Detroit Water and Sewerage Department

Wastewater Master Plan

DWSD Project No. CS-1314

Description of Sewer Service Districts

Technical Memorandum
Original Date: November 26, 2001
Revision Date: May 31, 2003
Author: CDM and Sigma Associates

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Description of Sewer Service Districts

1.0 Introduction

This technical memorandum describes the nineteen sewer districts and ten individual municipalities that constitute the DWSD service area. Many of these districts follow community or other jurisdictional boundaries commonly used to categorize the DWSD wastewater system. In most cases, these also represent hydraulic boundaries determined during the wastewater system development to minimize the number of inflow points into the DWSD collection system. This is typically done to allow measurement of flow for billing purposes.

In some cases, these districts represent areas within the City of Detroit collection system that act independently from other areas in the city. While there is a significant amount of interconnection throughout the City of Detroit, these major districts largely behave independently.

These fifteen sewer districts and ten individual communities are distributed as follows (see Figure 1.0) (1):

- City of Detroit - Nine sewer districts (Rouge River, Hubbell, Southfield, Oakwood, Baby Creek, Conner Creek, Central, Fox Creek, and East Jefferson).
- Wayne County - Two large sewer districts (North Huron Valley - Rouge Valley, Northeast Wayne County), and the independent municipalities of Highland Park, Hamtramck, Dearborn, Allen Park, Melvindale, Grosse Pointe, Grosse Pointe Farms and Grosse Pointe Park. There are also several small areas in Wayne County with separate sewage disposal contracts located in Dearborn Heights, Redford Township, and Harper Woods.
- Oakland County - Three sewer districts (Evergreen-Farmington, Clinton-Oakland, Southeast Oakland) and the independent municipality of Farmington.
- Macomb County - Two sewer districts (Southeast Macomb, Macomb County) and the independent municipality of Center Line.

Sewer districts are based generally on a political jurisdiction or rate boundary, but the definition of a sewer district is not uniform. In the process of defining sewer district boundaries, four types of sewer district have been identified. Examples of the four types of sewer district are:

1) Sewer drainage areas defined as the city developed, with no formal legal boundaries (example: City of Detroit sewer districts). In some cases, these districts have slightly different sewerage rates.

2) An operating authority formed by agreement between several jurisdictions to build and maintain sewer system components (example: Southeast Macomb Sanitary District).

3) Sewer service areas covering several cities in the same drainage area. Each city or sub-area has different rates. Common-use facilities in these districts are operated by the county (example: Evergreen-Farmington Sewer District in Oakland County).

4) Cities with their own sewer system maintained by city personnel (Center Line).

Many, but not all, of the suburban districts as defined above are also first-tier customers of DWSD. However, sewer districts boundaries, as defined in this technical memo, are not necessarily the same as contract area boundaries as defined by DWSD contracts with suburban communities. Wherever possible, we have obtained boundary information directly from the sewer district, showing what they believe is their complete service area.

In the district maps included in this technical memorandum, the differences between sewer district service areas as indicated by the district boundaries, and currently sewered areas (which are sometimes labeled service areas) are clearly shown. The currently sewered area information was obtained from Southeast Michigan Council of Governments (SEMCOG) data, except where indicated.

The total area of all sewer districts is approximately 690,000 acres or 1,078 square miles. The area of each district is shown in Table 1.0-A. Actual sewered area is difficult to determine accurately, but is estimated to be approximately 584,000 acres or 912 square miles. Thus, approximately 85% of the service area is sewered.

In addition to the districts mentioned above, there are two other potential sources of wastewater flow that are not included in the districts, and not examined in detail in the current technical memo:

- Highway Drainage System: Major freeways, such as I-696, I-96, and I-94 have a separate drainage system designed by Michigan Department of Transportation, commonly called the "MDOT system". This system is designed to drain to the major rivers directly, so the flows from these freeways are not considered to contribute directly to the wastewater treatment plant load. However, the contribution of these areas to combined sewer flows is unknown.

- Independent Customers: There are some customers that contract directly with DWSD for service. A review of a 1995 list of contracts indicates that the following companies have indefinite-term contracts with DWSD for sewage disposal:

    - Ford Motor Company
    - General Motors Corporation

- Great Lakes Steel
- Michigan State Highway Commission (currently Michigan Department of Transportation)
- Scott Paper Company

There may also be individual service agreements, such as customers along Eight Mile Road that may have contracts with DWSD even though they are located in Evergreen-Farmington or Southeast Oakland Districts.

The information presented in this memo was collected by reviewing DWSD records, previous reports prepared by consultants, and as-built drawings. Details were also obtained through discussions with DWSD staff and suburban communities. This memorandum is intended to be a summary and an update of the information previously described in the various reports prepared by and for DWSD such as CS-1281 - DWSD Greater Detroit Regional Sewer System Final Reports (1994, 2001), CS-1158 - Long Term CSO Control Plan for the Detroit and Rouge Rivers (1996) and CS-806 - Segmented Facilities Plan (1978).

The draft version of this technical memorandum included copies of maps and other documents from DWSD records and pages from previous reports on the wastewater system. These attachments are referenced at the end of this document and the originals can be viewed in the Wastewater Master Plan library at CDM. The revised version of the technical memorandum include information from studies on suburban systems and, where available, electronic mapping data directly from the communities.

A general description of major physical features of the Detroit wastewater system, such as the Wastewater Treatment Plant, interceptors, basins, mechanical devices, etc., can be found in Appendix A.

The terminology used in this document is described in the glossary in Appendix B.

Additional information on the infrastructure described in this technical memorandum can be found in other Wastewater Master Plan technical memoranda, such as:

- *Suburban CSO Basins in the DWSD Service Area*
- *Review of Collection System Regulators and Outfalls*
- *Lateral Sewers and Connector Sewers*
- *Wastewater Facilities Inventory: Pump Stations and Meters*
- *Septage Transport and Disposal to the Detroit Wastewater System*

The maps of the districts (figures) in this technical memorandum show only the location of major facilities such as interceptors, pump stations, and CSO basins. The location of outfalls, backwater gates, regulators, and in-system storage devices are

shown in the technical memorandum *Review of Collection System Regulators and Outfalls*.

The location of other wastewater treatment plants in or near the DWSD sewer service districts is covered in the technical memorandum *Evaluation of Other Wastewater Treatment Plants in DWSD Planning Area*.

Table 1.0-A
Sewer District Total Area

SEWER DISTRICT	AREA (ACRES)
Detroit Sewer Districts	
Rouge River	10,780
Southfield	7,710
Hubbell	6,490
Oakwood	1,520
Baby Creek	11,760
Conner Creek	17,360
Central	22,490
Fox Creek	8,420
East Jefferson	2,810
TOTAL	*89,340*
Wayne County (Outside Detroit)	
North Huron Valley-Rouge Valley	175,027
Dearborn	15,615
Allen Park	1,696
Melvindale	1,728
Highland Park	1,894
Hamtramck	1,337
Grosse Pointe Park	1,734
Grosse Pointe	845
Grosse Pointe Farms	2,041
Grosse Pointe Park	1,300
Northeast Wayne	4,720
Other Small Districts	371
TOTAL	*208,308*
Oakland County	
Evergreen-Farmington	83,090
Farmington	1,424
Southeast Oakland	41,960
Clinton-Oakland	146,480
TOTAL	*272,954*
Macomb County	
Center Line	1,060
Southeast Macomb	15,098
Macomb County	103,865
TOTAL	*120,023*
GRAND TOTAL	*690,625*

Sources: *DWSD Flow Management Report*, Aug. 1987. *GDRSS Final Report*, March 2001. SEMCOG statistics. Highland Park and Hamtramck are included in area of Detroit Districts.

2.0 City of Detroit Sewer Districts

2.0.1 General Description

The City of Detroit is the largest city in Michigan and is located entirely in Wayne County. The approximate boundaries of the city are the Detroit River to the south, the Rouge River to the west, Eight Mile Road to the north. To the east lie the eastern suburbs of Wayne County and Lake St. Clair. The total area of the city is approximately 139.5 square miles, and is divided into nine sewer districts (see Figure 2.0).

The nine sewer districts in the City of Detroit are listed below, with their abbreviations as used in the 1978 Segmented Facilities Plan (3), and areas as listed in the DWSD Flow Management Report (1987):

District	Area in Acres	Abbreviation
Rouge River	10,780	RR
Southfield	7,710	S
Hubbell	6,490	H
Oakwood	1,520	O
Baby Creek	11,760	BC
Conner Creek	17,360	CC
Central	22,490	C
Fox Creek	8,420	FC
East Jefferson	2,810	EJ
TOTAL	89,340	

The land within the present city limits originally drained into four separate natural watercourses. These natural drainage basins are shown in a map produced by the City Engineers Office in 1944 (2), and are described as follows: The western part of the City is in the Rouge River watershed. This area drained to several smaller creeks including Baby Creek and Campbell Creek, which then discharged to the Rouge River. The central part of the City is tributary to the Detroit River. The area to the north and west of the Central City was drained by Conner Creek, which flowed from the area of the present Wyoming Road in the west to the present Conner Avenue in the east, where it turned south and followed the line of Conner Avenue to the Detroit River. Finally, the east side of Detroit was drained by Fox Creek to the Detroit River.

The Central District encompasses the oldest sections of the city. The original sewers in this district run along streets at right angles to the Detroit River where these sewers discharged directly before the construction of the Detroit River Interceptor and the WWTP. The other districts are based on the natural drainage basins described above. The Rouge River, Southfield, Hubbell and Oakwood districts are based on the Rouge River or on creeks tributary to it. The Baby Creek District is based on the old Baby Creek watercourse. Baby Creek was originally a creek that entered the Rouge River near Fort Street and was enclosed to provide combined drainage for the area after it was annexed. The Conner Creek, Fox Creek and East Jefferson districts are based on two natural creeks to the east of Detroit.

2.0.2 History and Development

The overall layout and designation of the sewer districts that lie within the City of Detroit can be best understood by referring to the natural drainage areas in the City and to the historical expansion of the City limits. The source documents for the delineation and historical development of the various sewer districts within the City of Detroit are located in the Urban Section of DWSD on the 14th floor of the City of Detroit Water Board Building (WBB) located on Randolph Street.

The original settlement in Detroit was at the foot of the present Woodward Avenue on the bank of the Detroit River. This has remained the center of the city and the growth of the City has radiated from this point. In 1836, the Common Council authorized the construction of the first sewer. By 1900, the City of Detroit had expanded to an area roughly corresponding to the Central Sewer District. A map produced by the City Engineers Office, possibly in 1950, shows the public sewers in Detroit in 1900 laid out on the north-south streets and draining directly to the Detroit River (4).

A second map, showing the public sewers in 1920 (also possibly drawn in 1950), shows the expansion of the city limits to Eight Mile Road in the vicinity of the Michigan State Fairgrounds (5). The area incorporated into the City between 1900 and 1920 was shown as mostly unserviced by sewers. However, the sewer along Woodward Avenue had been extended through Highland Park to the municipality's north limit. The extensions to the sewer system between 1900 and 1920 still drain mostly to the Detroit River. The exceptions were the first sewers discharging to Conner Creek at Shoemaker and Mack Avenues. The areas east of Conner along Jefferson were served by an interceptor along Jefferson, to a point just west of the Waterworks Park Water Intake, to avoid contaminating Detroit's water supply. This sewer was the beginning of what subsequently became the Detroit River Interceptor (DRI). On the west side of Detroit, the first sewer draining to the Rouge River was constructed in the vicinity of the present location of the WWTP.

Between 1920 and 1930, the City of Detroit expanded to its current limits, incorporating large areas of undeveloped land and what were then separate rural villages or hamlets. During this period of time, the sewer system was expanded to service these areas, the first interceptors were planned, and portions of them were

built in preparation for a proposed Wastewater Treatment Plant to be located in the southwest of the City near the Detroit River.

In the period between 1927 and 1931, the sewer system was expanded greatly, with a significant portion of the funds provided by the Federal Government. This construction was done in expectation of major development in Detroit, due to the economic expansion of the 1920's that was expected to continue into the 1930's. Then there was the Great Depression, and economic growth in Detroit slowed to a crawl. A brief recovery in 1935 saw some upturn in industrial activity, but it was short-lived and not enough to cause much increase in population. By way of comparison, the population increased by 58% in the 1920's (a period when large areas were incorporated into the city), 3% in the 1930's, and 14% in the 1940's, according to the U.S. Census. However, the late 1930's did see the construction of the first Wastewater Treatment Plant and the completion of the Detroit River Interceptor and the Oakwood-Northwest Interceptor.

Prior to 1940, the sewer system only served the City of Detroit (including the Cities of Highland Park and Hamtramck). In 1940, the Wastewater Treatment Plant was commissioned, and Detroit began to accept the sewage flow of its suburban neighbors. In that year, flows from the suburban communities of the Grosse Pointe, Grosse Pointe Farms, Grosse Pointe Park, Grosse Pointe Woods, Harper Woods, Redford Township and St. Clair Shores were accepted into the Detroit sewer system.

The expanded sewer system in the annexed areas was largely unused or underutilized until the early 1940's. Then the stimulus of World War II and Detroit's unofficial status as one of the "arsenals of democracy" caused an upsurge of manufacturing activity and an influx of workers to staff the newly busy factories. Detroit then embarked on sustained period of growth and prosperity interrupted by short and moderate recessions after the end of WW II and again at the end of the Korean War in the mid-1950's. In 1955, the City of Detroit's population peaked at approximately 2 million inhabitants.

Around 1945, a program of combined sewer relief was started and continued through the 1970's. The North Interceptor-East Arm was constructed in the 1970's, the first part of a two proposed interceptor arms to relieve CSOs to the Detroit and Rouge Rivers. This major project relieved overloading on the Detroit River Interceptor and reduced CSO discharges to the river. The second part, the West Arm, was never constructed because of objections from the U.S. EPA as to whether it was the best solution to CSO discharges to the Rouge River. Since 1980, most of the construction work within the City has been the addition of CSO basins and upgrades of pump stations. No major sewer construction has occurred in the last 20 years within the City boundaries.

There are generally considered to be three major interceptor sewers in the City of Detroit (6). The original interceptors were the Oakwood-Northwest Interceptor (ONWI) and the Detroit River Interceptor (DRI). These intercepted the flows that went to the Rouge River and the Detroit River, respectively, and conveyed the flows

to the WWTP. (The Oakwood-Northwest Interceptor is sometimes considered to be two segments, the Northwest Interceptor, and a short segment called the Oakwood Interceptor). The third interceptor constructed was the North Interceptor-East Arm (NI-EA). This takes flows from the Northeast Pump Station and the trunk sewers draining to the DRI and relieves the DRI of excess surcharging. More information on the major interceptors can be found in Appendix A and the narratives for each district.

In addition, there are several major transport and relief sewers, large sewers with few connections that can transport large flows to the major interceptors. These include original sewers such as the Southfield Sewer, Conner Creek Enclosure, and Conant-Mt. Elliot Sewer, and relief sewers constructed later, such as the First-Hamilton Relief Sewer.

The delineation between the original sewer districts in the City of Detroit has been blurred by the construction of later relief sewers and the North Interceptor-East Arm. These sewers often cross the original boundaries and carry flow between districts during times of high flow. It may be expected that the operation of the system under dry weather flow conditions will more closely approximate the original delineation of the system.

An overview of the other major features of the Detroit system, such as the Wastewater Treatment Plant, pump stations, meter, etc., can be found in Appendix A.

The sections that follow describe the individual sewer districts in more detail.

2.1 Rouge River Sewer District

2.1.1 General Description and History

This sewer district covers Detroit's western sector (7). The north boundary of the district is Eight Mile Road, bordering the City of Southfield and Oakland County. The district is bounded on the west by Redford Township and on the south by the City of Dearborn. To the east lies the Southfield Sewer District. (See Figure 2.1.)

The name of this western-most district in the City of Detroit varies between references. For example, in the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (1975), it is called the "Detroit Rouge District" while in the Segmented Facilities Plan-Book VII, WCT-203 (1978), it is called the "Rouge River District". This memorandum will refer to it as the Rouge River Sewer District.

It should be noted that the Rouge River Sewer District was originally considered as a part of a larger district, the Northwest or Rouge River Sewer District, which also contained the present Southfield and the Hubbell Sewer Districts (8). It was still considered to be part of the "Northwest District" in a map dated July 1964 (9). However, by 1975 the "Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System" (1975) dealt with it as a sewer district on its own.

The Rouge River Sewer District was one of the areas incorporated into the City of Detroit between 1920 and 1926 in the city's final expansion to its present limits, which was completed by 1929. The trunk sewers were built in the 1920's and 1930's. Residential development of the area proceeded in the 1920's, eased in the 1930's during the Great Depression, and resumed again in the 1940's and 50's.

The most important physical feature of the Rouge River Sewer District is the valley of the Main Branch of the Rouge River. The valley runs from north to south almost at the western boundary of the sewer district. The Middle Rouge Branch joins the valley at Ford Road just south of the City of Detroit limits in the City of Dearborn. Just north of I-96/ Schoolcraft Avenue corridor, the Rouge River splits into two branches, the Upper and Main branches. The Main Branch continues northwards while the Upper Rouge Branch comes in from the west. There are some residential areas within the City boundaries that lie on the west side of the river. Because the main interceptor runs along the east side of the river valley and is at a higher elevation than the bed of the river, the residential areas located on the west side of the river require special connections to connect to the interceptor. These connections include four inverted siphons under the river.

The river valley is a flood plain and most of the low-lying ground in the flood plain does not have any structures on it. There are a number of open spaces adjacent to the river channel occupied by golf courses, public parks, a cemetery and school play-areas. The City of Detroit's River Rouge Park occupies the southern part of the valley that lies in the sewer district. The floodplain extends for varying widths on both sides

of the main river channel and is lined by shallow bluffs overlooking the valley. North of Fenkell Road, the flood plain is much narrower compared to its width south of the confluence of the Upper and Main Branches of the river. The river valley also determined the layout of the sewers in the district.

The surface contours of the area slope gently from the northeast to the southwest. The elevation in the northeast corner of the district (at the intersection of Eight-Mile Road and Greenview Street) is approximately 670 feet, National Geodetic Datum 1927, (190 feet, Detroit Datum). The elevation at the bluff overlooking the Rouge River in the southwest corner (at the intersection of Warren Avenue and Pierson Street) is 615 feet, National Geodetic Datum 1927, (135 feet, Detroit Datum). Thus the land falls approximately 55 feet in 7 miles (37,000 feet). This is an average slope of approximately 0.15%, a flat gradient.

The area of the district is 10,780 acres. The land use in the district is mainly residential, primarily single-family housing. Another principal land use is open space, primarily municipal parkland, public and private golf courses and a cemetery. There are also some areas of commercial and industrial activity along the I-96 corridor as it passes through the district.

The major roads in the district are the Jeffries Freeway (I-96), the Southfield Freeway (M-39), Eight-Mile Road (M-102), Grand River Avenue (M-5) and Telegraph Road (US-24). Most of the freeway drainage systems discharge to the combined sewer system. The exception is the portion of the Jeffries Freeway (I-96) that goes through the Rouge, Southfield, and Hubbell sewer districts. The discharge for this section is directly to the Rouge River, not to the combined sewer system.

2.1.2 Physical Characteristics of the Sewer System

The construction of the sewer system in the Rouge River Sewer District began in the 1920's, soon after the annexation of the area to the City of Detroit. The Northwest Interceptor, the only interceptor in the district, was constructed in the 1920's. It is located close to the east side of the Rouge River flood plain. The remaining sewers are trunk and lateral sewers, which generally run east to west along the major streets.

There are two sanitary pump stations, Brennan Pools Pump Station and sanitary pumps located at the Puritan-Fenkell Detention Basin (described later):

- ***Brennan Pools Pump Station:*** The Brennan Pools Pump Station is located in the Brennan Swimming Pools Complex at 21415 Plymouth Road, in Rouge Park. This package pump station, with a total capacity of 4 cfs (2.6 mgd), has two 900-gpm pumps that operate intermittently as required. This pump station has two functions: to pump wastewater from the Brennan swimming pools and bathhouse facility to the Oakwood-Northwest Interceptor, and to drain the three swimming pools.

An additional sanitary pump station and two dewatering pump stations are located at the two CSO facilities in the district, Puritan-Fenkell and Seven Mile Detention Basins, as described below.

The Puritan Sanitary Pump Station was recently decommissioned when the Puritan-Fenkell and Seven-Mile CSO Detention Facilities went into operation. It was built in 1931, and was located at 16100 Riverview Avenue near Puritan Avenue. This station pumped the sanitary sewage from the area in the extreme northwest area of the district under the Rouge River and into the Northwest Interceptor. There were three pumps in the station with a total capacity of 24 cfs. The station was upgraded in 1963 when the old pumps were replaced.

There was also formerly a sanitary pump station at Warren and Pierson, which pumped the flow from the Northwest Interceptor to the Southfield Sewer. It was removed when the Northwest Interceptor was extended south of Warren Avenue in 1958 and the flow could continue southwards under gravity.

There is one major regulator structure in the district, the Warren-Pierson Control Regulator. This regulator can be operated to limit flow downstream of the regulator to the safe hydraulic capacity of the Northwest Interceptor. This regulator was installed when the original pump station at Warren and Pierson was removed and the Northwest Interceptor was extended south of Warren Avenue in 1958. The regulator diverts flows into the Rouge River at the Tireman Avenue outfall by raising the hydraulic grade upstream of the regulator.

There are four inverted siphons from the sewers on the west side of the river, under the Rouge River to the Northwest Interceptor. These siphons are located at Warren, West Chicago, Schoolcraft and Puritan. The siphons are small diameter sewers that carry the dry weather flow across the river to the Northwest Interceptor.

There are 21 outfalls from the district's sewers to the Rouge River, divided nearly equally between the east and west sides of the river. These outfalls operate when the hydraulic gradeline of the flow exceeds the elevation of the overflow weir sill. The flows from these outfalls are generally considered to be combined sewer overflows unless local problems cause the system to overflow under dry weather conditions. CSO treatment facilities and in-system storage devices have been installed by DWSD to reduce the discharge of CSOs.

Seven in-system devices (double leaf in-system storage slide gates and associated equipment) were completed in 1998 in various outfalls along the Rouge River.

There are two CSO Basins in the district:

- ***Seven Mile Detention Basin***: This basin is located on the east side of Shiawassee Avenue, north of Seven Mile, on the west side of the Rouge River. Construction of this basin was completed in 1999, and its treatment performance is currently being evaluated. It is designed to capture and treat CSOs from part of the area formerly

draining to the Puritan Sanitary Pump Station, including 983 acres in Detroit and 46 acres of Redford Township and Wayne County. Its storage capacity is 2.2 MG, and it can provide treatment for up to 656 cfs of flow. The facility contains two catinary-type bar screens and a sodium hypochlorite feed system. The basin was designed for 1-year, 1-hour duration storm (1-inch) with 30-minute detention.

