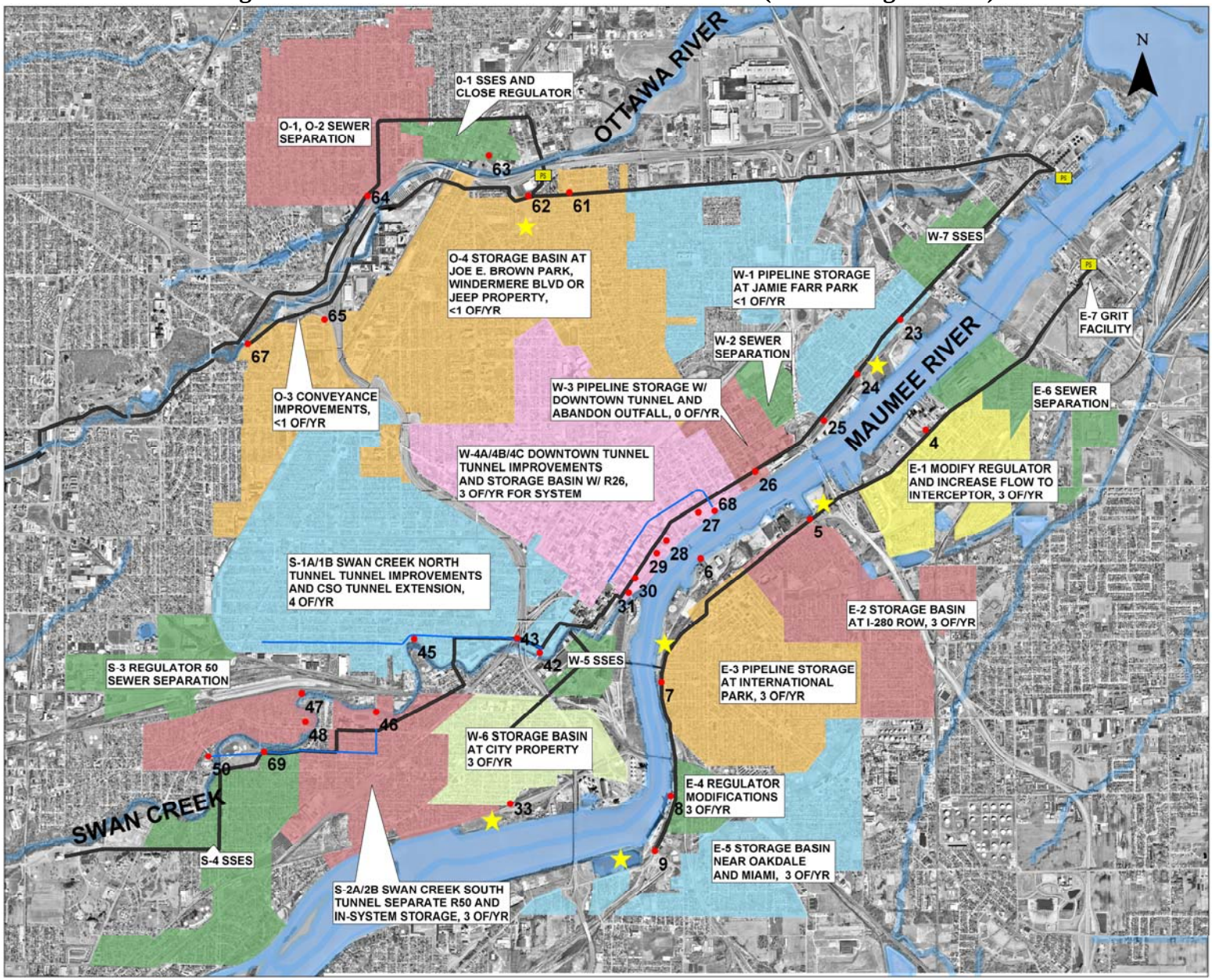
ES.11.2. Ottawa River

Table ES.26 provides details for revised projects within the Ottawa River system as discussed in Chapter 13 – Recommended Plan.