During dry weather, there is no flow routed to the Seven Mile Road Basin. During wet weather, the control gate at SevenMile and Shiawassee regulates the flow between the Seven Mile Basin and Puritan-Fenkell Basin and allows operators to simultaneously fill both basins. Additional in-system storage is also provided by Seven Mile Basin. Thus both Puritan-Fenkell and Seven Mile Basin provide about 6.3 MG of additional in-system storage as a result of new Frisbee and Dale Avenue Sewers in combination with the existing sewer system. Seven Mile Basin has a minimum decant time of 0.5 hours and a minimum of 1.1 MG of volume (top half of basin) can be decanted if the decant is of high quality. The basin dewaters to the North West Interceptor (NWI). There are three dewatering pumps rated at 3000 gpm.

- ***Puritan-Fenkell Detention Basin and Pump Station***: This facility is located within the Eliza Howell Park east of Telegraph Road, south of Fenkell Avenue, and west of the Rouge River. Construction of the basin was completed in 1999, and the facility is currently in the demonstration evaluation period. It captures the remainder of the CSOs from the area draining to the Puritan station, and provides storage for 2.8 MG of CSO and treatment for up to 845 cfs of flow. Screening and disinfection is provided through three catinary-type bar screens and a sodium hypochlorite feed system. The Puritan Fenkell Basin was designed for 1-year, 1-hour duration storm (1-inch) with 20 minutes detention.

  During dry weather, total flow is conveyed to Puritan-Fenkell Basin and then pumped to the NWI. The facility contains two sanitary pumps rated at 1100 gpm each. During wet weather events, the control gate at Seven Mile and Shiawassee is used to allocate flow between the Seven Mile and Puritan-Fenkell basins to maximize CSO treatment. The basin fills by gravity from the 12'-0" diameter influent interceptor. The basin, when full, acts as a dam resulting in additional in-system storage in the collection system. The basin compartments have a 24-inch decant valve, which will allow the basin to accept more influent if the decant is of high quality. Minimum decant time for Puritan Fenkell is about 0.75 hours and decant volume is 1.8 MG (top half of basin). The basin dewaters to the NWI. There are three dewatering pumps each rated at 4500 gpm.

2.1.3 Sources

The Rouge River Sewer District boundaries are outlined in the Segmented Facilities Plan (1978) (7). The development of sewers in the district is shown in a series of drawings of the "Advanced Plan Program" done by the City Engineer's Office starting in 1945 and ending in 1965. These drawings show proposed sewers and those under construction (8, 10, 11, 12). These maps and drawings were obtained from the Sewer

Section on the 14th floor of the WBB located on Randolph Street. The characteristics of the district shown on the map have been updated with current information from the Long Term CSO Control Plan (CS-1281) and other recent DWSD projects.

The physical components of the sewer system in the Rouge River Sewer District are listed in the table below.

WASTEWATER SYSTEM COMPONENTS Rouge River Sewer District				
Area	10,780 acres or 16.8 square miles			
Miles of Sewer (estimated from GIS)	311			
Pump Stations (2)	Brennan Pools Puritan-Fenkell Detention Basin (contains sanitary pump station)			
Outfalls to the Rouge River (21)	No.	Location	No.	Location
	B54	W. Warren & Rouge River	B75	Fenkell & Rouge River
	B56, 57, 58	Tireman & Trinity	B76	Puritan Station - W. of Rouge River
	B60	W. Chicago & Spinoza	B77	Puritan Station - E. of Rouge River
	B63	W. Chicago (W. side of Rouge River)	B79	Ridge & Florence
	B64	Outer Drive & Plymouth (W. side of Rouge River)	B80, 81	McNichols & Beaverland
	B65	Burt & Capital	B82	Glenhurst & Margareta
	B67	Lahser & Dolson	B83	Seven Mile & Shiawassee
	B69	W. Parkway & Outer Drive	B85	Seven Mile & Berg
	B70	Schoolcraft & Outer Drive	B86	Frisbee & Shiawassee
	B71	Ray & Brammell	B87	Pembroke & Berg
	B72	Lyndon & Brammell		
Major Control Structures - Backwater Gates (25)	No.	Location	No.	Location
	B054	W. Warren & Rouge River	B072	Lyndon & Brammel
	B056	Tireman & Trinity (Gate 1)	B075	Eliza Howell Dr. & Fenkell
	B057	Tireman & Trinity (Gate 2)	B076	Puritan Pump Station - 16100 Riverview
	B058	Tireman & Trinity (Gate 3)	B077	Puritan Headwell - Puritan & Hazelton
	B060	West Chicago & Spinoza (Gate 1)	B079	Ridge & Florence
	B061	West Chicago & Spinoza (Gate 2)	B080	McNichols & Beaverland
	B062	West Chicago & Spinoza (Gate 3)	B081	McNichols Relief & Beaverland
	B065	Burt & Capital	B082	Glenhurst & Margareta
	B067	Lahser & Dolson (Gate 1)	B083	7 Mile & Shiawassee
	B068	Lahser & Dolson (Gate 2)	B085	7 Mile & Berg
	B069	West Parkway & Outer Drive	B086	Frisbee & Shiawassee
	B070	Schoolcraft & Outer Drive	B087	Pembroke & Berg
	B071	Ray & Brammel		

WASTEWATER SYSTEM COMPONENTS Rouge Sewer District		
Major Control Structures - Dams (23)	No. Location D56 Tireman & Trinity (Gate 1) D57 Tireman & Trinity (Gate 2) D58 Tireman & Trinity (Gate 3) D60 West Chicago & Spinoza (Gate 1) D61 West Chicago & Spinoza (Gate 2) D62 West Chicago & Spinoza (Gate 3) D63 West Chicago & Outer Drive D64 Plymouth & Outer Drive D65 Burt & Capital D67 Dolson & Lahser (Gate 1) D68 Dolson & Lahser (Gate 2) D69 Schoolcraft & W. Outer Drive	No. Location D70 Schoolcraft & W. Outer Drive D72 Brammel & Lyndon D76 Puritan Pump Station - 16100 Riverview D77 Puritan Headwall - Puritan & Hazelton D80 McNichols & Beaverland D81 McNichols & Beaverland D82 Glenhurst & Margareta D83 7 Mile & Shiawassee D85 7 Mile & Berg D86 Shiawassee & Frisbee D87 Pembroke & Berg
Other Major Control Structures	Warren Pierson Regulator Four inverted siphons under the Rouge River: Warren West Chicago Schoolcraft Puritan	
CSO or Equalization Basins (2)	Seven Mile CSO Detention Basin Puritan-Fenkell CSO Detention Basin	

2.2 Southfield Sewer District

2.2.1 General Description and History

This sewer district is on the west side of Detroit and extends from Eight Mile Road on the north to the City of Dearborn on the south. The district is bounded on the west by the Rouge River Sewer District and to the east by the Hubbell Sewer District. (See Figure 2.2.)

Like the Rouge River Sewer District, this is one of the areas incorporated into the City of Detroit between 1920 and 1926 in the City's final expansion to its present limits. The trunk sewers were built in the 1920's and 1930's and the residential development of the area proceeded in the 1920's, eased in the 1930's during the Great Depression, and resumed in the 1940's and 50's.

The surface contours of the area slope gently from the northeast to the southwest. The elevation in the northeast corner of the district (at the intersection of Eight-Mile Road and Greenfield Road) is approximately 670 feet, National Geodetic Datum 1927, (190 feet, Detroit Datum). The elevation at the bluff overlooking the Rouge River in the southwest corner (at the intersection of the Southfield Freeway and Michigan Avenue) is approximately 610 feet, National Geodetic Datum 1927, (130 feet, Detroit Datum). The land falls approximately 60 feet in 11 miles (58,000 feet). This is an average slope of approximately 0.10%, a flat gradient.

The district covers an area of 7,710 acres. The land use in the area is mostly residential, primarily single-family housing. There is also an area of industrial activity along the I-96 corridor and a strip of commercial land use along the Grand River Avenue corridor. The only appreciable area of open space is the O'Hair Park and the institutional space at Outer Drive and the Southfield Freeway.

The major roads in the district are the Jeffries Freeway (I-96), the Southfield Freeway (M-39), Eight-Mile Road (M-102) and Grand River Avenue (M-5). The Southfield Sewer District is dominated by the Southfield Freeway, which runs north-south along the line of the old Southfield Road. The freeway was constructed in the 1960's. This freeway is below grade and its construction had an impact on the drainage as it cut below the invert of the sewers crossing the Southfield Freeway.

2.2.2 Physical Characteristics of the Sewer System

The construction of the sewer system in the Southfield Sewer District (when it was the eastern part of the Northwestern District) began in the 1920's. The major sewer in the area is the Southfield sewer, located in the Southfield Freeway from Eight Mile Road to Ford Road where it joins the Hubbell sewer at the Asbury Park right-of-way. The Southfield sewer is a concrete cylinder varying in size from 6'-9" to 12'-6" in diameter. It has no remote control facilities, but has several relief connections running in an east-west direction for routing of excess combined flows to outfalls located on the east side of the Rouge River. Major relief sewers for transporting excess flow west from

the Southfield sewer are McNichols Relief (15'-0"), Glendale (13'-0"), Plymouth (8'-3" to 10'-6"), and Tireman (8'-3" to 10' -6").

The Southfield Sewer transports flow south into the Hubbell-Southfield combined sewer at Ford Road. The Hubbell-Southfield sewer extends from Ford Road south to the Rouge River, out of the City of Detroit. At the discharge of this sewer in the City of Dearborn is the Hubbell-Southfield CSO Control Basin. Just upstream from this basin are remotely controlled control gates that provide additional in-system storage. Discharges from the district to the NWI are controlled through a regulator gate at Michigan Avenue and through the Hubbell-Southfield CSO control basin.

The upper portion of the Hubbell-Southfield combined sewer, from Ford Road to Michigan Avenue, is a 13'-4" x 14'-3" concrete double box. At Michigan Avenue, where the control regulator is located, the combined sewer changes to a 14'-6" x 12'-0" concrete double box.

The construction of the Southfield Freeway and other major freeways in the area affected the routing of sewage flow in the district. The storm drainage for the road network is divided between the City of Detroit combined sewer system and a separate MDOT system, which discharges directly to the Rouge River. Most of the freeway drainage systems discharge to the combined sewer system. The exception is the portion of the Jeffries Freeway (I-96) that goes through the Hubbell, Southfield, and Rouge River sewer districts. The discharge for this section is directly to the Rouge River and not into the combined sewer system.

Parallel sewers were constructed in some sections of the Southfield freeway because of a failure soon after it opened in 1932. Recently (in the 1990's), these sections were repaired and reopened.

At the northern end of the district, the drainage from the Evergreen-Farmington Sewer District in Oakland County originally went to the Southfield Sewer. Since the construction of the Evergreen-Farmington Relief Sewer, this flow has been redirected to the First Hamilton Sewer and the North Interceptor - East Arm in the Conner Creek Sewer District.

There are two relief sewers to the Rouge River that serve the district. The first is the Glendale Relief Sewer that diverts flow from the Hubbell and the Southfield Districts to the Rouge River. The second is the Six Mile Relief Sewer (also called the McNichols Relief Sewer) that also diverts flow from the Hubbell and the Southfield Districts to the Rouge River.

There is one outfall directly discharging from the district's sewers to the Rouge River, at the place where the Hubbell sewer joins the Northwest Interceptor. (See Dearborn District map in section 4.2). This outfall formerly operated when the flow in the Hubbell Sewer or in the Northwest Interceptor exceeds the height of a weir in a regulator chamber. In 1999, the ***Hubbell-Southfield CSO Basin*** was completed just upstream of the outfall from the Hubbell Sewer to the Rouge River. The Hubbell-

Southfield Basin is located east of Southfield Freeway, south of Michigan Avenue, and north of Rotunda Drive, in the City of Dearborn. The function of this facility is to provide storage for 22 million gallons (MG) of CSOs and treatment for up to 3,200 cfs of flow. The tributary sewers/ areas that contribute to this storage facility are 140 acres in the City of Dearborn, 6,610 acres in the Hubbell Sewer District , and 7,681 acres in the Southfield Sewer District.

Flows enter the basin through the influent bar screens to the influent channel. There are six catenary-type bar screens in the facility. The influent channel then routes flows to either of the two compartments (one on each side of the DWSD NWI). When compartments are full, the water flows over the effluent weirs into the weir channel, which discharges to the Rouge River by gravity. The discharges are disinfected through the addition of sodium hypochlorite. Currently there is outflow from the basin to the Rouge River only when the design capacity of the basin is exceeded. The basin dewaters to the North West Interceptor, through four dewatering pumps each rated at 5300 gpm.

The ***Hubbell-Southfield Control Regulator*** controls the flow from the Hubbell sewer into the Northwest Interceptor and the Hubbell-Southfield CSO Basin. The regulator at Michigan Avenue has two remotely controlled 30" x 60" sluice gates, which allow diversion of flow to the Oakwood-Northwest Interceptor. The 14'-6" x 12'-0" double box contains two automatically controlled inflatable dams installed directly upstream from the backwater gates. The outfall has a reverse slope, allowing dewatering of stored sewage through the regulator to the Oakwood-Northwest Interceptor.

During dry weather, the flow is diverted to the NWI and during wet weather, the regulator will be set to divert a maximum of 86 cfs to the NWI, remaining flow is captured behind an inflatable dam up to an elevation of 100 ft. (City of Detroit Datum). When the hydraulic grade line exceeds 102 feet, the inflatable dam throttles to maintain 102 feet with resulting overflow to the Hubbell-Southfield CSO Basin.

2.2.3 Sources

The Southfield Sewer District boundaries were originally outlined in the Segmented Facilities Plan (1978) (7). The original district boundaries included the Hubbell-Southfield sewer, control regulator, and CSO basin, all located in the City of Dearborn, but controlling flows from this district. However, the current district boundaries are based on the tributary areas defined in the GDRSS model (Long Term CSO Control Plan), which considers the area below Tireman Street as part of the City of Dearborn District. Therefore, the reader should refer to the City of Dearborn District map in Section 4.2 for the location of these facilities.

The development of sewers in the district is shown in a series of drawings of the "Advanced Plan Program" done by the City Engineer's Office starting in 1945 and ending in 1965. These drawings show proposed sewers and those under construction (8, 10, 11, 12). These maps and drawings were obtained from the Sewer Section on the 14th floor of the Water Board Building. The district's interceptors and wastewater

system structures are shown in the district map based on information from more recent projects, such as the Long Term CSO Control Plan (CS-1281).

The physical components of the sewer system in the Southfield Sewer District are listed in the table below.

WASTEWATER SYSTEM COMPONENTS Southfield Sewer District	
Area	7,710 acres or 12 square miles
Miles of Sewer (estimated from GIS)	278
Pump Stations	Dewatering Pump Station at Hubbell-Southfield CSO Basin
Outfalls	Hubbell-Southfield Outfall (located in Dearborn)
Major Control Structures	Hubbell-Southfield Control Regulator (located in Dearborn
CSO or Equalization Basins	Hubbell-Southfield CSO Basin (located in Dearborn)

2.3 Hubbell Sewer District

2.3.1 General Description and History

This is sewer district is located in northwest Detroit (7). It is bounded on the north by the Oakland County boundary at Eight Mile Road, and the City of Oak Park and Royal Oak Township. The district is bounded on the west by the Southfield Sewer District and on the south by the City of Dearborn. To the east lie the Conner Creek and Baby Creek Districts of the City of Detroit. (See Figure 2.3.)

This area was incorporated into the City of Detroit between 1920 and 1926 and its development was similar to the Rouge and Southfield Districts. The trunk sewers were built in the 1920's and 1930's. The residential development of the area proceeded in the 1920's, slowed in the 1930's during the Great Depression, and resumed in the 1940's and 50's.

The Hubbell Sewer District has no dominant physical characteristic. Hubbell Avenue is the main north-south street. The Hubbell sewer was constructed in the Hubbell Avenue right-of-way in 1927. The road is located on the western side of a shallow spur of slightly higher ground that extends out from the ridge that parallels the Detroit River and meets the river at Detroit's downtown area.

The surface contours of the area slope gently from the northeast to the southwest. The elevation in the northeast corner of the district (at the intersection of Eight-Mile Road and Central Avenue) is approximately 670 feet, National Geodetic Datum 1927, (190 feet, Detroit Datum). The elevation at the southern limit of the district (at the intersection of Tireman Avenue and Greenfield Street) is 615 feet, National Geodetic Datum 1927, (135 feet, Detroit Datum). Thus the land falls approximately 55 feet in 6.5 miles (34,000 feet). This is an average slope of approximately 0.16%, a flat gradient.

The district covers an area of 6,490 acres. The land use in the area is mostly residential, primarily single-family housing. There are also some small areas of commercial and industrial activity along the I-96 corridor as it passes through the district. The major roads in the district are the Jeffries Freeway (I-96), Eight-Mile Road (M-102), Grand River Avenue (M-5) and the Lodge Freeway (M-10).

2.3.2 Physical Characteristics of the Sewer System

The construction of the sewer system in the Hubbell Sewer District began in the 1920's with the construction of sewers in the area. The area drains ultimately to the Northwest Interceptor. The major sewer in the district is the Hubbell Sewer which is located in the Hubbell Avenue right-of-way from Hessell Street to Tireman Avenue where it turns west along Tireman and enters the Southfield Sewer District. The remaining sewers are trunk and lateral sewers that generally run east to west along the major streets.

The Hubbell sewer is a concrete cylinder that extends south along Hubbell Road, from Eight Mile Road to Paul Road, varying in size from 8'-3" to 14'-3". At Paul Road, the Hubbell sewer changes to a 12'-0" x 14'-3" double box that extends south to Ford Road, where it joins the Southfield sewer and continues south as the Hubbell-Southfield sewer (described under Southfield District). The Hubbell sewer has no remotely controlled facilities, but has high-level relief conduits to transport excess flow in an east-west direction to the Southfield sewer and Rouge River outfalls.

Various relief sewers were constructed in the district to relieve the Hubbell Sewer. These sewers include: the Six Mile or McNichols Relief Sewer (11'-3"), which runs from just east of Hubbell Avenue to the Rouge River at Six Mile Road crossing; the Hubbell Relief Sewer, which runs along Hubbell Avenue from Curtis to McNichols and takes flow from the Curtis Sewer to the Six Mile Relief Sewer; and the Glendale Relief Sewer (11'-3"), which takes flow from the Hubbell Sewer to the Rouge River, and is connected to the Hubbell sewer by high-level relief sewers directly south of Schoolcraft Road.

There are no outfalls from the district's sewers directly to the Rouge River. Any overflows to the river occur after flow has entered the Southfield district. There are no major regulators, CSO basins, or pump stations located in the district. However, the flow from this district is discharged through the Hubbell-Southfield interceptor, regulator, and CSO basin, as described in Section 2.2 (Southfield Sewer District).

2.3.3 Sources

The maps available are the same as those showing the Rouge and Southfield sewer districts. The Hubbell Sewer District boundaries are outlined in the Segmented Facilities Plan (1978) (7). The development of sewers in the district is shown in a series of drawings of the "Advanced Plan Program" done by the City Engineer's Office starting in 1945 and ending in 1965. These drawings show proposed sewers and those under construction (8, 10, 11, 12). These maps and drawings were obtained from the Sewer Section on the 14th floor of the WBB located on Randolph Street. The characteristics of the district shown on the map have been updated with current information from the Long Term CSO Control Plan (CS-1281) and other recent DWSD projects.

The physical components of the sewer system in the Hubbell Sewer District are listed in the table below.

WASTEWATER SYSTEM COMPONENTS Hubbell Sewer District	
Area	6,490 acres or 10.1 square miles
Miles of Sewer (estimated from GIS)	218
Pump Stations	None
Outfalls	None
Major Control Structures	None
CSO or Equalization Basins	None

2.4 Oakwood Sewer District

2.4.1 General Description and History

The Oakwood Sewer District lies on the south side of the Rouge River. It was annexed to the City of Detroit in 1922. It looks like a long finger that extends between the cities of River Rouge and Ecorse on the east and the City of Melvindale to the west and ends at West Outer Drive at the Detroit boundary with the City of Lincoln Park. (See Figure 2.4.)

The surface contours of the area slope very gently from the southwest to the northeast. The elevation in the southwest corner of the district is approximately 600 feet, National Geodetic Datum 1927, (120 feet, Detroit Datum). The elevation at the Rouge River in the northeast is 585 feet, National Geodetic Datum 1927, (105 feet, Detroit Datum). Thus the land falls approximately 15 feet in 2.5 miles (12,500 feet). This is an average slope of approximately 0.12%, a flat gradient.

The major physical features dominating the Oakwood District are the Rouge River and the Fisher Freeway (I-75). The freeway cuts through the district along the long axis. Because of the relatively small size of district, the freeway constitutes a major fraction of the area of the district. However while it makes a significant impact on storm flows due to its relatively large impervious area, it does not contribute to the dry weather flow.

This sewer district is the smallest in Detroit, covering an area of 1,520 acres. The land use in the area is mostly residential, single-family housing, with a large industrial corridor between Oakwood Boulevard and I-75, and around the Rouge River.

2.4.2 Physical Characteristics of the Sewer System

The Oakwood Sewer District is the smallest sewer district in Detroit. The whole district drains to the Northwest Interceptor, which runs along the north edge of the district and then crosses the river to join the Oakwood Interceptor on the east side of the Rouge River.

The Oakwood District is drained by two trunk sewers that transport flow to the Oakwood Pump Station, the Liddesdale sewer and the Sanders sewer. The Liddesdale sewer begins at Gleason Road as a 5'-6" diameter concrete cylinder and runs in a northeasterly direction, increasing to a 10'-0" diameter cylinder at Oakwood Pump Station. The Sanders sewer is a short 6'-9" diameter sewer that runs in a southerly direction, increasing to a 10'-0" diameter cylinder at the Oakwood Pump Station. The Oakwood Pump Station lifts flow into the Oakwood-Northwest Interceptor at Fort Street west of the Rouge River. Excess combined flows are discharged to the Rouge River.

There are a number of smaller sewers on Sanders Street, Mellon Street, and West Fort Street that drain the area north and west of the Fisher Freeway to the Oakwood Pump Station. The sewers on Schaefer Highway drain to the Liddesdale Sewer.

The district's wastewater and stormwater is pumped by the ***Oakwood Pump Station***. The Oakwood Pump Station is located at 12330 Sanders Avenue, about 1-1/ 2 miles northwest of the Detroit Wastewater Treatment Plant. During dry weather, flow into the station is primarily domestic and industrial wastewater. This wastewater is pumped by two sanitary pumps rated at 20.1 cfs (13 mgd) each through a 36-inch force main to the Oakwood Interceptor, which flows to the WWTP. One sanitary pump normally will maintain a low level in the wet well.

During heavy rains when the storage capacity is exceeded, the six storm water pumps can discharge combined sewage to the O'Brien Drain to avoid flooding. These six pumps are rated as follows: two pumps rated at 106 cfs (68.5 mgd), two pumps rated at 41.5 cfs (63.3 mgd), and two pumps rated at 40.2 cfs (26 mgd). The O'Brien Drain transports these flows to the Rouge River. Due to the industrial character of the district, the potential exists for accumulation of waste oil in the wet well. To remove as much oil as possible from the wet well, an oil skimmer is installed at the station. The removed skimmed oil is stored in an underground waste oil storage tank.

Oakwood Pump Station and flooding problems in the Oakwood District have been evaluated under PC-719. Renovations for the pump station (replacement and reconditioning of pumps) and additional improvements are currently under design, with a projected completion date of 2004. An additional recent contract has provided an emergency diesel generator to provide power during outages.

There three outfalls in the district along the Rouge River, four backwater gates, and a siphon under the Rouge River.

2.4.3 Sources

There is a map of the Oakwood Sewer District in the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (1975) (13). The characteristics of the district shown on the map have been updated with current information from the Long Term CSO Control Plan (CS-1281) and other recent DWSD projects.

The various physical components of the sewer system in the Oakwood Sewer District are listed in the table below.

WASTEWATER SYSTEM COMPONENTS Oakwood Sewer District		
Area	1,520 acres or 2.4 square miles	
Miles of Sewer (estimated from GIS)	51	
Pump Stations	Oakwood (sanitary and storm)	
Outfalls (3)	No. 54 55 56	Location (all on the Rouge River) Rouge Valley Isolation Gate (Fort & Oakwood) Rouge Valley Isolation Gate S. Fort & Oakwood
Major Control Structures - Backwater Gates (4)	No. B049 B050 B051 B097	Location Oakwood & Fort West Oakwood & Fort Oakwood & Fort/ Wayne Co. Oakwood & Pleasant Siphon under the Rouge River (Northwest Interceptor)
CSO or Equalization Basins	None	

2.5 Baby Creek Sewer District

2.5.1 General Description and History

This is sewer district covers the west central part of the City of Detroit (14) and extends from I-94 all the way to McNichols (Six Mile) Road. It is bounded on the north by the Conner Creek Sewer District, and on the west by the Hubbell Sewer District. To the south and east lies the Central Sewer District. (See Figure 2.5.)

Most of the community of Highland Park was traditionally considered part of the Baby Creek Sewer District, although it is also considered to be a suburban customer of DWSD. Highland Park is also considered separately in Section 4.5. The southeastern section of the City of Dearborn near Baby Creek was also considered to be part of this area.

The surface contours of the area slope gently from the north to the south. The elevation in the northwest corner of the district is approximately 665 feet, National Geodetic Datum 1927, (180 feet, Detroit Datum). The elevation at the Rouge River in the south is 585 feet, National Geodetic Datum 1927, (105 feet, Detroit Datum). Thus the land falls approximately 80 feet in 8 miles (40,000 feet). This is an average slope of approximately 0.20%, a flat gradient.

The Baby Creek Sewer District was one of the areas incorporated into the City of Detroit between 1905 and 1917. The trunk sewers were built in the 1920's and 1930's. The residential development of the area proceeded in the 1920's, slowed in the 1930's during the Great Depression, and resumed in the 1940's and 50's.

The area of the district is 11,760 acres. Land use is approximately 60% residential, with large sections of industrial land use near the center of the district, and institutional land use along McNichols. There are several large freeways and major roads that cross the district - from north to south, the John C. Lodge (I-10), Jeffries (I-96), and Ford (I-94) freeways.

2.5.2 Physical Characteristics of the Sewer System

Baby Creek Sewer District drains primarily into the Baby Creek Enclosure, which transports flow into the Oakwood Interceptor through a remotely controlled regulator. The control facility is located on Miller Road north of Fort Street and contains two 72" x 48" sluice gates. The westerly gate is manually controlled and normally remains closed, while the easterly gate is remotely controlled to divert flows to the Oakwood Interceptor. Excess combined flows discharge to the Rouge River through the Baby Creek Outfall.

The major sewers in the Baby Creek District are as follows in the Segmented Facilities Plan (14):

- Baby Creek Enclosure: The Baby Creek Enclosure extends approximately three miles from Kirkwood Road south to the Rouge River, and varies from a 14'-6" x 17'-

6" double box at Dix just south of Kirkwood Road to a 14'-6" x 17'-6" triple box and then to a 14'-6" x 17'-6" double box.

- Lonyo Sewer: The Lonyo sewer begins at Kirkwood Road as a 14'-0" x 14'-6" concrete double box and changes to three 11'-6" diameter concrete cylinders, then back to a 14'-0" x 14'-6" double box before connecting into the Baby Creek Enclosure at Dix Road. The Lonyo sewer has no remotely controlled facilities.

- Elmer Ternes Sewer: This sewer parallels the Lonyo sewer. It begins at Kirkwood Road as a 14'-0" x 14'-6" concrete double box and changes to three 11'-6" diameter concrete cylinders, then back to a 14'-0" x 14'-6" double box before connecting into the Baby Creek Enclosure at Dix Road.

- Wyoming Sewer: The Wyoming sewer is a concrete cylinder varying from 5'-3" diameter at Puritan road to 11'-6" diameter at Warren Avenue, where it joins the Wetherby sewer. The Wyoming sewer runs in a general north-south direction and has no remotely controlled facilities.

- Wyoming Relief Sewer: The Wyoming relief sewer is a concrete cylinder varying from 7'-0" to 15'-0" in diameter, and also has no remotely controlled facilities. It parallels the Wyoming sewer in a general north-south direction, connecting into the Lonyo sewer, south of the Weatherby sewer through relief port type connections.

- Joy and Edison Sewer (also called the Weatherby Arm): The Weatherby sewer transports dry weather and some storm flows from the junction structure of the Livernois, Upper Livernois relief and Joy sewers at Joy Road to the Lonyo sewer at the intersection of Lonyo Road and Kirkwood Road. The Weatherby sewer is a 17'-9" x 13'-5" five-centered brick arch and has no remotely controlled facilities.

- Livernois Sewer: The Livernois sewer is a concrete cylinder running primarily in a north-south direction, transporting combined flows from Puritan Road to Joy Road. The Livernois sewer varies from 5'-0" diameter at Puritan Road to 9'-0" diameter at Joy road, and has no flow control facilities.

- Livernois Relief Sewer: The Livernois relief sewer runs in a north-south direction from Joy Road to the Detroit River, receiving excess combined flows from the Wetherby sewer through high level relief connections, and from a remotely controlled low level (sluice gate) connection, for discharge to the Detroit River Interceptor (DRI) and Dragoon Outfall. The Livernois relief sewer is a 19'-6" diameter concrete cylinder and extending from Joy Road to Jefferson Avenue. Beyond Jefferson Avenue, the Livernois relief sewer flows to the Detroit River throughout the Dragoon Outfall, a 10'-6" x 9'-0" concrete box.

  The Livernois relief sewer has four remotely controlled facilities. At Joy Road, a low-level connection from the Weatherby sewer is remotely controlled through a sluice gate. At Warren Road, all flow in the Livernois relief sewer can be restricted by two 6'-6" remotely controlled sluice gates. At Ranspatch Avenue, a 7'-0"

fabridam was installed for remotely controlled operation. This dam is not currently operational. The float controlled regulator at Jefferson Avenue was modified with a remotely controlled 36" x 24" sluice gate for diverting excess combined flow to the Dragoon Outfall.

- Upper Livernois Relief Sewer: The Upper Livernois relief sewer is a concrete cylinder running parallel with the Livernois sewer. It varies in size from 6'-0" diameter at Puritan Road to 11'-6" diameter at Joy Road. The Upper Livernois Relief Sewer begins at Puritan Road, receiving flow through a series of high level relief connections and transports combined flow to the Weatherby sewer south of Joy Road through another series of high level relief connections. The Upper Livernois relief has no flow control facilities.

- Linwood Sewer: This 9'6" diameter concrete sewer follows Linwood Street at a 0.12 percent slope.

There is only one pump station in the district, the ***Woodmere Sanitary and Storm Pump Station***, located in George Patton Park between Dix Avenue and Vernor Highway, about two miles north of the Detroit Wastewater Treatment Plant. This station serves a 450-acre area at the southern end of the district close to the WWTP. It was built in 1959 to service an area that was sewered in the early 1900's with shallow sewers and drained directly to the Rouge River and Baby Creek.

At the time the station was installed, a deeper sewer system was also installed to provide storm relief to the original sewers. These deep sewers, the Woodmere and Vernor relief sewers, discharge into the Woodmere wet well. The station stores wastewater until the Oakwood Interceptor can handle the excess flow. Then, wastewater is pumped from the wet well to the Baby Creek Enclosure, where a regulator directs the flow either to the Oakwood Interceptor or to the Rouge River during wet weather events.

The station pumps mostly storm flows but also discharges some sanitary flows to the Baby Creek Enclosure. There are three storm pumps each rated at 256 cfs (165.5 mgd), and two sanitary pumps each rated at 8 cfs (5.2 mgd).

The Woodmere Station is scheduled to receive an emergency backup generator to provide power during power outages and reduce the possibility of sewage overflows and backups.

The following control structures divert flow under high flow conditions:

- The Joy Control Gate divides flow between the Weatherby Arm Sewer and the Livernois Relief Sewer.

- There is a diversion structure where the First-Hamilton Relief Sewer crosses the Edison Sewer. This structure diverts flow under wet weather conditions from the

upper part of the district (Subdistrict BC-6 east of the First-Hamilton Sewer) to the North Interceptor-East Arm and the Detroit River Interceptor.

There is one outfall in the district to the Rouge River. In addition to the structures mentioned above, there are two backwater gates in the district.

The ***Baby Creek CSO Control Facility*** will control and treat discharges from the Baby Creek outfall through screening and disinfection. The project is scheduled to start in June 2003 and be completed by August 2005. The Basis of Design Report, completed in October 2000, locates the facility in Detroit's Patton Park, close to Woodmere Pump Station, between the Baby Creek Sewer and the Elmer Ternes Sewer immediately north of Vernor Highway. The structure planned will be 250' by 100' by 30', constructed mostly below ground. Treatment capacity (screening and disinfection) is 5,100 cfs.

2.5.3 Sources

A map of the Baby Creek Sewer District is shown in Figure 4 of the "Segmented Facilities Plan-Book VII, WCT-203" (1978) (14). The district boundaries and wastewater system facilities are shown in the district map based on information from more recent projects, such as the Long Term CSO Control Plan (CS-1281).

The physical components of the sewer system in the Baby Creek Sewer District are listed in the table below.

WASTEWATER SYSTEM COMPONENTS Baby Creek Sewer District	
Area	11,760 acres or 18.4 square miles
Miles of Sewer (estimated from GIS)	466
Pump Stations	Woodmere (sanitary and storm)
Outfalls	No. B52 - Baby Creek (Miller & W. Fort) to the Rouge River
Major Control Structures	No. B52 - Miller & Fort/Baby Creek (backwater gate & regulator) No. B118 - Wyoming & Southern (backwater gate) Baby Creek Control Regulator Joy Control Gate Diversion Structure - First-Hamilton Relief & Edison Sewers
CSO or Equalization Basins	Baby Creek CSO Control Facility (under construction)

2.6 Conner Creek Sewer District

2.6.1 General Description and History

This sewer district is located on the north-central boundary of Detroit (15). It is bounded on the north by the Oakland County boundary on Eight Mile Road and the Cities of Ferndale, Oak Park and Warren. To the west is the Hubbell Sewer District, and to the east is the Fox Creek Sewer District. To the south lie the Baby Creek, Central, and East Jefferson Sewer Districts. (See Figure 2.6.)

Some of the community of Highland Park and part of Hamtramck are included in the Connor Creek Sewer District, although these cities are also considered to be suburban customers of DWSD. This section will consider these communities only with respect to the physical components of the sewer system that lie within their boundaries. The institutional arrangements will be considered separately under the sections dealing directly with the suburban customers.

The surface contours of the area slope gently from the northwest to the southeast. The elevation in the northwest corner of the district is approximately 645 feet, National Geodetic Datum 1927, (165 feet, Detroit Datum). The elevation at the Rouge River in the south is 590 feet, National Geodetic Datum 1927, (105 feet, Detroit Datum). Thus the land falls approximately 55 feet in 12 miles (60,000 feet). This is an average slope of approximately 0.09%, a very flat gradient.

Two major suburban flows enter the district from the north, the Evergreen – Farmington Sewer District flow and the Southeast Oakland Sewer District flow. Both these flows are carried to the North Interceptor–East Arm by relief sewers.

The district covers an area of 17,360 acres, making it the second largest sewer district. Land use is primarily residential single-family homes, with some large undeveloped areas (Palmer Park and Woodland Cemetery) and industrial areas in the eastern portion of the district around Mound Road.

The major roads in the district are Woodward Avenue, the Chrysler Freeway (I-75), Gratiot Avenue, and the Ford Freeway (I-94).

2.6.2 Physical Characteristics of the Sewer System

This district originally drained eastwards to the Conner Creek Enclosure following the natural surface drainage of the area to the creek. Subsequently, flow was diverted south through the First-Hamilton and Evergreen-Farmington Relief Sewers and additional relief sewers were constructed on McNichols (Six Mile) and Seven Mile Roads.

The major sewers in the District are as follows:

- Conner Creek Sewer (Enclosure): The Conner Creek District primarily drains into the Conner Creek Sewer. The Conner Creek Sewer also transports suburban flow

from the City of Center Line. This sewer flows in a general north-south direction and discharges through the Conner Creek control regulator into the DRI or, during wet weather events, through the Conner Creek outfall to the Detroit River. The Conner Creek CSO Facility (currently under construction and located in the Fox Creek Sewer District, Section 2.8) will treat the discharges from the Conner Creek system.

Conner Creek Sewer begins at Eight Mile Road as an 8'-0" diameter concrete cylinder increasing in size to a 13'-6" diameter cylinder at Seven Mile Road. From Seven Mile Road south to McNichols (Six Mile) Road, the Conner Creek sewer is a 19'-3" x 14'-5" five-centered arch. It changes to a 24'-0" x 17'-8" five centered arch from Six Mile Road to Lynch Road. Between Lynch Road and the flushing gates at Warren Avenue, Conner Creek sewer changes to a 12'-0" x 17'-6" concrete double box. From the flushing gates south to the control regulator, the combined sewer changes from a 15'-9" x 17'-6" concrete triple box to a 17'-6" x 22'-11" double box. Downstream of the control regulator, Conner Creek sewer is an 18'-6" x 21'-9" concrete triple box outfall. Approximately seven miles of open channel remain on this sewer

- Seven Mile Sewer and Seven Mile Relief Sewer: The Seven Mile Sewer follows Seven Mile Road from Conner Creek Sewer, where it starts as a 11'6"-foot arch, to the Rouge River on the west side of the city. The Seven Mile Relief Sewer runs in an east-west direction, varying from a 13'-0" to a 9'0" diameter concrete cylinder between Conner Creek Sewer and Conant-Mt. Elliott.

- Conant – Mt. Elliott Relief Sewer: The Conant-Mt. Elliott Relief Sewer is a concrete cylinder varying from 9'-0" diameter at Eight Mile Road to 16'-3" diameter at Monroe Avenue. At Monroe Avenue, the sewer divides into two 11'-0" diameter cylinders each extending to East Jefferson Avenue. Between East Jefferson Avenue and the Detroit River, the sewer is a 10'-0" x 10'-6" concrete double box.

  The Conant-Mt. Elliott sewer receives metered suburban flows from Southeast Oakland County Sewage District via the Dequindre Interceptor. Flow from the Dequindre Interceptor enters the Conant-Mt. Elliott sewer by gravity at Emery Road. The flows are then conveyed south and drop by gravity into the North Interceptor-East Arm. During dry weather, all of the flows are conveyed through the NI-EA to the Wastewater Treatment Plant. During wet weather, the excess wet weather flows are conveyed through the four remotely controlled Leib regulators to the DRI and are discharged through an outfall to the Detroit River. The Leib CSO Facility currently under construction (described in Section 2.7) will treat these discharges to the river.

  The Conant-Mt. Elliott sewer also transports dry weather and some excess combined flows which it receives through high and low-level relief connections from the Seven Mile Relief, McNichols, Lynch Road, and other sewers in the Conner Creek and Central Districts.

- First–Hamilton Relief Sewer: Originally, the First-Hamilton Relief Sewer transported flow from Seven Mile to the DRI and the Detroit River Interceptor. After the construction of the Evergreen-Farmington Relief Sewer, the First-Hamilton Sewer transported flow from the Evergreen-Farmington District in Oakland County to the North-Interceptor -East Arm and the Detroit River Interceptor.

  There is a structure at the intersection of the First-Hamilton Relief Sewer and Seven Mile Sewer that allows for flow to be diverted into the relief sewer under certain conditions. Similarly, there is a cross-connection structure at the intersection of the First-Hamilton and Six Mile Sewer that allows for flow to be diverted into the First–Hamilton Relief Sewer under certain conditions.

  The First-Hamilton Sewer is a concrete cylinder varying from 4'-0" diameter along Seven Mile Road to 15'-6" diameter at Congress Avenue. From Congress Avenue to the Detroit River, it is a 10'-0" x 10'-6" double box. The First-Hamilton Sewer has one remotely controlled facility that regulates the flow to the DRI. The float-operated regulators are located at Congress and have been modified with hydraulic operators that can be remotely operated by system control.

- McNichols (Six Mile) Sewer, a combined sewer, varies within the Conner Creek district from a 5'-6" concrete cylinder at Griggs Street to a 10'-6" cylinder at its junction with Conner Creek sewer. The McNichols sewer has no remotely controlled facilities, but has two flow routing connections within the Conner Creek district. Dry weather and some excess combined flow is transported from the McNichols sewer to the First-Hamilton and Conant-Mt. Elliott sewers through high and low-level connections at their intersections.

- The Lynch Road Sewer, a combined sewer, is a concrete cylinder varying in size from 4'-0" diameter west of the Conant-Mt. Elliott sewer to 11'-6" diameter at its junction with Conner Creek sewer. The Lynch Road sewer provides routing for dry weather flow to the Conant-Mt. Elliott sewer through high and low-level connections.

- The North Interceptor-East Arm (NI-EA) Interceptor crosses the district from north to south, starting at the Northeast PumpStation. This interceptor is described further in Appendix A, section A.2.3.

Conner Creek Sewer contains two remotely controlled facilities, the ***Connor Creek Flushing Gates*** at Warren Avenue and the ***Conner Creek Control Regulator*** (control gates) south of East Jefferson Avenue (actually located in the East Jefferson Sewer District). The flushing gates consist of three 10'-0" x 7'-0" roller gates. The flushing gates were installed at the upstream end of the three barrels to route minor storm flow into a single barrel and to reduce sedimentation. The control regulator has a 48-inch knife gate of sufficient capacity to allow normal dry weather flow into the Detroit

River Interceptor and two additional 60" x 72" sluice gates for remotely controlled operation.

The ***Northeast Pump Station*** is located in Detroit, but serves Macomb County Wastewater Disposal District in Macomb County and the Clinton-Oakland Sewer District in Oakland County. It is located at 11000 East Eight Mile Road, south of the Northeast Water Treatment Plant and between Van Dyke and Hoover Roads in Detroit. The Northeast Pump Station accepts wastewater from the Edison Corridor Interceptor and pumps it to the North Interceptor - East Arm. The Edison Corridor Interceptor receives flow from two branches. One branch is the 15 Mile Road Interceptor, which receives flow from the Romeo Arm, and Garfield and Lakeshore Interceptors in Macomb County. The other branch transports flow from Oakland County through the Oakland Arm Interceptor. Because most of the collection systems in these suburban areas have separated rather than combined sewers, the wastewater flow to the station was though to be nearly all sanitary sewerage with only small increases in flow during wet weather. However, in 1995-96 a wet-weather response was observed at the pump station and evaluated in subsequent study.

The pump station currently includes 3 pumps: two sanitary pumps rated at 150 cfs (97 mgd) each, and one sanitary pump rated at 100.6 cfs (65 mgd). The pump station can be expanded to include three additional pumps. Work is currently underway to add an additional 150 cfs (97 mgd) pump to the station to increase its reliability and to reduce maintenance related to solids buildup in the station wet well. The installation of this third pump is scheduled to be completed by 2004.

The ***Conner Creek Pump Station*** and associated other facilities (such as the Conner Creek CSO Basin and Conner Creek Control Regulator) associated with the Conner Creek Enclosure are located in the East Jefferson Sewer District.

2.6.3 Sources

A map of the Connor Creek Sewer District is shown in Figure 5 of the "Segmented Facilities Plan-Book VII, WCT-203" (1978) (15). The district's interceptors and wastewater system structures are shown in the district map based on information from more recent projects, such as the Long Term CSO Control Plan (CS-1281).

The physical components of the sewer system in the Conner Creek Sewer District are listed in the tables below.

WASTEWATER SYSTEM COMPONENTS Conner Creek Sewer District	
Area	17,360 acres or 27.1 square miles
Miles of Sewer (estimated from GIS)	595
Pump Stations	Northeast Pump Station (Conner Creek Pump Station - see East Jefferson Sewer District)
Outfalls	None
Major Control Structures	Conner Creek Flushing Gates (Conner Creek Control Regulator (Gates) - see East Jefferson Sewer District)
CSO or Equalization Basins	None - (Conner Creek CSO Facility - see East Jefferson Sewer District)

2.7 Central Sewer District

2.7.1 General Description and History

This sewer district lies at the center of the City of Detroit (16). It is bounded on the north by the Conner Creek Sewer District and on the south by the Detroit River. The district is bounded on the west by the Baby Creek Sewer District and on the east by the Conner Creek Sewer District and East Jefferson Sewer District. (See Figure 2.7.)

The Central Sewer District includes the area of the original city settlement dating back to the early 1800's. Settlement of the city expanded outward during the 1800's from the city center at Woodward and Jefferson, and thus includes the oldest infrastructure. Most of this area was incorporated into the City by 1900.

The most important physical feature of the Central Sewer District is the Detroit River. All of the major sewers in the district run to the Detroit River, where they originally discharged directly to the river.

The surface contours of the area slope gently from the northwest to the southeast. The elevation in the northeast corner of the district is approximately 626 feet, National Geodetic Datum 1927, (145 feet, Detroit Datum). The elevation at the Rouge River in the south is 590 feet, National Geodetic Datum 1927, (105 feet, Detroit Datum). Thus the land falls approximately 36 feet in 8.5 miles (43,000 feet). This is an average slope of approximately 0.08%, a very flat gradient.

The area of the district is 22,490 acres, making it the largest sewer district in the city. The land use in the district is generally a mixture of residential, commercial and industrial. The principal category is the commercial center in the downtown core and single-family housing in the surrounding areas. The Central Sewer District incorporates most of the City of Hamtramck. Hamtramck is also discussed in Section 4.5.