Table ES.26: Ottawa River Projects in the Recommended Plan (Revised Table ES.12)

Project Identifier	Project Description	Cost ($M)
O-1	Study of the Lockwood (64) and Devilbiss (63) regulator tributary areas. Objective: identify work required to completely separate the tributary areas, remove inflow sources from the existing sanitary. Project is part of the Bennett Area SSES	$3.0
O-2	Lockwood and Devilbiss sewer separation. Work includes extension of sanitary and storm sewer as needed to accomplish separation. Regulators would be abandoned. Private inflow sources would be removed (by property owner). May include replacement of some sanitary sewer lines on Sylvania and Berdan. May include stormwater quality ponds at the outlet. May be implemented in several contracts or projects as determined by the study (project O-1). Follow-up project certification effort to confirm all inflow sources removed.	$15.1
O-3	Monroe (67) and Ayers (65) collector sewer study; design and construction. Rehabilitate or replace the sewer on the south side of the Ottawa River from Monroe to Ayers. Add new overflow location with floatables control and backwater protection. Abandon existing outfalls. Alternative will create 0.3 MG of pipeline storage/conveyance and make use of 1.3 MG of pipeline storage/conveyance.	$10.8
O-4	Ottawa River South Storage Facility. Project includes pre-study; design; construction; and post-construction evaluation of storage facility to limit discharge frequency, volume and pollutant load from outfalls 61, 62, 65, and 67. Facility would be located in Joe E. Brown Park or the Windermere right of way with approximate storage volume of 25.1 MG. Alternative creates approximately 0.2 MG of pipeline storage /conveyance from Regulator 61 to the facility. Pre-study will establish actual volume required based on flow monitoring in the Ten Mile Creek system after projects O-1 to O-3 have been implemented. An influent pump station is assumed to be part of the project, as well as collector sewers.	$70.8
	Total	**99.7**

Figure ES.6: Recommended Plan for CSO Control (Revised Figure ES.5)



ES.11.3. Maumee River

Table ES.27 provides further details for revised projects within the Maumee River Eastside system as discussed in Chapter 13 – Recommended Plan.

Table ES.27: Maumee River Eastside Projects in the Recommended Plan (Revised Table ES.13)

Project Identifier	Project Description	Cost ($M)
E-1	Modification to the Paine (4) regulator and return line to allow increased transport of CSO flows to the Eastside Interceptor. Limited sewer separation in portions of the Paine CSO tributary area to reduce incidence of basement backup and reduce CSO tributary area. Addition of floatables control and backwater protection to the discharge.	$1.7
E-2	Dearborn (5) Storage Facility. Project includes pre-study; design; construction; and post-construction evaluation of storage facility to limit discharge frequency, volume and pollutant load from outfall 5. Facility would be located in the I-280/ Front Street interchange area with approximate storage volume of 1.6 MG. Flow to the basin is anticipated to be gravity influent and gravity discharge. Basin is expected to operate in a first flush configuration, although flow through is a potential. Floatables control for all discharge would be provided.	$15.1
E-3	International Park Pipeline Storage Facility. Project includes pre-study; design; construction; and post-construction evaluation of pipeline storage facility to limit discharge frequency, volume and pollutant load from outfalls 6 and 7. Facility would be located in International Park (probably along the eastern border) and would consist of one or dual box culverts to provide storage. Approximate storage volume of 5.5 MG would be provided. Flow to the pipeline storage facility basin is anticipated to be gravity influent and gravity or pumped dewatering. Pipeline storage would operate in a first flush configuration, with any discharge occurring at existing overflow locations. Regulator and return line modifications will be provided at existing outfalls with floatables control and backwater prevention added at these locations.	$21.4
E-4	Modification to the Fassett (8) regulator and return line to allow increased transport of CSO flows to the east side interceptor. Addition of floatables control and backwater protection to the discharge.	$1.5
E-5	Oakdale (9) Storage Facility. Project includes pre-study; design; construction; and post-construction evaluation of storage facility to limit discharge frequency, volume and pollutant load from outfall 9. Facility would be located at the existing Pilkington lagoon site with approximate storage volume of 4.5 MG. Alternative creates 0.2 MG of storage pipeline/conveyance from Regulator 09 to the facility. Flow to the basin is anticipated to be gravity influent and gravity discharge. Basin is expected to operate in a first flush configuration, although flow through is a potential. Floatables control for all discharge would be provided.	$26.2
E-6	Wheeling Area sewer separation. The Wheeling area is combined but not controlled by a regulator. The size of the area is limited. The Wheeling area sewer separation project (identified in Chapter 8) would reduce the wet weather flow directed to the East Side Interceptor.	$3.9
E-7	East Side Grit Facility	$13.9
	Totals	**$83.7**

Table ES.28 provides further details for revised projects within the Maumee River Westside system as discussed in Chapter 13 – Recommended Plan.