The major roads in the district are the Jeffries Freeway (I-96), the Lodge Freeway (M-10), the Ford Freeway (I-94), the Chrysler Freeway (I-75), Michigan Avenue, Grand River Avenue, Woodward Avenue, Gratiot Avenue and Jefferson Avenue. Drainage of the freeways in this area is to the combined sewer system.

2.7.2 Physical Characteristics of the Sewer System

The Central Sewer District receives flows from all of the other districts. The Rouge River, Southfield, Hubbell, Oakwood, Baby Creek, Conner Creek, Fox Creek, and East Jefferson District all eventually discharge to the Central District. Suburban flows also reach the district through major interceptors that cross the district and discharge to the Detroit Wastewater Treatment Plant. The construction of the sewer system in the Central Sewer District began in the mid-1800's. The Detroit River Interceptor (DRI) was constructed before 1910 in the district, and receives flows from both local trunk sewers and other portions of the DWSD service area. The North Interceptor-East Arm (NI-EA), constructed in the early 1980's, crosses the district, taking flows from

northeast suburban communities in Macomb County to the Wastewater Treatment Plant. The other major sewers transporting suburban flows are the First-Hamilton Interceptor, which transports flow from the Evergreen-Farmington District in Oakland County and the Conant-Mt. Elliot Sewer, which transports flow from the Southeast Oakland Sewer District. Both of these are connected to the NI-EA and the DRI, but overflow to the Detroit River . Additional details on the major interceptors can be found in Appendix A.

A number of relief sewers have been constructed through the district to convey flow from the areas to the north to the North Interceptor–East Arm and the Detroit River Interceptor. The remaining sewers are trunk and lateral sewers that generally run north to south along the major streets. The entire Central Sewer District drains generally southeast through combined trunk sewers, with dry weather and some combined flows discharging to the DRI through many flow control regulators. The combined sewers are generally perpendicular to the DRI and the Detroit River, having relatively short lengths and flat slopes. Nearly all have individual outfall sewers to the Detroit River.

Some of the major trunk and relief sewers in the district include the Livernois Relief, Morrell, and Fischer Sewers. There are so many large sewers in this district, that it is not possible to show all of them on the district map. Some important ones that are not shown include the Central, Clark, Third Street, Brush, and Joseph Campau Sewers.

Wastewater collection system structures in the district include the Detroit Wastewater Treatment Plant, regulators, control gates, pump stations, backwater gates, dams, outfalls, and CSO basins (2). Some additional information on the Wastewater Treatment Plant is presented in Appendix A, but this facility will not be described in detail in this technical memorandum. The other major regulators, pump stations, and CSO basins are described below. The backwater gates, dams, and outfalls are described in Appendix A and listed in the table at the end of this section.

Some of the major regulator structures in the District are:

- Dearborn Regulator: The Dearborn regulator is located at Dearborn Street and West Jefferson Avenue near the Wastewater Treatment Plant. The regulator, when closed, restricts flow from the Dearborn sewer to the DRI, thus allowing storage in the Dearborn sewer up to the elevation of the existing dams or the river level on the backwater gates, before an overflow occurs. The regulator is modulated to prevent an overflow, while maximizing storage. The regulator was modified to include remotely controlled operation with a 66" diameter electrically operated sluice gate, for selective loading to the DRI. This change was made because the float-operated regulator sometimes would not close due to drawdown in the interceptor from the treatment plant pump station. The remotely controlled facilities allow the first flush to be intercepted during a storm event.

- Livernois Regulator: The Livernois regulator located at Dragoon and West Jefferson Avenue, transfers flow from the Livernois relief sewer to the DRI. The

regulator was modified for remote control operation with installation of a 24" x 36" sluice gate for diverting excess combined flow to the outfall.

- Leib Regulator: The Leib regulator, located at the intersection of the Leib and East Jefferson Avenue, transfers flow from the Conant-Mt. Elliott combined sewer to the DRI. The existing regulator was modified for remote control operation with the installation of hydraulic cylinder operators on each of the existing shutter gates.

- McClellan-Cadillac Control Regulator: The McClellan-Cadillac regulator is located approximately 2,000 feet downstream of the Fairview Pump Station. It has been modified by removal of the original float mechanism and gates, and installation of two remotely controlled a 24" x 24" sluice gates. This change was made because it was found that flow in the DRI would sometimes back up through the regulator chamber and top the overflows weirs in the McClellan and Cadillac sewers when Fairview Pump Station was operated during storm events.

Other control facilities include:

- Warren Control Gate

- Joy Control Gate at Joy Road and Warren, in the Livernois Relief Sewer

- Fabridam (remotely controlled) at Ranspatch Avenue in the Livernois Relief Sewer

- First-Hamilton (remotely controlled facility along the DRI)

There are five major pump stations in the district:

- ***Pump Stations - Detroit Wastewater Treatment Plant***: There are two large pump stations at the Wastewater Treatment Plant. The older Pump Station No. 1 (PS-1) contains eight centrifugal pumps. PS-1 has an installed capacity of 2,234 cfs (1,440 mgd), and a firm capacity of 1,895 cfs (1,225 mgd). Pump Station No. 2 was completed in 1994 and contains seven pumps. It has an installed capacity of 1,246 cfs (805 mgd) and firm capacity of 1,067 cfs (690 mgd).

- ***Fairview Sanitary Pump Station***: This is a lift station for the Detroit River Interceptor that is located at 202 Parkview East, off East Jefferson Avenue. The station was originally built in 1910. It was upgraded in 1952 when the pumps were replaced. In 1974, further modifications were made to increase the capacity of the station to 336 MGD. It contains three sanitary pumps each rated at 150 cfs (97 mgd), one sanitary pump rated at 75.8 cfs (49 mgd), and a dewatering pump rated at 1.5 cfs (1 mgd). An emergency backup generator is planned for this facility in the near future.

  The wastewater discharged from the Conner Creek Pump Station into the DRI passes into the Fairview Pump Station wet well through a 9-foot diameter conduit. Up to four sanitary pumps can pump the wastewater flow into the DRI. One pump operates at all times to handle normal dry weather flow. During storm events

additional pumps are started to handle the increased flow. Because of the limited capacity of the discharge channel, no more than two large pumps and one small pump are operated simultaneously. The capacity of the pump station can be exceeded, causing the flow to back up in the Detroit River Interceptor and the Conner Pump Station. Flap gates have been installed on the pump discharge lines in the channel to reduce backflow through the pumps.

- ***Fischer Pump Station***: This facility is located in Erma Henderson Park, 8650 East Jefferson Avenue. It contains two sanitary pumps rated at 10.5 cfs (6.8 mgd) each. Wastewater is pumped from the Fischer Relief Sewer into the Detroit River Interceptor. The pump station is below ground, near the point where the Fischer Relief Sewer passes under the 11-foot diameter DRI. During dry weather conditions, this station is able to handle all incoming flow through the relief sewer. Normally, one pump operates intermittently to pump the dry weather flow. In the unmanned mode, operation of the pumps is controlled locally by a level control system. During storm conditions, when the DRI flow level is too high and cannot accept additional flow, the pump is shut down, and wastewater backs up to the backwater gates, resulting in overflows.

- ***Belle Isle Pump Station***: The sewage pumping system on Belle Isle consists of seven packaged pump stations and a main pump station. All the packaged stations, except Station No. 7, pump the sewage to the main pump station (No. 7 collects the parking lot storm drainage and discharges it to the canal). The six package stations include two sanitary pumps with capacities ranging from 150 to 2,000 gpm. At the main Belle Isle Pump Station, wastewater is pumped by two sanitary pumps rated at 18.6 cfs (12 mgd) each across the Detroit River to the Detroit River Interceptor (DRI) through a 12-inch force main. When excessive storm flow is received at the Belle Isle main pump station, two storm pumps rated at 15.8 cfs (10.2 mgd) each are used to pump the excessive flow into a storage tank, where it is held until the flow decreases. If the storage tank capacity is exceeded, the overflow goes directly to the Detroit River. Stormwater remaining in the storage tank after the flow has decreased is pumped back to the main pump station wet well, where it is then pumped to the Detroit River Interceptor.

Two pilot CSO facilities are currently under construction in the district, the Leib and St. Aubin Screening and Disinfection Facilities:

- The ***Leib CSO Screening and Disinfection Facility*** is located next to the Mt. Elliott Sewer north of Kercheval, and is designed to divert all flows from the Mt. Elliott sewer. Wet weather flows will be screened and disinfected before being discharged to the DRI (if there is sufficient capacity) or through the existing Leib outfall. The treatment capacity of the facility is 1,550 cfs, but the facility was designed to pass up to 2,000 cfs.

- The ***St. Aubin CSO Screening and Disinfection Facility*** is located south of Atwater in Chene Park. It is designed to intercept flows from the Chene, St. Aubin, and

Dubois outfalls. The first two outfalls will be eliminated, and the flow to the Dubois outfall regulated. The facility is designed to screen and disinfect 250 cfs.

Testing of the pilot facilities will begin after their completion in 2002. An additional CSO basin is planned for Belle Isle.

2.7.3 Sources

The Central Sewer District boundaries are outlined in the Segmented Facilities Plan (1978) (16). The development of sewers in the district is shown in a series of drawings of the "Advanced Plan Program" done by the City Engineer's Office starting in 1945 and ending in 1965. These drawings show proposed sewers and those under construction (8, 10, 11, 12). These maps and drawings were obtained from the Sewer Section on the 14th floor of the WBB located on Randolph Street. The district boundaries and wastewater system facilities are shown in the district map based on information from more recent projects, such as the Long Term CSO Control Plan (CS-1281).

Information on the Wastewater Treatment Plant and Pump Stations Nos. 1 and 2 was obtained from the Needs Assessment Study, Revision 2, PC-744 (Detroit Wastewater Partners), 11/ 15/ 01.

The physical components of the sewer system in the Central District are listed in the table below.

WASTEWATER SYSTEM COMPONENTS
Central Sewer District

Area	22,490 acres or 35.1 square miles
Miles of Sewer (estimated from GIS)	971
Pump Stations (5)	PS-1 (Detroit Wastewater Treatment Plant) PS-2 (Detroit Wastewater Treatment Plant) Fairview Fischer Belle Isle

Outfalls to the Detroit River (49)

No.	Location	No.	Location
--	Fairview Pump Station - McClellan Road	B27	12th & Jefferson
B3	Fairview Pump Station - McClellan & Jefferson	B28	14th & Jefferson
B4	Fischer Pump Station - Fischer Rd. (Burns & Jefferson)	B29	18th & Jefferson
B5	Iroquois & Jefferson	B30	21st & Jefferson
B6	Helen & Jefferson	B31	24th & Jefferson
B7	Meldrum (Mt. Elliott)	B32	W. Grand Blvd. & Jefferson
B8	Conant-Mt. Elliott (Leib)	B33	Swain & Jefferson
B9	Adair & Wight	B34	Scotten & Jefferson
B10	Jos. Campau & Wight	B35	McKinstry & Jefferson
B11	Chene St. & Franklin	B36	Summit & Jefferson
B12	Dubois & Franklin	B37	Ferdinand & Jefferson
B13	St. Aubin & Franklin	B38	Morrell & Jefferson
B14	Orleans & Franklin	B39	Junction & Jefferson
B15	Orleans Relief & Guoin	B40	Campbell & Jefferson
B16	Riopelle & Franklin	B41	Dragoon & Detroit River
B17	Rivard & Franklin	B42	Schroeder & Jefferson
B18	Schwiezer Place (Hastings)	B44	Cary & Jefferson
B19	Randolph & Jefferson	B45	Dearborn St. & Jefferson
B20	Bates & Atwater	B46	Carbon & Rouge River
B21	Woodward Ave. & Hart Plaza	B47	Flora & Reisner
B22	Griswold & Hart Plaza	B48	West Fort & Reisner
B23	First Hamilton & Civic Center Drive	B52	Baby Creek - Mille & W. Fort
B24	Third & Jefferson	B59	Pulaski & Jefferson
B25	Cabacier & Jefferson	B95	McDougall & Franklin
B26	11th & Jefferson		

WASTEWATER SYSTEM COMPONENTS
Central Sewer District

Major Control Structures - Backwater Gates (24)

No.	Location	No.	Location
B004	E. Jefferson & Burns	B032	Jefferson & W. Grand Blvd.
B009	Adair & Wight	B036	Jefferson & Summit
B010	Jos. Campau & Wight	B038	Jefferson & Morrell
B011	Chene St. & Franklin	B039	Jefferson & Junction
B017	Rivard & Franklin	B041	Detroit River & Dragoon
B019	Randolph & Jefferson	B045	W. Jefferson & Dearborn
B020	Bates & Atwater	B046	Carbon & Foreman
B021	Woodward Ave. & Hart Plaza	B047	Reisner & Flora - Fort East
B022	Griswold & Hart Plaza	B052	Miller & Fort / Baby Creek
B023	Cobo Hall West	B059	Jefferson & Pulaski
B024	Jefferson & Third	B098	Fairview Pump Station - 202 Parkview
B030	Jefferson & 21st	B95	McDougall & Franklin

Major Control Structures - Regulators (40)

No.	Location	No.	Location
B005	E. Jefferson & Iroquois	B026	Jefferson & 11th
B006	E. Jefferson & Helen	B027	W. Jefferson & Rosa Parks Blvd.
B007	Wight & Mt. Elliott Coast Guard Station	B028	Jefferson & 14th
B008	E. Jefferson & Harbortown	B029	Jefferson & 18th
B009	Adair & Wight	B030	Jefferson & 21st
B010	Jos. Campau & Wight	B031	Jefferson & 24th
B011	Chene St. & Franklin	B032	Jefferson & W. Grand Blvd.
B012	Dubois & Franklin	B033	Jefferson & Swain
B013	St. Aubin & Franklin	B034	Jefferson & Scotten
B014	Orleans & Franklin	B035	Jefferson & McKinstry
B016	Riopelle & Franklin	B036	Jefferson & Summit
B017	Rivard & Franklin	B037	Jefferson & Ferdinand
B018	Franklin & Schweizer	B038	Jefferson & Morrell
B019	Randolph & Jefferson	B039	Jefferson & Junction
B020	Bates & Atwater	B040	Jefferson & Campbell
B021	Woodward Ave. & Hart Plaza	B042	Jefferson & Schroeder
B022	Griswold & Hart Plaza	B044	Jefferson & Clay
B023	Cobo Hall West	B047	Reisner & Flora - Fort East
B024	Jefferson & Third	B059	Jefferson & Pulaski
B025	Jefferson & Cabacier	B95	McDougall & Franklin

WASTEWATER SYSTEM COMPONENTS Central Sewer District		
Major Control Structures - Dams (31)	No. Location D3 E. Jefferson & McClellan -- E. Jefferson & Iroquois D5 E. Jefferson & Helen D6 Wight & Mt. Elliott Coast Guard Station D7 E. Jefferson & Harbortown D8 McDougall & Franklin D11 Dubois & Franklin D12 St. Aubin & Franklin D13 Orleans & Franklin D14 Orleans & Guoin D18 Franklin & Schweizer D20 Bates & Atwater D21 Woodward Ave. & Hart Plaza D23 Cobo Hall West D25 Jefferson & Cabacier D26 Jefferson & 11th	No. Location D27 W. Jefferson & Rosa Parks Blvd. D28 Jefferson & 14th D29 Jefferson & 18th D31 Jefferson & 24th D33 Jefferson & Swain D34 Jefferson & Scotten D35 Jefferson & McKinstry D36 Jefferson & Summit D37 Jefferson & Ferdinand D40 Jefferson & Campbell D42 Jefferson & Schroeder D44 Jefferson & Clay D48 Fort East D56 Riopelle & Franklin D95 Chene St. & Franklin
Other Major Control Structures (8)	McClellan-Cadillac Control Regulator Leib Control Regulator Warren Control Gate Joy Control Gate Livernois Control Regulator Dearborn Control Regulator First Hamilton Regulator Fabridam (Livernois Relief Sewer)	
CSO Basins (2)	Leib CSO Screening & Disinfection Pilot Facility (under construction) St. Aubin CSO Screening & Disinfection Facility (under construction) Belle Isle Basin (planned)	

2.8 Fox Creek Sewer District

2.8.1 General Description and History

This sewer district is located on the eastern boundary of Detroit (17). It is bounded on the north by the Macomb County boundary on Eight Mile Road and the City of Eastpointe . The Detroit River lies at the south limit of the District. The district is bounded on the west by the Conner Creek and East Jefferson Sewer Districts. To the east and south lie the communities of Harper Woods, Grosse Pointe Woods, Grosse Pointe and Grosse Pointe Park. (See Figure 2.8.)

Originally, parts of three of these communities (Grosse Pointe Park, Grosse Pointe Farms and Grosse Pointe) were considered to be part of the Fox Creek Sewer District as defined in the Segmented Facilities Plan , although they are also considered to be suburban customers of DWSD (17). Subdistrict FC-1 of the Fox Creek Sewer District includes the City of Grosse Pointe Park, and Subdistrict FC-2 covers Grosse Pointe Farms and Grosse Pointe. These communities are also covered separately in Sections 4.7, 4.8, and 4.9. The current boundaries of the Fox Creek Sewer District, as described in the Greater Detroit Regional Sewer System (GDRSS) Model, does not include these areas.

The surface contours of the area generally slope from northwest to south and southeast. The valley of Conner Creek lies on the west side of the district. There are two local high points in or near the district. The first is in the vicinity of the intersection of Greiner and Dresden (located in the Conner Creek District) and marks a division between the Conner Creek drainage basin to the west and the Fox Creek drainage basin to the east. The area to the immediate north (up to Eight Mile Road) and east of this localized hill lies in the Fox Creek Sewer District. The second high point is located in the City of Grosse Pointe Farms. It is a ridge that runs from north to south along the shore of Lake St. Clair from the vicinity of Eight Mile Road to McMillan Road and then west to Barrington Road. The highest point is located near the intersection of Moran and Kercheval. This ridge blocks the natural drainage from directly reaching Lake St. Clair and redirects water southwesterly towards Barrington (18).

The elevation in the northwest corner of the district is approximately 625 feet (National Geodetic Datum 1927). The elevation at the Fox Creek inlet is 574 feet (National Geodetic Datum 1927). Therefore the land surface falls approximately 50 feet in 7 miles (37,000 feet). This is an average slope of approximately 0.14 %, a flat gradient.

Fox Creek is the watercourse that formed in the valley located behind the ridge that runs along Lake St. Clair, as described in the paragraph above. Prior to the urbanization of the area, the creek flowed from northeast to southwest on the west side of the ridge until Barrington Road, then due south into the Detroit River. This water feature defines the drainage layout of the District and was used to define the sewer district when it was delineated in the 1920's. Like Conner Creek, the Fox Creek

was enclosed in the 1920's soon after annexation of the area to the City of Detroit. Several facilities associated with the Fox Creek drainage area are actually located in the East Jefferson Sewer District, and are described in Section 2.9.

This area was incorporated into the City of Detroit between 1920 and 1926. As described above, the enclosure of Fox Creek was done in the mid 1920's, although approximately 1.3 miles of open channel remain. First the areas along Ashland and Bedford Roads were provided with sewers.

The district covers 8,420 acres. The land use in the District is a mixture of residential and some commercial. The principal category is single-family housing. There is relatively little open space in the District and that is generally located along the Detroit River and the Lake St. Clair shoreline.

The major roads in the District are the Ford Freeway (I-94), Gratiot Avenue (M-3) and Eight-Mile Road (M-107).

2.8.2 Physical Characteristics of the Sewer System

The Fox Creek Sewer District sewer system is laid out at right angles to the Fox Creek Enclosure, the outlet the system originally drained to. The Fox Creek District contains a 2.4 square mile area of separate rather than combined sewers. Sanitary flow is conveyed by gravity to the DRI, while the storm water flow from this area is drained through the deeper combined sewers to the Jefferson Avenue East Relief Sewer. Except for some new developments along the Detroit River, this is the only area within the City of Detroit that has separate sewers.

The major sewers in the district are the Rivard-McCormick, Cadieux, Bedford and Ashland Sewers. Relief sewers were constructed later, including the Ashland and Mack Avenue Relief Sewers.

The Fox Creek District drains sanitary and storm flow into the East Jefferson District through the Mack Avenue Relief Sewer, Fox Creek Relief Sewer, and Fox Creek Enclosure. Descriptions of these sewers are:

- Mack Avenue Relief Sewer: This sewer begins at the Bluehill Pump Station as an 8'-6" x 8'-6" concrete box, which changes to a 9'-3" diameter cylinder. At Bedford Road, Mack Avenue relief sewer becomes a 14'-0" diameter cylinder, extending to Manistique Avenue, where it changes size to 16'-0" diameter, and turns south following Manistique Avenue to the Jefferson Avenue East Relief Sewer. Mack Avenue Relief Sewer has no remotely controlled facilities and no high level relief connections. It has one major connection at Three Mile Drive, where it is joined by the Three Mile sewer.

Excess combined flows from Mack Avenue, Mack Avenue relief and Fox Creek relief sewers are routed to the Conner Creek Pump Station and to the Freud Pump Station (described later under East Jefferson Sewer District). The Fox Creek Relief Sewer and

the Fox Creek Enclosure are also described in the East Jefferson Sewer District, Section 2.9.

Several combined sewers transport flow from within the Fox Creek district to the Mack Avenue, Mack Avenue relief, Fox Creek relief, and Fox Creek Enclosure sewers:

- Ashland Relief Sewer: This sewer starts at Seven Mile and ends at Twelve Mile, beginning at the 3'-2" x 4'-4" box at Kercheval Avenue, where it connects to the Fox Creek relief sewer. From Kercheval Avenue, flow from Ashland relief sewer and excess combined flow from Fox Creek relief and Mack Avenue relief sewers is transported to the Freud Pump Station via a sewer on Algonquin Street. The Algonquin Street sewer varies in size from a 16'-0" diameter concrete cylinder to two 11'-6" diameter cylinders, back to a 16'-0" diameter cylinder to the Freud Pump Station. The Ashland relief sewer has no control facilities.

- Ashland Sewer: This sewer is a concrete cylinder beginning at Seven Mile Road and running in a north-south direction transporting flow to the Fox Creek backwater gate structure. The Ashland sewer varies from 10'-0" diameter to 12'-3" diameter between Seven Mile and Harper Roads. At Harper Road, Ashland sewer changes to a 13'-3" cylinder extending to Warren Avenue. Ashland sewer has no remotely controlled facilities, no high level relief connections, and only one major lateral connection at Seven Mile Road.

- Bedford Sewer: This sewer is a concrete cylinder running in a north-south direction varying in size from 4'-3" to 8'-9" diameter from Evanston to Kercheval Roads, respectively. The Bedford sewer has no remotely controlled facilities and transports all flow directly to the Fox Creek relief sewer.

- Three Mile Road Sewer: This sewer is a concrete cylinder running in a north-south direction and varying in size from 5'-0" diameter to 11'-0" diameter at Mack Avenue. The Three Mile sewer has no remotely controlled facilities and transports all flow to the Mack Avenue relief sewer.

- Cadieux Sewer: This sewer is a concrete cylinder running in a north-south direction varying in size from a 4'-6" diameter at Morang and Linnhurst to 9'-3" diameter at Mack Avenue, where all flow is transported to the Fox Creek relief sewer. The Cadieux sewer has no remotely controlled facilities.

- Rivard Sewer: This sewer starts at Eight Mile Road as a 4'-3" diameter concrete cylinder and increases in size on Kelly, McCormick, Marseilles, and Rivard Streets to an 11'-9" diameter cylinder to the Bluehill Pump Station. The Rivard sewer discharges all flow to the Bluehill Pump Station and has no remotely-controlled facilities.

The Fox Creek Backwater Gate Structure transfers flow from the Fox Creek Enclosure into the Jefferson Avenue East relief sewer. This structure is located in the East Jefferson Sewer District, and is described further in section 2.9. Three major city-

owned pump stations pump sanitary and combined wastewater flows generated within the district: the Grosse Pointe Farms Pump Station, the Grosse Pointe City Pump Station, and the Grosse Pointe Park Pump Station. The Kerby Road Pump Station operated by Wayne County pumps flows generated outside the district into the DWSD interceptors. Patterson Park Pump Station in Grosse Pointe Park pumps stormwater flows to the DWSD system. These pump stations are described in Sections 4.7, 4.8, and 4.9, and in Appendix A.

In this report, with the boundaries shown for the Fox Creek and Conner Creek Sewer Districts, the ***Northeast Pump Station*** is considered to be located in the Conner Creek Sewer District, and is therefore described in Section 2.6.

The ***Bluehill Pump Station*** is the only DWSD-owned pump station in the district pumping flows generated within the district. This pump station is located at 17145 Mack Avenue, between Cadieux Avenue and Moross Road. This station serves a 3.7 square mile area north of the Bluehill Pump Station in the Fox Creek District. There are two separate stations: a sanitary pump station for dry weather flows and a storm water pump station for wet weather flows. The station contains two sanitary pumps rated at 10 cfs (6.5 mgd) each, and three storm pumps rated at 390 cfs (252 mgd), with space for a fourth pump. A fourth storm pump will be added to the station and electrical improvements will be made by 2003.

The station receives combined wastewater flow into its sanitary and storm water pump station wet wells through the 11'-9" diameter Rivard Sewer. During dry weather flow periods, a 3-foot high overflow dam, located in the Rivard Sewer, diverts all the flow to the sanitary pump station where it is pumped to the 10'-6" diameter Fox Creek Relief Sewer.

During storm weather, combined wastewater overflows the dam and enters the storm pump station wet well. The combined wastewater is then pumped by three storm pumps through a control chamber into the Fox Creek Relief Sewer. This combined wastewater flows through the Fox Creek Relief Sewer to the Freud, Conner Creek, and Fairview Stations before reaching the WWTP. Under high storm flow conditions, a control chamber diverts excess flow into the Mack Avenue Relief Sewer.

There are no CSO basins in the district. There is an emergency outfall at the Fox Creek Backwater Gates.

2.8.3 Sources

The boundaries of the Fox Creek District have been defined differently in previous DWSD projects. One version of the boundary is shown in the 1978 Segmented Facilities Plan Book VII (1978).

An older drawing of the "Fox Creek Drainage District" by Metcalf and Eddy dated April 1, 1926 (18) show the drainage district boundaries covering an additional area south of Eight Mile Road to Lake St. Clair. This area includes the communities of

Harper Woods and Grosse Pointe Woods. The western boundary of the district also differs somewhat from the version shown in the Segmented Facilities Plan.

The district boundaries and wastewater system facilities are shown in the district map based on information from more recent projects, such as the Long Term CSO Control Plan (CS-1281).

The physical components of the sewer system in the Fox Creek Sewer District are listed in the table below.

WASTEWATER SYSTEM COMPONENTS Fox Creek Sewer District	
Area	8,420 acres or 13.1 square miles
Miles of Sewer (estimated from GIS)	321
Pump Stations	Bluehill (DWSD)
Outfalls	Emergency outfall at Fox Creek Backwater Gates
Major Control Structures	Fox Creek Backwater Gates
CSO or Equalization Basins	None

2.9 East Jefferson Sewer District

2.9.1 General Description and History

The East Jefferson Sewer District is located downstream of the Conner Creek and the Fox Creek Sewer Districts (17). It is bounded on the north by the Conner Creek Sewer District. The Detroit River lies at the south limit of the district and is the point of discharge for the CSOs from the district. To the west of the district is the Central Sewer District, and to the east is the Fox Creek Sewer District. (See Figure 2.9.)

In the Segmented Facilities Plan (1978), the East Jefferson Sewer District is not subdivided and is considered to be one Subdistrict EJ-1, with following boundaries: Bewick Street on the west, Alter Avenue on the east, the Detroit River on the south and Mack Avenue on the north.

The surface contours of the area slope gently from the northwest to the southeast. The elevation in the northeast corner of the district is approximately 590 feet, National Geodetic Datum 1927, (105 feet, Detroit Datum). The elevation at the Rouge River in the south is 580 feet, National Geodetic Datum 1927, (100 feet, Detroit Datum). Thus the land falls approximately 10 feet in 1 mile (5,000 feet). This is an average slope of approximately 0.20%, a flat gradient. The district includes a diked area of several hundred acres near the Detroit River where the ground level is lower than the water level in the river.

This is the second-smallest district, at 2,810 acres. Land use is approximately 55% residential, with some multi-family housing. About 25% of the area is industrial and transportation facilities, with the Chrysler Jefferson Avenue Assembly Plant and railroad yards located in the district. About 15% of the area is recreation areas and parkland along the river. The remaining 5% is institutional and some commercial.

There are no major freeways in this district. Major roads are East Jefferson Avenue, Conner, Freud, and Kercheval.

2.9.2 Physical Characteristics of the Sewer System

The East Jefferson Sewer District is at the downstream end of both the Conner Creek Sewer District and the Fox Creek Sewer District. Several major trunk sewers and relief sewers transport combined flows from the Fox Creek Sewer District and surrounding suburbs, primarily to the Jefferson Avenue East relief sewer. Dry weather and excess combined flows are also transported through the DRI west along Jefferson Avenue from the easterly city limits of Grosse Pointe Park. The Fox Creek Relief Sewer, a small part of the Fox Creek Enclosure, and the Fox Creek Backwater Gates are located in the East Jefferson District.

- Fox Creek Relief Sewer: This sewer is a 10'-6" diameter concrete cylinder from Bluehill Pump Station to Cadieux Road. From Cadieux Road to the junction structure at the intersection of Manistique Avenue and Kercheval Avenue, the Fox

Creek relief sewer varies from 13'-6" to 14'-6" diameter. From Manistique and Kercheval Avenue, flow is transported down the 16'-0" Manistique sewer to the Jefferson Avenue East relief sewer. The Fox Creek Relief Sewer has two high level relief connections for receiving flow from Cadieux and Bedford sewers. There are no remotely controlled facilities installed on the Fox Creek relief sewer.

- Fox Creek Enclosure: This sewer begins at Grosse Pointe Farms Pump Station at Kerby Road as an 11'-7" x 16'-0" five-centered arch. At Cadieux Road, the enclosure changes to a 14'-0" diameter cylinder and at Bedford Road it becomes a 15'-0" diameter cylinder. It continues into the Fox Creek backwater gate structure where it continues either into the Jefferson Avenue East relief sewer or to Fox Creek open channel. Fox Creek Enclosure has no control facilities and has no high level relief connections.

The East Jefferson District also receives dry weather and combined flows from the Conner Creek Sewer District. They are transported from the Conner Creek Sewer by gravity to the DRI through a short 7'-0" diameter cylinder. Excess combined sewage overflows through the Conner Creek backwater gate structure to the Detroit River through the Conner Creek open channel. These overflows will be stored and treated when the Conner Creek CSO Basin is completed.

The district includes a diked area on the east side of Detroit where the ground level is lower than the water level in the Detroit River. The area is served by the Detroit River Interceptor (DRI), the Jefferson Avenue East and West Relief Sewers, the Fox Creek Relief Sewer, and the Ashland Sewer.

There are two outfalls located in the district, associated with the Conner Creek and Freud Pump Stations. Four backwater gate structures are also found in the district, including the Conner Creek and Fox Creek Backwater Gates.

The ***Fox Creek Backwater Gate*** structure transfers flow from the Fox Creek Enclosure into the Jefferson Avenue East relief sewer. Excess combined flow may also be routed through this structure to Fox Creek. The structure also contains four manually operated sluice gates, which one is used for back flushing the Fox Creek open channel into the Jefferson Avenue East relief sewer.

The ***Conner Creek Control Regulator*** is the only remotely controlled facility located within the East Jefferson district. Conner Creek Enclosure dry weather flow is diverted by the Conner Creek Control Regulator into the Detroit River Interceptor.

The East Jefferson District contains three pump stations:

- ***Conner Creek Pump Station***: This pump station is located at 12244 East Jefferson Avenue on the southwest corner of Jefferson Avenue and Clairpointe Avenue. It receives both sanitary and storm flows from two 14-foot diameter sewers, the Jefferson Avenue East and West Relief Sewers. During dry weather conditions,

sanitary flow is pumped to the Detroit River Interceptor (DRI). This large pump station contains the following pumps:

- Eight storm pumps each rated at 492 cfs (318 mgd)
- Two sanitary pumps each rated at 110 cfs (71.1 mgd)
- One sanitary pump rated at 75 cfs (48.5 mgd)
- One sanitary pump rated at 60.3 cfs (39 mgd)

During storm conditions, flows that cannot be pumped into the DRI are discharged to the Conner Creek open channel, which discharges to the Detroit River. The pump station operation is controlled through the DWSD System Control Center. The station is currently undergoing structural, mechanical, and electrical renovations to increase its reliability.

- ***Freud Pump Station***: The station is located at 12300 Freud Avenue, between Tennessee and Clairpointe, south of Jefferson Avenue, and has both sanitary and storm pumps, as follows:

  - Eight storm pumps each rated at 449 cfs (290.2 mgd)
  - One sanitary pump rated at 35.1 cfs (22.7 mgd)
  - One sanitary pump rated at 20.1 cfs (13 mgd)

  The Freud station receives wastewater flow through two 16-foot diameter relief sewers, Fox Creek and Ashland.

  Because the Freud Pump Station is primarily a storm pumping station, very little dry weather flow is received. The station discharges dry weather flows to the Conner Creek Pump Station via the East Jefferson Relief Sewer. Past records have shown that the sanitary pumps need to be operated only once every one or two days for a short period to maintain a low wet well level. During storm flows, the sanitary pumps are not operated and the storm pumps are started. At high wet well levels, the station's storm water pumps will discharge directly to the Conner Creek channel. This pump station is affected by operations at Conner Creek Pump Station: when the Conner Creek Pump Station capacity is exceeded because of high storm flow, storm water will overflow into the Fox Creek and Ashland relief sewers that discharge to the Freud Pump Station.

- ***Lighthouse Point Pump Station***: This pump station is located at Lighthouse Point Recreation Center, 14490 Riverside Drive. This submersible pump station includes two pumps, each rated at 450 gpm.

Construction of the ***Conner Creek CSO Basin*** commenced in 2001. The basin, located at the head of Conner Creek, will collect CSOs from the Conner Creek Pump Station, Freud Pump Station, and Conner Creek Backwater Gates. This pilot facility will test the effectiveness of treatment through bar screens to remove floatables, and sodium hypochlorite disinfection with a five-minute contact time. The capacity of the basin is

30 MG, based on the 10 year-one hour storm peak flow of 13,262 cfs. There will be four compartments in the facility, with the ability to decant. The basin dewaters to the Detroit River Interceptor (DRI), and will be controlled by the level in the DRI. Pumps will be used for dewatering and decanting.

2.9.3 Sources

The Segmented Facilities Plan-Book VII (17) shows the boundaries of the East Jefferson Sewer District. The district boundaries and wastewater system facilities are shown in the district map based on information from more recent projects, such as the Long Term CSO Control Plan (CS-1281). These boundaries are slightly different those shown in the Segmented Facilities Plan.

The physical components of the sewer system in the East Jefferson Sewer District are listed in the table below.

WASTEWATER SYSTEM COMPONENTS East Jefferson Sewer District		
Area	2,810 acres or 4.4 square miles	
Miles of Sewer (estimated from GIS)	101	
Pump Stations	Conner Creek (DWSD) Freud (DWSD) Lighthouse Point (DWSD)	
Outfalls	No. B2 B1	Location (at the Detroit River) Conner Creek Fox Creek
Major Control Structures - Backwater Gates	No. B001 B002 B099 B100	Location Fox Creek at E. Jefferson Conner Creek Pump Station - 12244 E. Jefferson E. Jefferson & Tennessee E. Jefferson & Montclair
Major Control Structures - Regulators	Conner Creek Control Regulator	
CSO or Equalization Basins	Conner Creek CSO Basin (under construction)	

3.0 Suburban Sewer Districts

In addition to servicing the City of Detroit, Highland Park, and Hamtramck, DWSD's wastewater collection system services multiple communities outside of the City of Detroit boundaries. These suburban communities are located in Macomb, Oakland and Wayne Counties. (See Figure 3.0.)

The City of Detroit started accepting sewage flows from communities in 1898 when the City of Highland Park began discharging flow to the Woodward Avenue Sewer. The City of Hamtramck began discharging to the City of Detroit sewer system in the 1920's. Formal arrangements with large numbers of suburban communities began in 1940 with the completion of the WWTP, and a requirement for treatment of municipal sewage being imposed on Michigan's municipalities. The first suburban communities outside of the city limits started discharging to the City of Detroit's sewer system. By 1962, some 50 suburban communities were discharging wastewater to the Detroit system.

The Board of Water Commissioners was expanded in the late 1950's to a seven-person board, including a member each from Macomb, Oakland, and Wayne Counties. In 1957, the Supervisors Inter-County Committee commissioned a study from the National Sanitation Foundation on the sewerage and drainage needs for the six-county area of Southeastern Michigan. This Committee was composed of chairman of the board of supervisors for Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne Counties. The results were presented in 1964. The plan provided for the extension of interceptors to provide service to areas outside of the City of Detroit and expansion of the Detroit Wastewater Treatment Plant (19).

There are seven wastewater districts, which include several communities under area authorities such as County Departments of Public Works (DPW's), Drain Commissioner's Offices and other special purpose authorities and commissions. These seven districts provide wastewater services to communities located within their jurisdictions, by way of contractual flow and treatment agreements between the communities and the districts. The seven districts have also contractual flow and treatment agreements with DWSD. Other communities have individual agreements directly with DWSD without forming part of a wastewater disposal district. The wastewater districts and individual communities entered into agreements with DWSD at different dates.

A description of each wastewater disposal district and individual community in the suburban area is presented in the following sections.

4.0 Wayne County

DWSD entered into agreements with Wayne County to provide wastewater disposal services to the County as early as 1944. There are three sewage disposal districts that are customers of DWSD through Wayne County. Two of them are located in Wayne County: North Huron Valley - Rouge Valley (NHV-RV) Sewage Disposal District in western Wayne County and the Northeast Wayne County (NEWC) Sanitary District in the eastern part of the county. The third district, Southeast Macomb Sanitary District, is a customer of Northeast Wayne County Sanitary District, and is located in Macomb County. This district is described in the next section under Macomb County.

Wastewater operations in Wayne County are administered through the Wayne County Department of the Environment. The Division of Public Works in this department operates and maintains the county-owned wastewater facilities located throughout the county, many of them located in municipalities. However, the Milk River Drainage Board operates the Milk River System located in the Northeast Wayne County Sewer District separately.

In addition to the districts mentioned above, the Cities of Dearborn, Allen Park, Melvindale, Grosse Pointe, Grosse Pointe Farms, Grosse Pointe Park, Hamtramck and Highland Park have individual contracts with DWSD to dispose of their wastewater. The cities of Hamtramck and Highland Park are completely contained within the City of Detroit. Therefore, their sewer systems were discussed briefly under earlier sections, but will be discussed further below.

The description of sewer service areas in Wayne County will proceed from the western to the eastern side of the county.

4.1 North Huron Valley - Rouge Valley Sewer District (NHV-RV)

4.1.1 General Description and History

The North Huron Valley–Rouge Valley (NHV-RV) Sewer District serves the following communities in Western Wayne County: Garden City, Inkster, Livonia, Northville, Plymouth, , Redford Township, Wayne, Westland, and parts of Dearborn Heights, Van Buren Township and Romulus. The district also includes part of the City of Novi in Oakland County. (See Figure 4.1.) The operating agency for the North Huron Valley-Rouge Valley Sewer District is the Wayne County Department of the Environment, except the portion of the district located in Oakland County.

The district also currently accepts wastewater from the Western Townships Utility Authority (WTUA). This utility serves Canton, Northville, and Plymouth Townships in western Wayne County. About half of the wastewater flows from this area are routed to the Wayne County system, and the other half goes to Ypsilanti Community Utilities Authority (YCUA). WTUA signed an agreement with YCUA in 2001 to participate in the expansion of the YCUA wastewater plant, eliminating all flows to DWSD. However, controversy over the expansion of the plant, particularly sludge handling and incineration, has delayed this project.

The NHV-RV Sewer District is bounded on the west by the Western Townships Utility Authority, followed by Lyon, Salem, Superior and Ypsilanti Townships. To the north are the Evergreen Farmington Sewer District, Farmington District and Commerce Township. The City of Detroit and Dearborn Sanitary District border the NHV-RV Sewer District on the east.

The topography in the district changes gradually from low rounded hills in the north (Oakland County) and west (western Wayne County) to very flat in the eastern part of the district. The Middle and Lower Branches of the Rouge River and their tributaries drain most of the service area. Only the City of Wixom and a portion of Novi in the northwest corner of the district have a different drainage pattern. These areas drain northwest towards the Huron River.

Land use in the district varies widely depending on community. Of the 175,027 acres (274 square miles) in the district, it is estimated that 55% is actually sewered area. The eastern portions of the district are approaching full development, as the expansion of several communities began in the 1950's and accelerated in the 1960's and 1970's. These communities have a higher level of commercial and industrial land use. The western portions of the District are not built out and are expected to see additional growth.

Major roads in the district include east-west Highway I-96, Plymouth Road, Ford Road, and Michigan Avenue. North-south roads include Telegraph Road, Inkster Road, Haggerty Road, and I-275.

The first agreement between DWSD and Wayne County to serve the communities within the NHV-RV Sewer District dates from December 1953 and was later amended by several complex agreements, as described below:

- 12/ 29/ 53: Original agreement. City of Detroit agrees to pay Wayne County to increase the size of the Middle Rouge Parkway Interceptor, so the City can discharge into the interceptor at Evergreen. In turn, Wayne County can discharge into Northwest Interceptor (NWI) at Southfield and Ford.

- 5/ 12/ 55: Sewer use agreement with Rouge Valley District. County agrees to install meter and comply with regulations.

- 8/ 14/ 61: Temporary discharge from the Rouge Valley District to the Oakwood and NWI from Rouge Valley District.

- 8/ 15/ 61: New discharge limits for connections to Middle Rouge Parkway and Oakwood and NWI. Rescinds agreement of 5/ 12/ 55. Expanded service area of the district now called Rouge Valley Sewage Disposal District.

- 6/ 13/ 83: Amendment requiring compliance to federal court consent decree and regulations.

- 8/ 29/ 84: Amendment No. 1 - Expanded service area (added Novi, Wixom, Commerce Township) is now called North Huron Valley -Rouge Valley Wastewater Control System. Wayne County to build a new interceptor. At the same time, DWSD commits to build the Evergreen-Farmington Relief Sewer to connect to the First-Hamilton Sewer, to shift flow from the NWI and Southfield Sewer. Cost to be borne by Wayne and Oakland Counties. Amendment No. 2 - Expanded service area (Commerce Township, Plymouth Township, Westland added) with new interceptor construction by Wayne County.

- 3/ 1/ 88: Amendment decreases flow for connections at Hubbard and Michigan and Hubbard and Southfield.

The agreements of 1953 and 1961 between Wayne County and DWSD allow a maximum discharge of 230 cfs into the Oakwood-Northwest Interceptor and 149.5 cfs into the Northwest Interceptor. The peak flow rate allowed from the District was 324.5 cfs. According to a document entitled “System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan” (April 1998), 245.6 MGD (380 cfs) represents the peak flow allowed for discharge from the NHV-RV Sewage Disposal District sewers into the City of Detroit sewer system.

4.1.2 Physical Characteristics of the Sewer System

Combined sewer areas in the North Huron Valley–Rouge Valley Sewer District are primarily limited to the eastern portion of the district in the oldest communities. Combined and separated sewer system areas were estimated in the Rouge Valley Combined Sewer Overflow Control Projects - SRF Project Plan as follows:

- Garden City: Service area of 1,750 acres, 70% separated, 30% combined.
- Inkster: Service area of 3,930 acres, 40% separated sewers tributary to combined interceptors, 40% combined sewers, 20% unsewered or fully separated.
- Livonia: Primarily separated, with combined sewers serving only 193 acres (of 23,040 acres total).
- Plymouth Township: 163 acres served by combined sewers, 4,500 acres served by separated sewers, remaining unsewered (of 9,473 acres).
- Redford Township: Combined and separated sewers that discharge to combined sewers (6,998 acres).
- Wayne: Mostly separated sewers (of 3,919 acres), except for downtown area.
- Westland: 5% of total area (11,942 acres) has combined sewers.

The North Huron Valley-Rouge Valley Interceptor System can be best understood by reviewing the history of the system's development. The following summary is adapted from the Rouge Valley Combined Sewer Overflow Control Projects - State Revolving Loan Fund Project Plan:

- 1930's: Interceptors were constructed along the 1) Upper Rouge River, with treatment at the Lola Valley Treatment Plant, south of Five Mile Road; 2) Middle Rouge River, with treatment at the Parkway Treatment Plant at Merriman Road; 3) along Michigan Avenue, with discharge to the City of Dearborn.
- 1950': The Middle and Upper Rouge interceptors were extended to a connection with the City of Detroit system on Ford and Evergreen Roads. Both wastewater treatment plants were taken out of service.
- 1960's: Interceptors were constructed parallel to the existing Middle and Lower Rouge Interceptors, but extended further to Oakwood Avenue, where an interceptor was built to connect the two interceptors and transport the Rouge Valley flows to the Detroit system at Fort Street.
- 1970's: The Huron Valley Wastewater Control System (Super Sewer) was proposed by Wayne County to provide wastewater treatment for the Huron

Valley and portions of the Rouge Valley watersheds (western Wayne County, eastern Washtenaw County, and southern Oakland County). However, officials in Washtenaw County decided to take advantage of federal grant funds and construct a local plant. In 1974, the Ypsilanti Community Utilities Authority (YCUA) was founded and a wastewater plant constructed. This was followed by the formation of the Western Townships Utility Authority in western Wayne County.