Table ES.28: Maumee River Westside Projects in the Recommended Plan (Revised Table ES.14)

Project Identifier	Project Description	Cost ($M)
W-1	Pipeline Storage Facility adjacent to Jamie Farr Park. Project includes pre-study; design; construction; and post-construction evaluation of pipeline storage facility to limit discharge frequency, volume and pollutant load from outfalls 23 through 25. Facility would be located adjacent to the Maumee River near Jamie Farr Park and would consist of a single pipeline. Approximate storage volume of 1.1 MG would be provided. Flow to the pipeline storage facility basin is anticipated to be gravity influent and gravity or pumped dewatering. The CSOs would be consolidated so that the outfall from the discharges would be located near the existing CSO 23 discharge. Regulator and return line modifications will be provided at existing locations with floatables control and backwater prevention added at the overflow from the pipeline storage system.	$9.8
W-2	Ash to Interceptor sewer separation project. This project (identified in Chapter 8) would separate the combined area that is directly tributary to the interceptor at Ash.	$7.2
W-3	This project has been incorporated into W-4C.	$0.0
W-4a	Downtown Tunnel Optimization. This project (discussed in chapter 8) includes modifications to the existing Downtown Tunnel and associated regulators in order to reduce overflow frequency and volume and provide enhancement of the existing tunnel system operation. Specific project elements include: addition of in-system storage devices upstream of regulators 28, 29, 30 and 31 (providing approximately 1.0 MG of additional storage), modifying the regulator associated with CSO 27 (to better direct flow to the tunnel system), clean the tunnel of accumulated sediment, add floatables control and backwater protection to remaining CSO discharges, improve monitoring, and improve other tunnel operational characteristics. In addition localized sewer system modifications to enable elimination of the overflow location at Madison and the Maumee River would be implemented.	$8.9
W-4b	This project has been eliminated.	$0.0
W-4c	Downtown System Storage Basin. Project includes pre-study; design; construction; and post-construction evaluation of storage facility to limit discharge frequency, volume and pollutant load from the Downtown Tunnel System (26-31). Facility would be located along the Water Street corridor with an approximate storage volume of 6.7 MG. Flow to the basin is anticipated to be gravity influent and gravity discharge. Alternative creates approximately 0.3 MG of pipeline storage/conveyance from Regulator 26 and the existing tunnel to the storage basin. Basin is expected to operate in a flow through configuration. Floatables control for all discharges would be provided. The existing CSO outfall 26 would be eliminated.	$43.7
W-5	William and Knapp Area SSES, inflow removal and Regulator 32 abandonment. This project (discussed in Chapter 8) would investigate steps necessary to eliminate CSO 32. This area previously was separated but private inflow was not addressed. The regulator remains open and may discharge.	$1.6
W-6	Maumee (33) Storage Facility. Project includes pre-study; design; construction; and post-construction evaluation of storage facility to limit discharge frequency, volume and pollutant load from outfall 33. Facility would be located on existing City property located near Pleasant Street at Maumee River with approximate storage volume of 2.6 MG. Flow to the basin is anticipated to be gravity influent and	$20.1

Project Identifier	Project Description	Cost ($M)
	gravity discharge. Alternative creates approximately 0.2 MG of pipeline storage/conveyance from Regulator 33 to the storage basin. Basin is expected to operate in a flow through configuration. Floatables control for all discharges would be provided. The existing outfall would be eliminated.	
W-7	New York Area SSES. This project includes SSES projects and inflow reduction projects in formerly separated areas. The regulators for these areas were removed, but no specific assessment of the remaining wet weather flows was conducted. The projects identified include: New York (old 22).	$1.3
	Totals	**$92.6**

ES.11.4. Swan Creek

Table ES.29 provides details for revised projects within the Swan Creek system as discussed in Chapter 13 – Recommended Plan.

Table ES.29: Swan Creek Projects in the Recommended Plan (Revised Table ES.15)

Project Identifier	Project Description	Cost ($M)
S-1a	Swan North Tunnel Optimization. This project (discussed in chapter 8) includes modifications to the existing Swan North Tunnel and associated regulators in order to reduce overflow frequency and volume and provide enhancement of the existing tunnel system operation. Specific project elements include: addition of in-system storage devices upstream of regulators 43 and 47 (providing approximately 0.8 MG of additional storage), modifying the sewers associated with CSO 47 (to better direct flow to the tunnel system), clean the tunnel of accumulated sediment, add floatables control and backwater protection to remaining CSO discharges, improve monitoring, and improve other tunnel operational characteristics.	$6.0
S-1b	Swan North Tunnel Extension. Project includes pre-study; design; construction; and post-construction evaluation of CSO storage tunnel (1.6 MG) to limit discharge frequency, volume and pollutant load from the Swan Creek North System. Floatables control for all discharges would be provided.	$21.6
S-2a	Swan South Tunnel Optimization. This project (discussed in chapter 8) includes modifications to the existing Swan South Tunnel to control the discharge of floatables and improve operation of the tunnel system. Work would include: cleaning the tunnel of accumulated sediment, addition of floatables control and backwater protection to remaining CSO discharges, improved monitoring, and improvement of other tunnel operational characteristics.	$2.9
S-2b	Swan South Linear Storage. This project includes providing capabilities to fully utilize existing system storage (0.2 MG) in the Highland Park Tunnel.	$0.5
S - 3	Highland (Reg. 50) Sewer Separation. The separation of the area tributary to regulator 50 would be implemented in order to reduce the total tributary area to the Swan South Tunnel system, hence increasing the percentage of volume captured by the tunnel system for this tributary area.	$4.7
S-4	Woodsdale SSES and inflow reduction project. This project includes SSES projects and inflow reduction projects in formerly separated areas. The regulators for these areas were removed, but no specific assessment of the remaining wet weather flows was conducted. The projects identified include the Woodsdale area (old Reg. 49)	$4.0
	Total	**$39.7**