- 1980's: A third interceptor, paralleling the Middle Rouge Interceptor, was constructed. Currently, the Middle Rouge Subdistrict is served by the Upper Rouge and Middle Rouge Interceptors, which combine with Detroit's Evergreen Sewer at Ford Road. Metering points are now a 54-inch sonic meter at Ford/ Evergreen, and a 48-inch sonic meter at Southfield south of Michigan.

The Lower Rouge Subdistrict is served by an interceptor system that parallels the lower branches of the Rouge River. This interceptor system crosses under the Rouge River at Fort Street and discharges into the Oakwood section of the Northwest Interceptor. The flow at the connection is measured by a 66-inch magnetic flow meter, located at the River Rouge siphon on Fort at River Rouge (22).

There are numerous overflow points to the Rouge River. Two major overflows, the Master Control Relief on the Middle Rouge Interceptor, and the RVI Relief on the Rouge Valley Interceptor, were required by MDEQ permit provisions to be eliminated by 1999. DWSD is currently evaluating various CSO facility alternatives for overflows occurring along the Rouge River from Pembroke to the West Warren Siphon outfalls.

A high level weir is located between the Rouge Valley Interceptor and the Northwest Interceptor (22) and junction chambers are located at the intersection of the Middle and Lower Rouge Valley Interceptors.

Lift Station 1A is a major pump station operated by Wayne County. It is located just upstream of the Middle Rouge Interceptor inverted siphons. This pump station has the capacity to pump from the Middle Rouge Interceptor to the Northwest Interceptor under surcharged conditions. It was constructed to prevent backups in the Rouge Valley interceptors after the elimination of the two overflows.

The capacity of the pump station is 245 cfs (161 mgd). The station has six pumps, two of them rated at 15,000 gpm and four rated at 30,000 gpm. The wastewater entering the wet well is lifted from an elevation of 572.50 to a discharge elevation of 593.75, and is designed to maintain the design flow during elevated hydraulic conditions in the Northwest Interceptor.

There are several CSO and equalization basins in the district:

- ***Redford Township CSO Retention Basin***: This facility, currently in operation, is located in Redford Township at the intersection of Lola Drive and Puritan Avenue. The facility contains a two-compartment basin of 1.9 million gallons, three

catenary-type bar screens, two swirl concentrators, and sodium hypochlorite disinfection sized to treat 180 cfs with a retention time of 21 minute. The basin serves an area of 551 acres. Influent is pumped into the facility from a wet well with six vertical mixed-flow pumps. The pump station capacity is 16,200 gpm. Overflow from the basin enters the Upper Rouge River.

- ***Inkster CSO Retention Basin***: This facility, currently in operation, is owned by the City of Inkster, and is located on Inkster Road north of Michigan Avenue. Operation of the Inkster Basin began during January 1997, and has eliminated 10 CSO outfalls. The basin serves an area of 833 acres. It has a volume of 3.1 MG and was sized based on the 1 year-1 hour design storm with a peak flow of 500 cfs and 20 minutes of detention. It has six constant speed pumps at 45,000 gpm at 30 feet TDH. The Inkster Basin includes a separate 1.1 MG first flush compartment. When this compartment is full, additional flow is diverted to the 2 MG two-compartment main storage basin. The first flush tank has no flow-through capability. The basin compartments can dewater in 18 to 24 hours. Overflows from the basin enter the Lower Rouge River.

- ***Dearborn Heights CSO Retention Basin***: The Dearborn Heights Basin, currently in operation, is owned by the City of Dearborn Heights, and is located within the Middle Rouge Parkway on the south side of Edward Hines Drive, east of Telegraph Road. Operation of the Dearborn Heights Basin began during June 1997, and it has eliminated four CSO outfalls. It was constructed over a landfill that had been capped. The basin serves an area of 340 acres. Its volume is 2.7 MG and it was sized for the 10 year-1 hour design storm with a peak flow of 500 cfs and 30 minutes of detention. The basin has six vertical mixed flow pumps each having a pump capacity of 45,000 gpm at 28 feet TDH. There are three compartments in the facility, which fill sequentially. The basin is able to dewater in 12 to 18 hours. Overflows from the basin enter the Middle Rouge River.

- ***Wayne Equalization Basin***: This basin, located in the City of Wayne, has a volume of 2.3 MG. Operation began during the summer of 1999. The basin serves an area of 2,849 acres, and fills only when flows from the City of Wayne exceed 25 cfs. Once the basin has filled, it no longer receives flow, because it does not have an overflow. The basin begins to dewater once flows from the City of Wayne are less than 20 cfs.

- ***Livonia Equalization Basin***: This basin, located in Livonia, has a volume of 2.2 MG and was sized for the 10 year-6 hour storm event. It serves an area of 11,678 acres. Overflow into the basin's pump station occurs when flows are in excess of the Inkster Arm Interceptor's full pipe gravity flow capacity. The overflow is then pumped to the basin. When the basin is full, no further flow is pumped to the basin. The basin does not have an overflow.

The Western Townships Utilities Authority (WTUA) operates two equalization basins. WTUA has an agreement with DWSD to take excess flows from these basins. Both basins have pumped influent and gravity discharge to connecting interceptors.

- ***Middle Rouge Equalization Basin***, located at 40905 Joy Road, Canton,has a volume of 7.8 MG.

- ***Lower Rouge Equalization Basin***, located at 3501 S. Haggerty Road, Canton,has a volume of 5.5 MG.

There are 48 regulators in the district, listed in Table 4.1-A. Nearly all of these are associated with outfalls along the Rouge River and its branches. Of these, 20 are active CSO outfalls that will eventually be eliminated under the Rouge Program.

4.1.3 Sources

Publications reviewed for this district description include: Rouge Valley Combined Sewer Overflow Control Projects - SRF Project Plan (1993), NHV-RV Wastewater Control System - Hydraulic Basis of Design (1986), Wayne County Combined Sewer Overflow Demonstration Project - Redford Township Retention Basin Basis of Design Report (1993), and Final Project Plan - Lift Station 1A - NHV-RV Wastewater Control System (1996).

Older maps for the NHV-RV Sewage Disposal District are found in the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (20) and the Segmented Facilities Plan (21). The district's interceptors and wastewater system structures are shown in the district map based on information from Wayne County and from more recent projects, such as the Long Term CSO Control Plan (CS-1281).

Operating personnel in the Westland office of the Wayne County Department of Environment, Public Works Division provided additional information on the operation of the NHV-RV system, including Table 4.1-A.

The physical characteristics of the district are listed in the table below.

Table 4.1-A: NHV-RV Regulatory Structures

Name	City	Location	Type	Status
L34	Wayne	SE of 4th N Bank Glenwood	Tipping Gate	Separated System, outfall still in place
L35	Wayne	Mich & 5th	Vortex	Active CSO Outfall
L36	Wayne	Mich & Venoy	Shear Gate	Active CSO Outfall
L37	Wayne	Mich & 5th	Vortex	Separated System, outfall still in place
L38	Inkster	Mich & Weihoft	Vortex	Diverts to Inkster Basin
L39	Inkster	Mich & Sylvia	Vortex	Diverts to Inkster Basin
L40	Inkster	Franklin ext S Bank	Diversion	Diverts to Inkster Basin
L41	Inkster	Mich & Beech Daly	Vortex	Active CSO Outfall
L42	Dbn Hts	Beech Daly & Avondale	Tipping Gate	Active CSO Outfall
L43	Dbn Hts	E of Beech & Mich	Diversion	Storm outlet from separation project
L44	Dbn Hts	E of John Daly, S bank Hills Dr.	Diversion	Diverts to Inkster Basin
L45	Dbn Hts	E of John Daly, S bank, S River Pk.	Diversion	Diverts to Inkster Basin
L46	Inkster	E of Middlebelt, N Bank Buckingham	Diversion	Active CSO Basin
L47	Inkster	E of River Pk @ Crescent W Bank	McNulty	Diverts to Inkster Basin
L48	Inkster	W of Inkster, Magnolia ext N Bank	Tipping Gate	Diverts to Inkster Basin
M12	Dbn Hts	Master Control W of Hines	---	Eliminated by LS 1-A, Outfall Bulkheaded
M13	Dbn Hts	Hines & Parkland ext N bank	Tipping Gate	Active CSO Basin
M14	Dbn Hts	Ford E of Belmont ext S Bank	Diversion	Active CSO Basin
M15	Dbn Hts	Hines & Wormer ext N Bank	Tipping Gate	Diverts to Dearborn Hgts Basin
M16	Dbn Hts	Mayburn Tile, W of Tel, N of Warren	Tipping Gate	Diverts to Dearborn Hgts Basin
M17	Dbn Hts	Conley Tile, Rouge R Dr & Fenton ext	Tipping Gate	Diverts to Dearborn Hgts Basin
M18	Dbn Hts	Rouge R & Silvery Lane, ext S Bank	Tipping Gate	Active CSO Basin
M19	Dbn Hts	E of Beech Daly, E Bank	Diversion	Active CSO Basin
M20	Westland	Middlebelt & Warren	Shear Gate	Outfall Eliminated
M21	Westland	Inkster & Ann Arbor Trail	Tipping Gate	Active CSO Outfall
M22	Westland	Merriman & Ann Arbor Trail	Shear Gate	Active CSO Outfall
M23	Westland	E of Merriman, N Bank acr Pkwy Reg	Shear Gate	Storm Outlet from Separation Project
M24	Garden City	E of Merriman, Warren Ext	Shear Gate	Separated System, Outfall not active
M25	Westland	Hines & Ann Arbor Trail	Shear Gate	Active CSO Outfall
M26	Livonia	Newburg Tile, Ann Arbor & Levan Ext	Diversion	Separated System, Outfall Bulkheaded
M27	Plymouth	Butternut ext S Bank, Robinson I	Diversion	Separated System, Outfall Bulkheaded
M28	Plymouth	Hines & Brownell ext S bank Robinson II	Diversion	Separated System, Outfall Bulkheaded
M29	Plymouth	Hines E of Riverside S Bank	Diversion	Separated System, Outfall Bulkheaded
M30	Plymouth	E of Northville, S of Hines	Diversion	Separated System, Outfall Bulkheaded
M31	Plymouth	Northville Rd & Phoenix Lake	Diversion	Separated System, Outfall Bulkheaded
M32	Plymouth	Nville Rd at Phnx L, Schoolcraft & 5 Mi.	Diversion	Separated System, Outfall Bulkheaded
M33	Dbn Hgts	Bonaparte Tile, Hines E of Warrendale	Tipping Gate	Diverts to Dearborn Hgts Basin
U1	Dbn Hgts	Joy Rd & Grayfield, Hazelton & Joy	Vortex	Active CSO Outfall
U2	Redford	W Chicago, E of Telegraph	Tipping Gate	Active CSO Outfall
U3	Redford	5 Mile E of Inkster	Vortex	Active CSO Outfall
U4	Redford	Inkster & Ross	Vortex	Active CSO Outfall
U5	Redford	Dewby, N of 5 Mile	Vortex	Active CSO Outfall
U6	Redford	Lola & Wakeden, Near 6 Mile	Tipping Gate	Diverts to Reford Basin
U7	Redford	Puritan W of Beech Daly N Bank	Diversion	Diverts to Reford Basin
U8	Redford	Beech Daly & Lola N Bank	Diversion	Diverts to Reford Basin
U9	Redford	Graham & Sarasota	Vortex	Active CSO Outfall
U10	Redford	Ross & Sarasota	Vortex	Active CSO Outfall
U11	Redford	Beech Daly & Lyndon	Tipping Gate	Active CSO Outfall

WASTEWATER SYSTEM COMPONENTS North Huron Valley - Rouge Valley Sewer District	
Area	175,027 total acres (274 square miles) 96,767 acres of sewered area (151 square miles)
Miles of Sewer (estimated from GIS)	97 miles of interceptor, estimated from GIS
Pump Stations	Lift Station 1A
Outfalls	20 active CSO outfalls - see Table 4.1-A.
Major Control Structures	High Level Weir (Rouge Valley & NW Interceptor) Junction Chambers (Rouge Valley Interceptor) 48 regulators, see Table 4.1-A.
CSO or Equalization Basins	The following basins are operated by Wayne County but owned by their respective cities or townships: Redford Township CSO Retention Basin (Redford Township) Inkster CSO Retention Basin (City of Inkster) Dearborn Heights CSO Retention Basin (City of Dearborn Heights) Livonia Equalization Basin (City of Livonia) Wayne Equalization Basin (owned and operated by the City of Wayne) Middle Rouge Equalization Basin (WTUA) Lower Rouge Equalization Basin (WTUA)

4.2 City of Dearborn

4.2.1 General Description and History

The City of Dearborn is directly south and west of the City of Detroit and is also located at the terminus of the Wayne County interceptor system. It is therefore the location of many important facilities in both systems. To the west of the city is the North Huron Valley - Rouge Valley Sewage Disposal District. To the south are the Cities of Allen Park, Melvindale, Taylor and Romulus. (See Figure 4.2.)

The city is traversed by the Rouge River and the Lower Rouge River, which lie in the floors of shallow valleys. The ground slopes generally from northwest to southeast, although the topography is very flat, the result of a glacial lake plain formation.

Of the 15,615 acres in the city, approximately 30% of land use is residential, 10% is commercial, 16% industrial, 12% institutional, and the remaining 32% public right-of-ways, flood-control facilities, and vacant land. The large component of non-residential land use is due to the location of major companies and institutions such as Ford Motor Company, Greenfield Village, Henry Ford Community College, and the University of Michigan Dearborn Campus. The city's major roads include I-94, Michigan Avenue, Ford Road, Telegraph Road, and the Southfield Freeway.

Three agreements for sewage flow were reached between the City of Detroit and the City of Dearborn in December 1957, October 1960, and August 1961. Through these agreements, 64.6 MGD (100 cfs) represents the 1998 peak flow allowed for discharge from the Dearborn sewers into the City of Detroit sewer system. Billing for the City of Dearborn is divided into separate charges for Dearborn East, Dearborn East (storm), Dearborn West, and Dearborn Northeast.

4.2.2 Physical Characteristics of the Sewer System

The City of Dearborn's collection system has a total of 456 miles of sewer, most of it constructed before 1940. The existing sewer system for the City of Dearborn is mostly combined - 12,325 acres of combined sewer area and 934 acres of separated sewer area.

There are five sewer districts in the city: East Dearborn, West Dearborn, Northwest Interceptor District, Hubbell Creek District, and Baby Creek District. The last two areas have traditionally been considered as part of their bordering districts in Detroit, Hubbell District and Baby Creek District.

About 1,500 acres of Dearborn in the northeastern part of the City is in the drainage area of the City of Detroit's Baby Creek District, and is unmetered. In addition, some storm flows are unmetered and enter the City of Detroit combined system. The rest of Dearborn's sewage is metered at two points associated with the two pump stations in the city. These meters are located at the intersection of Miller Road and Dearborn Avenue and at the intersection of Greenfield Avenue and Butler Street.

According to the City of Dearborn, Michigan Facility Plan (1980), there are a total of 21 combined sewer overflows, including: 1) overflows at diversion chambers, 2) overflows at overflow manholes, and 3) emergency overflows at the pump stations. These overflows are listed in the table below. The Facility Plan also states that there are 18 diversion structures that regulate flow of wastewater into the interceptor system.

To address overflows to the Rouge River, construction of a storage tunnel is being pursued. The original plan for the Dearborn Tunnel consisted of two phases. The final design for Phase I of the tunnel was completed in 1994 and construction on the tunnel began in 1995. This initial design of the Dearborn Tunnel consisted of an approximately 31,000-ft long 18-ft diameter tunnel totaling 65 MG of storage volume. Due to heavy groundwater inflows encountered during construction of the Phase I tunnel, construction was halted. Since the halt of construction, the City of Dearborn reevaluated CSO facility alternatives. Recently, the City has decided to again pursue the tunnel option. The possibility of a joint project with the Rouge Tunnel was discussed for a time. In early 2003, the City of Dearborn decided to pursue the option of constructing a separate Dearborn Tunnel.

DWSD-owned wastewater facilities located partially or wholly in Dearborn include the ***Hubbell-Southfield CSO Basin*** (see Section 2.2), the ***Baby Creek CSO Basin*** to be constructed (see Section 2.5) and several meters.

There are two pump stations in Dearborn, the ***Greenfield Road*** and ***Miller Road Pump Stations***, that discharge part of the City's sewage to DWSD Sewer System. These pump stations were converted from wastewater plants that were formerly located at these sites. The Greenfield Road Pump Station has five submersible pumps, with a total station capacity of 68 cfs (44 mgd). The Miller Road Pump Station has one pump, providing a firm capacity of 20 cfs (13 mgd).

4.2.3 Sources

The interceptor map for the City of Dearborn is illustrated in the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (23). Other documents consulted include the City of Dearborn, Michigan Draft Facility Plan (November 1980), the Greenfield Road Pump Station Project Report (June 1989), and the Project Plan for Combined Sewer Overflow Control (October 1993).

The City of Dearborn Public Works Department was also contacted for verification of pump station and outfall information.

WASTEWATER SYSTEM COMPONENTS City of Dearborn Sewer District		
Area	15,615 acres or 24.4 square miles	
Miles of Sewer	456 estimated total miles of city-owned sewers 23 miles of interceptor, estimated from GIS	
Pump Stations	Greenfield Road (Dearborn) Miller Road (Dearborn)	
Outfalls (21)	No.	Location (on Lower Rouge River):
	B101	Dearborn Hills Golf Course, 10th Green
	B102	Dearborn Hills Golf Course, 11th Fairway
	B103	Michigan & Telegraph
	B104	Telegraph, north of River Rouge
	B105	Telegraph, south of River Rouge
	B106	Outer Drive, north of Michigan
	B107	Outer Drive & Michigan
	B108	Alexandrine & Reginald
	B109	675 Military, at Rouge River
	B110	Cherry Hill & Brentwood
	B112	Michigan & Elm
		Two Manholes:
	--	1000' N. of River, 1000' W. of Outer Drive
	--	East end Morley Ave. (South Bank)
	No.	Location (on Rouge River):
	B053	Michigan & Southfield (Backwater Gate, Dam, and Regulator)
	B111	Brady & Willoway
	B113	Village & Southfield, Greenfield Village
	B114	Southfield & Rotunda
	B115	Rotunda & Eastham
	B116	Palmer & Colson
	B117	Rotunda Drive & I-94, I-94 embankment
	B118	Baby Creek Enclosure
	--	Greenfield Pump Station
	--	Miller Road Pump Station
Major Control Structures - Regulators	18	
CSO or Equalization Basins	Hubbell-Southfield CSO Basin (DWSD - see Section 2.2) Baby Creek CSO Basin (DWSD - see Section 2.5)	

4.3 City of Allen Park

4.3.1 General Description and History

The City of Allen Park was incorporated in 1957 and covers an area of 4,524 acres or 7.1 square miles. Of this, approximately 1,696 acres, or 2.6 square miles, is served by the Detroit Water and Sewerage Department. (The actual service area boundary and acreage is currently a matter of discussion between the City of Allen Park and DWSD.) The City of Allen Park is bounded on the north and west by the cities of Dearborn and Dearborn Heights. The cities of Melvindale and Lincoln Park border the City of Allen Park to the east, and to the south are the cities of Taylor and Southgate (24). (See Figure 4.3.)

The northern third of Allen Park is served by DWSD. It is primarily an industrial area with about 1000 single-family residences and 500 multi-family units. The southern two-thirds of the city is served by the Wyandotte Wastewater Treatment Plant through a contract with the Wayne County Department of Public Works.

Land use in the city is 51% residential, 17% commercial, institutional, and office, 11% industrial and extractive, and the remaining 21% transportation, recreation, and other uses (SEMCOG, 1995). The housing stock was predominantly built in the 1950s and 1960s.

There are three industrial parks in Allen Park. Large industrial companies in the area include Frito-Lay, Inc., Ford Motor Company, and Heublien, Inc.. Major roads through Allen Park include the Southfield Freeway, I-94 (Ford Freeway), and Oakwood Boulevard.

Three agreements for sewage disposal were established between the City of Detroit and the City of Allen Park in April 1955, July/ August 1959 and June 1974. The peak flow allowed for discharge from Allen Park sewers into the Detroit sewer system is 0.4 cfs per 1000 persons based on population and the "Hydraulic Equivalent". Occasional excess wet weather flows in the system have resulted in backups from the DWSD connection and basement flooding in some sections of Allen Park. Allen Park officials have been meeting regularly with DWSD and MDEQ since February 2001 to discuss the availability of additional capacity. The city has spent over $73 million in recent years to improve its sanitary sewer system and reduce infiltration and inflow.

4.3.2 Physical Characteristics of the Sewer System

The sewer system in Allen Park is separated but footing drains and downspouts are connected to the sanitary system in many areas. The city has undertaken a program to require disconnection of downspouts and footing drain removal during renovations.

Flow from the Allen Park sewer system is discharged into the Northwest Interceptor through two connection points, AP-S-1 and AP-S-2. Flows at AP-S-1 are measured using an Accusonic meter installed in November 2001. This connection has an

overflow relief outfall to the Rouge River that was included in the system design and remains in place today.

There are three pump stations upstream of the APS-1 outlet: ***Outer Drive and I-94***, ***Lawrence Avenue***, and ***Watson Avenue***. The pump station at Outer Drive and I-94 lifts flows for gravity discharge into the Northwest Interceptor at APS-1. The pump station has 2 pumps, each at 3.6 mgd (5.6 cfs). Recent inspections indicate that an internal flap gate is rusted shut, and it is not likely that recent wet weather events have produced SSOs to the Rouge River through this pathway. During heavy rain events, however, to prevent basement flooding, the city has to pump excess sewage to the North Branch of Ecorse Creek using portable equipment.

The flows at APS-2 are measured by a recently-installed 10-inch magnetic flowmeter. There is no provision for an overflow at this location.

Allen Park is evaluating alternatives that will minimize basement flooding and sanitary sewer overflows that the district has experienced over the last three decades.

4.3.3 Sources

The interceptor map for the City of Allen Park was obtained from the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (1975). The Community Engineer for the City of Allen Park, John Kazuh, provided information on the pump stations. Engineering consultants from Wade-Trim currently working on the city sewer system and SSO issues provided additional information on the Allen Park sewer system.

WASTEWATER SYSTEM COMPONENTS City of Allen Park Sewer District	
Area	Estimated 1,696 acres connected to the DWSD out of 4,524 total acres in the city.
Miles of Sewer (estimated from GIS)	101 estimated total miles of sewer for the City of Allen Park (DWSD and Downriver) 2.5 miles of interceptor, estimated from GIS
Pump Stations (3)	Operated by Allen Park: 1) Outer Drive and I-94 2) Lawrence Avenue 3) Watson Avenue
Outfalls	No permitted outfalls. Occasional overflows to the Rouge River and Ecorse Creek during wet weather.
Major Control Structures	None
CSO or Equalization Basins	None

4.4 City of Melvindale

4.4.1 General Description and History

The City of Melvindale, located on the border of Detroit, was incorporated in 1932. To the east, the City of Melvindale is bordered by the City of Detroit and to the west by Allen Park. To the north is Dearborn, and to the south is Allen Park and Lincoln Park (25). (See Figure 4.4.) Several manufacturing facilities are located in the city.

The area of the city is 1,728 acres. Land use in the city is 37% residential, 17% commercial, office, and institutional, 18% industrial, 16% transportation, communication, and utility and the remaining 12% recreation, open land, and other uses (SEMCOG, 1995). The housing stock is primarily bungalows and ranches built in the 1920s to 1960s. A large number of residences were constructed in the early 1940s.

Major roads in the area include I-94, I-75, Greenfield Road, and Oakwood Boulevard. The Rouge River runs near the northern border of the city, and the Ecorse River runs along the southern border.

The first agreement between the Cities of Detroit and Melvindale to accept Melvindale's sanitary flow was established in June 1955. In this agreement, 6.375 cfs of sanitary flow was accepted into the Southfield section of the Northwest Interceptor, with an option to increase this to 0.5 cfs per 1000 population based on the 1970 census. Two additional agreements in July 1965 and May 1969 contract for sewer service up to 0.92 cfs to the old Melvindale Ordnance Forge Plant or Kropp Forge Ordnance Company property, owned by that time by Marathon Oil Company. This area is unmetered, but Melvindale pays a nominal rental charge for this discharge and sewage disposal charges paid by the property owners are to be based on standard DWSD rates.

The final agreement between Melvindale and Detroit, dated January 5, 1977, covers both of the previous agreements but appears to be a stand-alone contract and not an amendment. The allowable maximum flow in this agreement is 0.5 cfs per 1000 population, based on the most recent census. Sanitary plus infiltration/ inflow to the sanitary system are accepted as long as this limit is not exceeded. Melvindale must meter all flows, and it is acknowledged that the flow will have to be pumped into the Northwest Interceptor in Greenfield Road west of Wall Street. Finally, the rental charge for the Marathon Oil Company sewer line is increased.

According to a document entitled "System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan" (April 1998), 6.1 cfs (3.9 mgd) represents the peak flow allowed for discharge from the Melvindale sewers into the City of Detroit sewer system.

4.4.2 Physical Characteristics of the Sewer System

Construction began on the sewer system in Melvindale in 1929 as a separated system with residential footing drains connected. The original system discharged directly to

the Rouge River, but was eventually connected to the DWSD Northwest Interceptor through the Melvindale Pump Station. This connection included an emergency river bypass for surcharged conditions.

The original ***Melvindale Pump Station*** was located along the banks of the Rouge River near Greenfield Avenue and Wall Street. In 1966, the deteriorating pump station was replaced. The new pump station was located a few hundred feet away. As there was potential damage to the aging interceptor, Melvindale was required to use the existing tap into the Northwest Interceptor. This required a 16-inch force main from the new pump station up to the original pump station location. The original emergency bypass to the Rouge River is still available for surcharged conditions.

Under wet weather conditions, the new pump station is operated at about 15 cfs and is able to force flows into the Northwest Interceptor. During three rain events over the last five years, Melvindale has opened the emergency bypass to the Rouge River in order to reduce basement backups occurring during upstream surcharging. By opening the bypass, the pumps were able to operate at about 18 cfs. Two SSO overflows have been reported to MDEQ in the last two years, but one of these overflows was due to a maintenance issue.

The Melvindale Pump Station has two 4,000-gpm pumps and one 2,000-gpm pump. Sanitary flow is pumped into the Northwest Interceptor through a 16-inch connection at Greenfield Road, 400 feet west of Wall Street. There is a fourteen-inch magmeter at this location to measure flows to DWSD, originally installed in 1983.

Seaway Lift Station, located at 19140 Seaway, is also owned and operated by Melvindale. This lift station has two small pumps and their capacities are unknown.

4.4.3 Sources

An interceptor map for the City of Melvindale was obtained from the Segmented Facilities Plan (1978). The original contracts between DWSD and Melvindale were reviewed for the description of service agreements.

Additional information on the City of Melvindale system was obtained from Eric Witte, the Melvindale Department of Public Works Director. Information from the evaluation of sanitary sewer overflows in Melvindale was incorporated into this summary.

WASTEWATER SYSTEM COMPONENTS City of Melvindale Sewer District	
Area	1,728 acres or 2.7 square miles
Miles of Sewers (estimated from GIS)	Interceptor length estimated from GIS at 4.5 miles. No internal sewer information available.
Pump Stations	Melvindale/Greenfield Pump Station (City of Melvindale) Seaway Lift Station (City of Melvindale)
Outfalls	Emergency overflow outfall on the Rouge River
Major Control Structures	None
CSO or Equalization Basins	None

4.5 City of Highland Park

4.5.1 General Description and History

The City of Highland Park lies to the north of downtown Detroit along Woodward Avenue. The city boundary to the east is the John C. Lodge Expressway (I-10), and to the west is the I-75 freeway (26). It is bounded by Tuxedo and Tennyson Streets on the south and McNichols Road on the north. (See Figure 4.5.)

The city covers an area of 1,894 acres (2.96 square miles). Land use in the city is 49% residential, 26% commercial, institutional, and office, 11% industrial, and the remaining 14% is transportation, utilities, recreation, and other uses (SEMCOG, 1995). The housing stock was largely built in the 1920's, with many large brick art-and-crafts style houses originally built by auto company foremen.

The city's major roads include Woodward Avenue and McNichols Road, and both the John C. Lodge Expressway (I-10) and the Chrysler Freeway (I-75) run along the boundaries of the city. The Davison Freeway bisects the city.

The City of Highland Park's sewer system was constructed beginning in the 1890's as an outlet became available in the Detroit system. Highland Park was incorporated in 1917. The City was originally on the edge of Detroit but was surrounded by the City when Detroit annexed the area up to Eight Mile Road in the mid-1920's. The municipality made an agreement with the City of Detroit to discharge sewage into Detroit's sewer system in 1898. A new agreement was entered into in 1940 when the WWTP was constructed that provided for the community to pay for the treatment of its wastewater as well as the conveyance. Contractual agreements between Highland Park and DWSD allow the city to discharge up to a 10-year peak flow.

Highland Park was heavily industrialized for many decades, with both Ford and Chrysler automobile plants located here. Ford closed its Highland Park plant in 1971, and Chrysler left the city in 1996. More recently, despite some new commercial and residential developments, the city's industrial base has continued to decline. The city's financial problems resulted in the appointment of a state emergency financial director in 2001.

The Highland Park sewer system is so interconnected with the City of Detroit system that it is effectively an integral part of the City of Detroit system, with portions of the city falling within the Baby Creek and Conner Creek sewer districts.

4.5.2 Physical Characteristics of the Sewer System

The sewer system in Highland Park is between fifty and eighty years old. The entire system is combined and is reported to be adequate to handle storm flows. The city's sewers are interconnected with the City of Detroit sewers, so none of the city's discharges are metered separately.

Inspection of the system conducted for the 1982 City of Highland Park SSES Study showed that there was excessive infiltration in some areas of the city. Many manholes showed signs of deterioration. Numerous sewers contained appreciable sediment deposits.

Major interceptors and trunk sewers in Highland Park include the McNichols Sewer, the Woodward Sewer, and the First-Hamilton Relief Sewer. The First-Hamilton Relief Sewer was designed to include wet weather capacity for Highland Park. For further information on the sewers, see the more detailed description in the sections on the Connor Creek and Baby Creek Sewer Districts.

There are no pump stations, control structures, CSO outfalls or CSO basins in Highland Park.

4.5.3 Sources

A map of Highland Park is available from the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (26). Additional information on the sewer system was obtained from the City of Highland Park Sanitary Sewer Evaluation Study (SSES), April 1982.

WASTEWATER SYSTEM COMPONENTS City of Highland Park Sewer District	
Area	1,894 acres or 2.96 square miles
Miles of Major Sewers (estimated from GIS)	57
Pump Stations	None
Outfalls	None
Major Control Structures	None
CSO or Equalization Basins	None

4.6 City of Hamtramck

4.6.1 General Description and History

The City of Hamtramck lies to the north of downtown Detroit between Carpenter (north boundary) and Newton (south boundary, continuation of Mt. Elliott). The western boundary is Lumpkin and the Grand Trunk Western railway and the eastern is Conant and Vincent (27). Most of Hamtramck lies in the Central Sewer District. (See Figure 4.6.)

The city covers an area of 1,337 acres (2.09 square miles). Land use in the city is 53% residential, 16% commercial, institutional, and office, 19% industrial, and the remaining 12% is transportation, utilities, recreation, and other uses (SEMCOG, 1995). The housing stock is largely wooden single-family homes, built in the 1920's by Polish and German immigrants. Jos. Campau and Caniff are main streets, and I-75 and I-94 are located near the city.

The City of Hamtramck was incorporated in 1922. The city was originally on the edge of Detroit but was surrounded when Detroit annexed up to Eight Mile Road in the mid-1920's. Hamtramck was formerly a center of industry and had a peak population of approximately 90,000 in 1930. Since then, industrial activity and population have steadily declined. The Dodge Main Plant, which at one time employed 25,000 people, closed in 1980. The City is currently undergoing financial problems and the State of Michigan has appointed a financial controller to attempt to resolve these problems. Commercial activity in the city has increased, however, in recent years.

The City of Hamtramck's sewer system was constructed in the 1920's as an outlet became available in the Detroit system. The Hamtramck sewer system is so interconnected with the City of Detroit system that it is an integral part of the Detroit system.

The municipality originally made an agreement with the City of Detroit to discharge sewage into Detroit's sewer system in 1928. This agreement included capital and operating charges for past use of Detroit sewers, but the agreement may have expired in 1963. A contract for indefinite service was signed in August 1941, and states that the charge for sewer service will be based on the water consumption, at the rate of $0.2162 per thousand cubic feet of water delivered. A settlement agreement dated 9/ 14/ 89 requires the City of Hamtramck to pay back arrearages for these sewer service payments.

Documents from the Long Term CSO Control Plan state that the contracts between Hamtramck and DWSD allow for acceptance of peak flows up to 1,244.5 cfs. A total conveyance capacity of 337.5 cfs was purchased by Hamtramck, with an additional 907 cfs for a 10-year storm provided in the design of the Conant-Mt. Elliott Relief Sewer.

4.6.2 Physical Characteristics of the Sewer System

The entire system is combined and is reported to be adequate to convey the sanitary flows from the City but not adequate to carry the flow from a 10-year storm or greater. The sewer system is interconnected with the Detroit system and there are no meters installed to measure flow from the city.

Main sewers in the city are the Joseph Campau Sewer and the Conant-Mt. Elliott Relief Sewer. The relief sewer was designed to provide wet weather capacity for Hamtramck. For further information, see the description of the sewer system in the section on the Central and Connor Creek Sewer Districts.

There are no pump stations, control structures, CSO outfalls or CSO basins in Hamtramck.

4.6.3 Sources

A map of the area is shown in the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (27). The description of the district has been updated with current information from the Long Term CSO Control Plan (CS-1281) and other related DWSD projects. Contract information was obtained from DWSD contract files.

WASTEWATER SYSTEM COMPONENTS City of Hamtramck Sewer District	
Area	1,337 acres or 2.09 square miles
Miles of Sewer (estimated from GIS)	45.6
Pump Stations	None
Outfalls	None
Major Control Structures	None
CSO or Equalization Basins	None

4.7 City of Grosse Pointe Park

4.7.1 General Description and History

Grosse Point Park, like the other Grosse Pointe communities, is primarily a residential community with no industry. The City of Grosse Pointe Park developed rapidly in the 1920's and 1930's as a suburban residential area close to Detroit, but was not incorporated as a city until 1950. By 1970, the peak population was reached, and has declined since then.

The City covers 1,734 acres (2.71 square miles). The City of Grosse Pointe Park is bounded on the north and south by the City of Detroit and Lake St. Clair, respectively. The western boundary is the City of Detroit, whereas the eastern boundary is the City of Grosse Pointe. (See Figure 4.7.)

Grosse Point Park, like the other Grosse Pointe communities, is a residential area with no significant industrial discharges. Land use in the city is 92% residential (less than 1% multi-family housing), 4% commercial, institutional, and office, 0% industrial, and the remaining 2% is cultural, recreation, and other uses (SEMCOG, 1995).

Topography is flat to gently rolling, with ground slopes ranging from 0% to 2%, but typically 0.1% to 0.3%. There is a relatively low area located immediately behind a shore ridge that is a former marshy area, and is now developed.

Main streets are East Jefferson Avenue and Kercheval Street. There are no highways through the city.

The agreement between the Cities of Detroit and Grosse Pointe Park was first established in June 1938 for acceptage of sewage flow and amended in September 1940 to cover charges for sewage treatment. These contractual agreements provide for the transportation and treatment of combined sewage flows up to 84 cfs (54.3 mgd) entering the Detroit River Interceptor. These flows are also listed in the document entitled "System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan" (April 1998).

4.7.2 Physical Characteristics of the Sewer System

Grosse Pointe Park until recently had a combined sewer system, consisting of high-level lateral and interceptor sewers and low-level relief interceptors. In general, the laterals run in a north-south direction. Sewers south of Jefferson Avenue drain north to the interceptor that follows this road. Sewers between Jefferson and Mack Avenues drain south to Jefferson Avenue. The entire system drained to the Grosse Point Park Pump Station on Jefferson Avenue at Maryland Avenue.

Two interceptors in Jefferson Avenue transport sewage from the laterals westward to the station. One is a high-level sewer and the other low-level, with numerous interconnections. The shallower interceptor is a continuation of the Detroit River Interceptor (DRI), but the interceptor is bulkheaded by a permanently-closed

backwater gate at Wayburn Avenue, to force flow to the pump station. A 16-inch force main and 48-inch sewer connect the pump station to the DRI beyond the bulkhead. Although the DWSD's Fox Creek Enclosure crosses the city, it is not part of the city's sewer system, but entirely separate. The city sewers cross under the enclosure by means of inverted siphons.

The total length of sewers in the city is estimated at 49 miles. The high-level interceptors were constructed between 1912 and 1926, while the deep relief interceptors were constructed later, between 1938 and 1956. Many of these interceptors are of elliptical brick construction.

When the sewer system in Grosse Pointe Park was combined, the storm pumps would discharge excess flows to the Fox Creek Channel and eventually the Detroit River. These flows often ended up overflowing the channel and entering the property of residents in Creekside, a neighborhood in Detroit bordering Grosse Pointe Park. These residents sued Grosse Pointe Park. The city in turn sued DWSD and the City of Detroit, maintaining that the capacity of Fox Creek was inadequate. The lawsuit was settled in 1997. The sewer system was separated by the city, and a pump station the ***Patterson Park Stormwater Pump Station*** was constructed in Patterson Park to handle storm flows. There are seven pumps in the station, as follows:

- 1 storm pump rated at 1.44 mgd (0.93 cfs)
- 2 storm pumps each rated at 32.40 mgd (21 cfs)
- 4 storm pumps each rated at 86.40 mgd (55.8 cfs)

The overflows to Fox Creek were finally eliminated in the year 2000 (29).

The ***Grosse Pointe Park Pump Station*** collects wastewater flows from the city and pumps them to the DWSD system. The pump station was originally constructed in 1939, and expanded in 1961. There are eight pumps in the station, as follows:

- 3 sanitary pumps each rated at 2 mgd (3 cfs)
- 3 storm pumps each rated at 23 mgd (35.5 cfs)
- 2 storm pump each rated at 97.2 mgd (150 cfs)

The three sanitary pumps and two smaller storm pumps discharge to the DRI. Before the sewer separation, the two large storm pumps discharged through the Alter Road Outlet Conduit to the Fox Creek Canal.

4.7.3 Sources

The interceptor map for the City of Grosse Pointe communities (i.e., Grosse Pointe, Grosse Pointe Park and Grosse Pointe Farms) was obtained from the preliminary report entitled Segmented Facilities Plan-Book VII-Existing Waste Collection &

Treatment Facilities (1978) (28). Additional information was obtained from the City of Grosse Point Park Project Plan for Michigan DNR (March, 1995) and Infiltration Inflow Analysis (1979).

The Grosse Pointe Park Pump Station superintendent (Ken Alan), and a Grosse Pointe Department of Parks official (Terry Saloma) provided information on the pump stations.

WASTEWATER SYSTEM COMPONENTS **City of Grosse Pointe Park Sewer District**	
Area	1,734 acres or 2.71 square miles
Miles of Sewers	49 estimated total miles of city sewers (1979 I/I Study) 7.3 miles of interceptor, estimated from GIS
Pump Stations	Grosse Pointe Park Pump Station (City of Grosse Pointe Park) Patterson Park Stormwater Pump Station (City of Grosse Pointe Park)
Outfalls	None
Major Control Structures	None
CSO or Equalization Basins	None

4.8 City of Grosse Pointe

4.8.1 General Description and History

The City of Grosse Pointe was incorporated in 1934 and covers 845 acres (1.32 square miles). The sewer service area is approximately 691 acres. The City of Grosse Pointe is bounded on the east and west by the City of Grosse Pointe Farms, and the City of Grosse Pointe Park, respectively. To the north of the city is the City of Detroit and to the south is Lake St. Clair (28). (See Figure 4.8.)

Grosse Pointe is a fully developed residential community with no significant industrial discharges. Land use in the city is 86% residential (less than 1% multi-family housing), 12% commercial, institutional, and office, 0% industrial, and the remaining 2% is cultural, recreation, and other uses (SEMCOG, 1995).

Main streets are East Jefferson Avenue and Kercheval Street. There are no highways through the city.

The agreements between the Cities of Detroit and Grosse Pointe for sewage flow and treatment date back from June 1938 and December 1940, respectively. The agreement for sewage flow was amended in March 1941. Based on the agreements, DWSD will treat all sanitary flow from Grosse Pointe entering the Detroit Sewer System from the Fox Creek Enclosure. According to a document entitled "System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan" (April 1998), 124.1 MGD (192 cfs) represents the peak flow allowed for discharge from the Grosse Pointe sewers into the City of Detroit sewer system.

4.8.2 Physical Characteristics of the Sewer System

The sewers in Grosse Pointe were mostly constructed prior to 1965, with a large portion constructed between 1930 and 1950. There are approximately 244,000 feet of sewers ranging in size from 6-inch diameter to 63-inch by 98-inch arch pipe. The smaller sewers (less than 18 inch diameter) are mostly vitrified clay pipe, while the larger sewers are predominantly reinforced concrete pipe. Infiltration and inflow in the system are affected by lake levels in Lake St. Clair.

The City of Grosse Pointe sewer system is about 70% separated and 30% combined. The area north of Waterloo (one block north of Kercheval) has combined sewers. However, only a few blocks are true combined sewers, and the rest of the system in this area consists of separate storm and sanitary sewers which discharge to a common interceptor. The sanitary and storm flow from this area enter the Grosse Pointe Neff Road Pump Station via this interceptor and are pumped to DWSD's Fox Creek Enclosure.

The area south of Waterloo has separated sewers with storm sewers discharging to Lake St. Clair through twelve storm outfalls. Sanitary sewers flow to the north and discharge into the main interceptor taking flows to the Grosse Pointe Neff Road Pump Station.

The ***Grosse Pointe City (Neff Road) Pump Station*** contains two small sanitary pumps with a maximum capacity of 17.8 cfs (11.5 mgd) and four large storm pumps with a total maximum discharge capacity of 276 cfs (181 mgd). The pump station discharges flows into the Fox Creek Enclosure.

4.8.3 Sources

The interceptor maps for the City of Grosse Pointe communities (i.e., Grosse Pointe, Grosse Pointe Park and Grosse Pointe Farms) were obtained from the Segmented Facilities Plan-Book VII-Existing Waste Collection & Treatment Facilities (28). Additional information on the sewer system was obtained from the City of Grosse Pointe, Michigan Sewer Infrastructure Study (1987), and the Infiltration Inflow Analysis (1979).

Frank Shulty, pump station superintendent for the City of Grosse Pointe, provided additional information on the Grosse Pointe Pump Station.

WASTEWATER SYSTEM COMPONENTS **City of Grosse Pointe Sewer District**	
Area	845 acres or 1.32 square miles
Miles of Sewers	46 miles - estimated length of city sewers (Sewer Infrastructure Study, 1987) 3.4 miles of interceptor, estimated from GIS
Pump Stations	Grosse Pointe City (Neff Road) Pump Station
Outfalls	12 storm sewer outfalls
Major Control Structures	None
CSO or Equalization Basins	None

4.9 City of Grosse Pointe Farms

4.9.1 General Description and History

Grosse Pointe Farms is an established residential community incorporated in 1949, with an official area of 2,041 acres (3.19 square miles). The sewered area is 1,429 acres (2.2 square miles). The community is fully developed and has no significant industrial discharges into the sewer system.

The City of Grosse Pointe Farms is bounded on the north by the City of Detroit, and on the south by Lake St. Clair. To the east, the City of Grosse Pointe Farms borders the North East Wayne County Sewer District, while on the west is the City of Grosse Pointe (28). (See Figure 4.9.)

Land use in the city is 75% residential, 9% commercial, institutional, and office, 0% industrial, 1% transportation, communication, and utility, and the remaining 15% is cultural, recreation, and other uses (SEMCOG, 1995).

Main streets in the district are Lake Shore Road, Kercheval Avenue, and Moross Road. There are no highways through the city.

The topography of the area is fairly level, except for a low plateau rising about 25 feet from the shore in the southeastern section of the city. The underlying soils are mostly clay and sandy clay with seams of sand or gravel. These seams are especially common between Grosse Pointe Boulevard and the lake.

The agreement between the Cities of Detroit and Grosse Pointe Farms for sewage flow was reached in June 1938 and later amended in February 1941. The agreement for sewage treatment was established in January 1941, followed by amendments in December 1943 and February 1947. Dry weather flow from the entire City of Grosse Pointe Farms and storm flow from a portion of the City discharges into the Fox Creek Enclosure at the Kerby Road Pump Station at Kerby Road and Williams Street. The contract agreements with the City of Detroit provide for transport and treatment of all flows entering Detroit through the Fox Creek Enclosure.

According to a document entitled "System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan" (April 1998), 358 MGD (553.8 cfs) represents the peak flow allowed for discharge from the Grosse Pointe Farms sewers into the City of Detroit sewer system. This is equivalent to the current pump station capacity.