ES.12. Benefits of the Recommended Plan

Table ES.30 through Table ES.32 provide end of pipe benefit summaries for each watershed.

Table ES.30: Ottawa River Projects - End of Pipe Benefits (Revised Table ES.16)

Conditions	Percent Capture[2]	Frequency of Untreated Overflow	Untreated Volume (mg)	Treated Volume (mg)	CBOD (ton/yr)	Fecal Coliform (M#/yr)	TSS (ton/yr)
2003[1]	75%	26	164	0.0	77	5.3 E+09	139
Phase 1[1]	81%	25	123	0.0	44	4.6 E+09	117
Recommended Plan[1]	97%	2	14	0.0	5	3.8 E+08	10
2009 LTCP	92%	≈0	73.9	0	21	25.7 E+08	44

1 – Includes all outfalls in the Ottawa River system.
2 – Percent of wet weather volume sent to the WWTP.

Table ES.31: Maumee River Projects - End of Pipe Benefits (Revised Table ES.17)

Conditions	Percent Capture[2]	Frequency of Untreated Overflow	Untreated Volume (mg)	Treated Volume (mg)	CBOD (ton/yr)	Fecal Coliform (M#/yr)	TSS (ton/yr)
2003[1]	72%	33	374	0.0	122	1.2 E+10	316
Phase 1[1]	76%	32	316	0.0	109	1.1 E+10	271
Recommended Plan[1]	89%	4	50	47	26	10.9 E+08	58
2009 LTCP	92%	3	73.9	0	21	25.7 E+08	44

1 – Includes all outfalls in the Maumee River system.
2 – Percent of wet weather volume sent to the WWTP.

Table ES.32: Swan Creek Projects - End of Pipe Benefits (Revised Table ES.18)

Conditions	Percent Capture[2]	Frequency of Untreated Overflow	Untreated Volume (mg)	Treated Volume (mg)	CBOD (ton/yr)	Fecal Coliform (M#/yr)	TSS (ton/yr)
2003[1]	91%	11	86	0	22	1.9 E+09	56
Phase 1[1]	89%	11	105	0	34	2.6 E+09	73
Recommended Plan[1]	92%	3	5	73	19	3.0 E+08	49
2009 LTCP	93%	4	68.9	0	16	17.1 E+08	40

1 – Includes all outfalls in the Swan Creek system.
2 – Percent of wet weather volume sent to the WWTP.

ES.12.1. Implementation Schedule Revisions

The proposed implementation schedule has been updated based on a revised start date due to the negotiation period on the plan. While the start of major activities has been

delayed, the City has proceeded with some portions of the work, and has neared completion on project O-1, the Lockwood and Devilbiss (Bennett Area) SSES project.

The proposed implementation duration has been extended to accommodate the additional investment in the project. The proposed completion date is August 31, 2020. Additional detail and the revised implementation schedule are provided in the Addendum to Chapter 14.

ES.12.2. Compliance Monitoring and Evaluation

Monitoring requirements associated with tunnel disinfection facilities from the 2009 LTCP. Additional detail is provided in the Addendum to Chapter 15.

ES.12.3. Financial Capability Assessments

The financial capability assessment has been updated to reflect both the increased investment in the plan and the City's worsening financial situation. The economic climate has deteriorated since the original plan submittal, which was documented in an intermediate census update. Other financial data was updated from source material to provide a more current assessment of financial capability. Additional detail is provided in the Addendum to Chapter 16.

ES.12.4. Public/ Regulatory Involvement

Ongoing meetings have been held with the Citizens Advisory Committee since the submittal of the original plan in December 2005. Additional detail is provided in the Addendum to Chapter 17.