4.9.2 Physical Characteristics of the Sewer System

The sewer system in Grosse Pointe Farms was originally a totally combined system divided into two distinct areas, the Lake Area and the Fox Creek Area. The Lake Area is mostly east of Ridge Road. The Lake Area drains to an interceptor in Lake Shore Drive. An interceptor in Kerby Road conveys wastewater from the Lake Shore interceptor to the Grosse Point Farms Pump Station. In the past, during wet weather

events, the combined sewage from the Lake Area overflowed through a number of outfalls to Lake St. Clair. The city is currently separating 800 acres of combined sewered area, a project that will be completed by the end of 2002. Most of the area to be separated is in the Lake Area, south of Ridge Road, and east of the Country Club of Detroit.

The Fox Creek area lies to the west of Ridge Road. All of the wastewater from this area is discharged to the Grosse Pointe Pump Station and does not overflow to the lake.

The flow from the City of Grosse Pointe Farms discharges into the ***City of Grosse Pointe Farms (Kerby Road) Pump Station*** at 305 Chalfonte, not to be confused with the Kerby Road Pump Station located next to it but operated by Wayne County. The pump station contains eight pumps, rated as follows:

- Two sanitary pumps each rated at 2,000 gpm (4.5 cfs)
- One sanitary pump rated at 5,400 gpm (12 cfs)
- One storm pump rated at 10,800 (24 cfs)
- One storm pump rated at 33,750 gpm (75 cfs)
- One storm pump rated at 45,000 gpm (100 cfs)
- Two storm pumps rated at 75,000 gpm (165 cfs)

The maximum sanitary capacity is 21 cfs (13.5 mgd) and the maximum storm capacity is 529 cfs (347 mgd). Flow entering the wet well is pumped into the Fox Creek Enclosure. The flow into Detroit's sewer system is not metered, but is estimated with pumping records.

The ***Kerby Road Pump Station*** at 315 Chalfonte is located in Grosse Pointe Farms, and transfers flows from the Northeast Wayne County Sewer District and the Southeast Macomb Sewer District to the Detroit system. The station contains five pumps each rated at 14,200 gpm, for a total capacity of 158 cfs (102 mgd). More information on this station can be found in Section 4.10.

4.9.3 Sources

The interceptor map for the City of Grosse Pointe communities (i.e., Grosse Pointe, Grosse Pointe Park and Grosse Pointe Farms) is illustrated in the Segmented Facilities Plan-Book VII-Existing Waste Collection & Treatment Facilities (1978). Additional sources of information include the Infiltration/ Inflow Analysis (1979) and the Basis of Design Report for Sewer Separation, Combined Sewer Abatement Program - City of Grosse Pointe Farms, Lakeside Sewer District, Wayne County, Michigan (1998).

The City of Grosse Pointe Farms Engineering Department was contacted but declined a request to provide further information on the sewer system and pump stations.

WASTEWATER SYSTEM COMPONENTS City of Grosse Pointe Farms Sewer District	
Area	2,041 acres (3.2 square miles)
Miles of Sewers	54 miles of city sewers (I/I Analysis, 1979) 4.8 miles of interceptor, estimated from GIS
Pump Stations	Grosse Pointe Farms (City of Grosse Pointe Farms) Kerby Road (Wayne County and City of Grosse Pointe Farms)
Outfalls	Seven outfalls along Lake St. Clair 001: Provencal Road at Lakeshore 002: Tonnacour at Lakeshore 003: Kerby at Lakeshore 004: Moran at Lakeshore 005: St. Paul at Lakeshore 006: Warner at Lakeshore 007: McKinley (extended to lakeshore through private easement)
Major Control Structures	No. B131 Backwater Gate - Lakewood Dr. & Provencal
CSO or Equalization Basins	None

4.10 Northeast Wayne County Sewer District

4.10.1 General Description and History

The Northeast Wayne County Sewer District (NEWCSD) consists of the communities of Harper Woods, Grosse Pointe Woods and Grosse Pointe Shores. (See Figure 4.10.) The district covers all of these communities except a portion of Harper Woods between Roscommon Street and the City of Detroit boundary (Kingsville Road). This area is covered by a separate contract with DWSD.

The Milk River Drainage District, also located in the NEWCSD, was formed by communities discharging to the Milk River (Harper Woods and Grosse Pointe Woods). The Wayne County Department of Environment, Public Works Division (WCPWD) operates the facilities in both districts from offices located at the Milk River facility. The Northeast Wayne County Drainage Board and the Milk River Drainage Board are the decision-making entities that administer each district.

To the north of the Northeast Wayne County Sewer District is the Southeast Macomb Sewer District. At the southern boundary is the City of Grosse Point Farms. To the east is Lake St. Clair, and to the west is the City of Detroit.

Characteristics of the communities in the district are as follows:

COMMUNITY INFO	GROSSE POINTE WOODS	GROSSE POINTE SHORES	HARPER WOODS
Total Area (square miles)	3.28	1.72	2.63
Date Created or Incorporated	1950	1911	1951
Land Use (SEMCOG, 1995):	--	--	--
Residential	77	83	75
Commercial, Office, Institutional	14	4	20
Transportation, Communication, Utility	1	2	4
Cultural, Outdoor Recreation, Cemetary, Open Land	8	11	1

Industrial land use in these communities is negligible and is not listed by SEMCOG.

The only major freeway through the district is I-94. Other major roads are Lake Shore Road, Vernier Road, and Mack Avenue.

The Southeast Macomb Sanitary District communities of East Pointe, Roseville and St. Clair Shores also have an outlet to this interceptor within the district, and are

customers of the NEWCSD. For more information on the Southeast Macomb Sanitary District, see Section 6.2 on this district under Macomb County.

Wayne County entered into an agreement with DWSD in January 1944 to discharge its wastewater into Detroit's sewer system. The agreement was subsequently amended in March 1957 and February 1961. According to a document entitled "System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan" (April 1998), 82.1 MGD (127 cfs) is the peak discharge allowed from the NEWCSD into the City of Detroit sewer system. This maximum discharge includes the flow from the upstream Southeast Macomb Sanitary District, which has a contract with Wayne County Department of Public Works for sewage disposal service. The maximum flow from each community, as listed below, has largely determined the development of the sewer system in the district:

COMMUNITY	CONTRACTUAL CAPACITY (CFS)
Milk River Drainage District (Harper Woods & Grosse Pointe Woods)	22
Grosse Pointe Shores	3
Southeast Macomb Sanitary District (Eastpointe, Roseville, St. Clair Shores)	102
TOTAL	127

4.10.2 Physical Characteristics of the Sewer System

The sewer systems in the three communities comprising the district developed differently. Grosse Pointe Shores originally had combined and separated sewers in different parts of the city, but now has separated all sewers. Although it is the oldest of the three communities, most of its sewers were constructed between 1949 and 1975, with the largest proportion constructed in the 1950s. As of 1985, there was still one area of 36 homes not connected to the sewer system.

Grosse Pointe Woods has combined sewers, as much of the system was constructed before 1929. Harper Woods, however, has separated sewers, as a sanitary system discharging directly to the Detroit sewer system was constructed first. There is still a portion of Harper Woods that is not part of the Northeast Wayne County District but is covered by a separate contract with DWSD (See Section 4.11).

Grosse Pointe Woods and Harper Woods formed the Milk River Drainage District in the 1950s. The Milk River Pump Station was constructed in 1958 to pump wet weather flows to the Milk River. After water quality declined and odor problems developed, the Milk River Drainage Board pursued construction of a retention basin in the early 1970s. However, the retention basin, disinfection, and other facilities were not completed until the early 1990s.

All wastewater flows are transported by the main interceptor in the district, the Wayne County Grosse Pointe (WCGP) Interceptor, constructed in 1942. The schematic below (Figure 4.10A) shows the inflows into the interceptor and how they are connected to systems upstream and downstream of the district.

Starting at the upstream end, the Southeast Macomb Sanitary District discharges into the Jefferson Interceptor, which is connected to the WCGP Interceptor at 8 Mile Road. The ***Marter Road Booster Pump Station*** boosts the flow into the WCGP Interceptor during wet weather to the maximum allowed by the DWSD contract. This pump station has three pumps each rated at 55 cfs (36 mgd), for a total capacity of 167 cfs (108 mgd).

The Grosse Pointe Woods and Harper Woods sewer systems discharge to the WCGP Interceptor through the Milk River System. The Milk River System is operated by the Milk River Drainage Board and includes a pump station, a retention basin, and a recirculating pump station at the end of the Milk River on Lake Shore Drive.

The ***Milk River Pump Station*** contains three pumps rated at 5,000 gpm, and has a total capacity of 33.4 cfs (21.6 mgd). The ***Milk River Recirculation Station*** contains two pumps rated at 10,000 gpm, and has a total capacity of 44.6 cfs (28.8 mgd).

During dry weather, the Milk River Pump Station collects and lifts dry weather flows for discharge to the WCGP Interceptor. During storms, the pump station discharges flow in excess of 22 cfs to the 18.5 million gallon ***Milk River Retention Basin***. Overflows from the basin discharge to the Milk River.

The ***Torrey Road Pump Station***, operated by Grosse Pointe Woods, pumps sanitary flows from Grosse Pointe Woods to the Milk River Retention Basin. This station has the following pumps:

- 3 storm pumps rated at 20,250 gpm, 45,000 gpm, and 54,000 gpm, for a total storm capacity of 266 cfs (172 mgd).

- 2 sanitary pumps rated at 2600 gpm each, for a total sanitary capacity of 11.6 cfs (7.5 mgd).

There is regulating chamber at 19745 Mack in Grosse Pointe Woods operated by the Wayne County Public Work Division. This facility provides a gravity connection from Harper Woods to the WCGP interceptor. The first 5,000 gpm of flow goes to the WCGP interceptor and the rest is routed to the Milk River Retention Basin.

The City of Grosse Pointe Shores, which lies along Lake St. Clair, discharges the dry and wet weather flows from its combined (now separated) sewer system into the Lake Shore Interceptor (which becomes the Jefferson Interceptor in Macomb County). The Lake Shore Interceptor drains to the ***Cook Road Pump Station*** operated by the city. The station has two sanitary and two storm pumps that pump flow from Grosse Pointe Shores to the WCGP Interceptor. Pumping of wastewater to DWSD is

controlled at 3 cfs (2 mgd) to meet contract limitations, although the pump station maximum capacity is 5.8 cfs (8.9 mgd). There are four outfalls from the Lake Shore Interceptor to Lake St. Clair, listed in a 1985 sewer study, that used to overflow when the pumping capacity of the Cook Road Pump Station was exceeded. Since the sewers were separated, the storm pumps have not been operated.

The major discharge point for NEWCSD is the ***Kerby Road Pump Station***, located at 315 Chalfonte in Grosse Pointe Farms. This station has a design or firm flow capacity of 127 cfs, and a maximum capacity of 158 cfs (102 mgd) and contains a metered discharge line. In order to accommodate the need for storm drainage in the downstream Detroit Fox Creek District, the pump capacity of the Kerby Pump Station can be reduced or even interrupted. The station contains five pumps each rated at 14,200 gpm (20.4 mgd, 31 cfs).

The entire flow from the Northeast Wayne County Sewer District and the Southeast Macomb Sanitary District, as well as additional flow from Grosse Pointe Farms is lifted to the Fox Creek Enclosure by the Kerby Road Pump Station. The Fox Creek Enclosure is operated and maintained by the Wayne County PWD in the sections that cross the communities of Grosse Pointe Farms, Grosse Pointe, and Grosse Pointe Park. The flow from the Fox Creek Enclosure enters the DWSD Freud Pump Station and Detroit River Interceptor.

As described in Section 4.10, there is a 195-acre section of Harper Woods between Roscommon and Kingsville Roads that drains to the Detroit system, and is not included in the Northeast Wayne County Sewer District. This area has an estimated population of 1,703 and has mostly combined sewers. The agreement dated April 29, 1958 between DWSD and Harper Woods replaces an earlier agreement with the Township of Gratiot for sewer service. There are five known unmetered connections to the Detroit Sewer System in the southwestern portion of the City of Harper Woods.

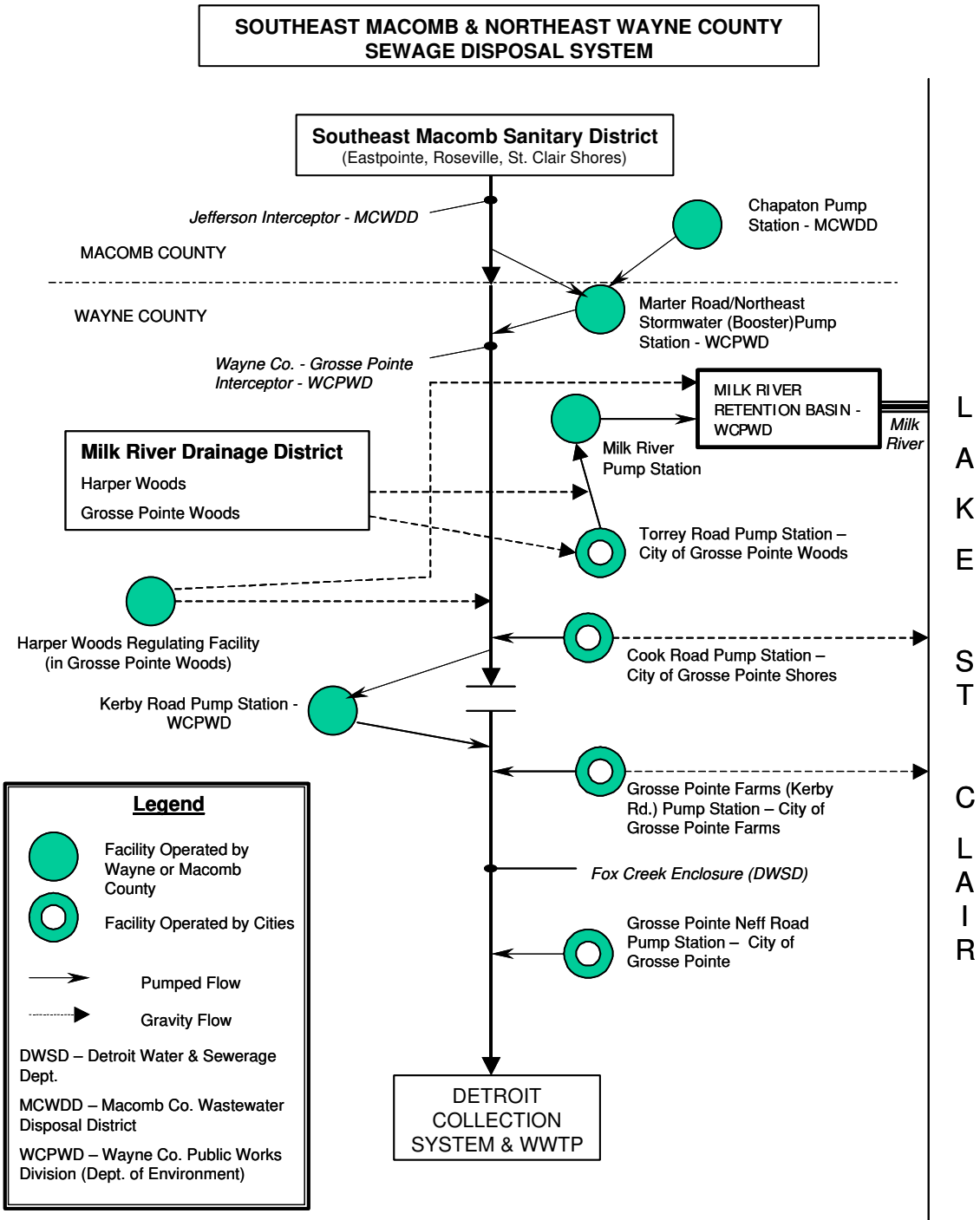
4.10.3 Sources

The sewer and interceptor map for the NEWCSD is illustrated in a map obtained from a report entitled Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (30). Other sources of information include: Wayne County Northeast Sewage Disposal System Improvement Project Basis of Design, 1992; Intercounty Drainage Board - Milk River Pump Station Retention Basin and Harper Woods Sanitary Pump Station - Value Engineering Report, 1991; Grosse Pointe Shores Infiltration Inflow Analysis, 1979; and Village of Grosse Pointe Shores Sewer System Study, 1985.

The following personnel from the Wayne County Department of Environment, Public Works Division provided assistance in understanding the northeast Wayne County sewer system: Bob Demyanovich (Pump Stations and CSOs), Mackey Howell (Foreman), and Nabil Jaafer (Engineer).

Bob Diauto of the Milk River District (Wayne County Department of Environment, Public Works Division) provided information on the pump stations in the Northeast Wayne County Sewer District. Mr. Joseph Ahee, Director of Public Works for Grosse Pointe Woods, provided information on the Torrey Road Pump Station.

Figure 4.10A


SOUTHEAST MACOMB & NORTHEAST WAYNE COUNTY SEWAGE DISPOSAL SYSTEM
Southeast Macomb Sanitary District
(Eastpointe, Roseville, St. Clair Shores)
Jefferson Interceptor - MCWDD
Chapaton Pump Station - MCWDD
MACOMB COUNTY
WAYNE COUNTY
Marter Road/Northeast Stormwater (Booster)Pump Station - WCPWD
Wayne Co. - Grosse Pointe Interceptor - WCPWD
MILK RIVER RETENTION BASIN - WCPWD
Milk River
Milk River Pump Station
Milk River Drainage District
Harper Woods
Grosse Pointe Woods
Torrey Road Pump Station – City of Grosse Pointe Woods
Harper Woods Regulating Facility (in Grosse Pointe Woods)
Cook Road Pump Station – City of Grosse Pointe Shores
Kerby Road Pump Station - WCPWD
Grosse Pointe Farms (Kerby Rd.) Pump Station – City of Grosse Pointe Farms
Fox Creek Enclosure (DWSD)
Grosse Pointe Neff Road Pump Station – City of Grosse Pointe
DETROIT COLLECTION SYSTEM & WWTP
LAKE ST CLAIR
Legend
Facility Operated by Wayne or Macomb County
Facility Operated by Cities
Pumped Flow
Gravity Flow
DWSD – Detroit Water & Sewerage Dept.
MCWDD – Macomb Co. Wastewater Disposal District
WCPWD – Wayne Co. Public Works Division (Dept. of Environment)

WASTEWATER SYSTEM COMPONENTS Northeast Wayne County Sewer District	
Area	4,720 acres or 7.4 square miles
Miles of Sewers and Interceptors (estimated from GIS)	11.4 miles of sewers and interceptors, estimated from GIS
Pump Stations	Milk River (WCPWD) Cook Road (City of Grosse Pointe Shores) Torrey Road (City of Grosse Pointe Woods) Marter Road (WCPWD) Kerby Road (WCPWD)
Outfalls	Overflow from Milk River Retention Basin Grosse Pointe Shores: Several discharge points to Lake St. Clair
Major Control Structures	Regulator from Harper Woods to WCGP Interceptor
CSO or Equalization Basins	Milk River Retention Basin (Wayne Co. Public Works Division, Milk River Drainage Board)

4.11 Other Small Districts in Wayne County

4.11.1 General Description

There are a few very small areas in Wayne County that have separate service contracts with the Detroit Water and Sewerage Department, and are considered separate contractual districts, even though they are part of larger areas. These are located in Redford Township (see Figure 4.11A), Dearborn Heights (see Figure 4.11B) and Harper Woods, and are described as follows:

- **Wayne County Area #3 (formerly Dearborn Township School District No. 2) :** This is a small 49-acre area within Dearborn Heights with a 1998 estimated population equivalent (used for flow estimation) of 257. Sewers in this area are combined. The original contract, signed July 3, 1950, by Wayne County Board of Road Commissioner and DWSD, provides for the connection by the Township of Dearborn of a 6" sewer from the premises of School District No. 2 of Dearborn Township to the Warren Avenue sewer of the City of Detroit. The property to be connected was located on the east side of Ann Arbor Trail approximately 500 feet south of Warren Avenue. USGS maps and aerials show that this area formerly had a school called Ford School on the property. This area is now part of Dearborn Heights and the Dearborn School District, but the school district does not operate a school on this property.

- **Other Dearborn Heights Contracts:** In addition to the above area, an April 1995 list of contracts from DWSD includes two other contracts with the Township of Dearborn (7/ 12/ 49 - sewer use agreement for West Parkway Avenue, and 4/ 4/ 50 - disposal agreement for the Warren Avenue Sewer). There is also a sewer use agreement between DWSD and Dearborn Heights dated 6/ 30/ 66 for dry weather discharges to the Warren Avenue sewer.

- **Wayne County Area #6 (Redford District 6):** This small 80-acre area in Redford Township has an estimated 1998 population equivalent of 900. Sewers in this area are combined. The original contract between the Wayne County Board of Road Commissioners and DWSD was signed on November 1, 1951. In the agreement, the Township of Redford was to construct a connecting 30" sewer to the 6'3" Six Mile Road Sewer.

- **Redford Township - 7 Mile and Grand River Area:** There is another small 47-acre section of Redford Township that has an estimated 1998 equivalent population of 841. The sewers in this area are combined. The contract for service to this area was signed between the City of Detroit and Redford Township on December 10, 1935, for a connection to the sewer at Seven Mile and Grand River Avenue.

An additional area in Wayne County discharges to a Detroit sewer district (Fox Creek) and does not have a separate contract with DWSD (see also Section 4.10 - Northeast Wayne County Sewer District):

- **Section of Harper Woods between Roscommon and Kingsville Roads** (see Section 4.10 for map): There is a 195-acre section of Harper Woods that drains to the Detroit system, and is not included in the Northeast Wayne County Sewer District. This area has an estimated population of 1,703 and has mostly combined sewers. The agreement dated April 29, 1958 between DWSD and Harper Woods replaces an earlier agreement with the Township of Gratiot for sewer service.

4.11.2 Physical Characteristics of the Sewer System

Separated and combined sewer areas are described above. These areas do not have any other significant infrastructure features such as interceptors, CSO basins, or other structures.

The flows from these areas are not metered, as most contracts contain an initial lump sum and/ or annual lump sum charge for service. The Harper Woods contract, however, bases payment on water usage.

4.11.3 Sources

There is a location map for these small districts in the DWSD Greater Detroit Regional Sewer System Report (March 2001) (31). The original boundaries of these areas were based on those defined for the Greater Detroit Regional Sewer System (GDRSS) program, but modified where district boundaries appeared to change. Where available, the original contracts for these areas from DWSD files were reviewed for a description of the service area.

Ron Havener of Dearborn Heights Public Works Department provided maps and descriptions of some of the areas in that city. Information on these contracts was not available from Wayne County or Redford Township.

WASTEWATER SYSTEM COMPONENTS Other Small Districts in Wayne County	
Area	Wayne County Area #3 (Dearborn Township School District No. 2) - 49 acres Wayne County Area #6 (Redford District 6) - 80 acres Redford Township - 7 Mile and Grand River Area - 47 acres Section of Harper Woods between Roscommon and Kingsville Roads - 195 acres
Miles of Sewers	Unknown - These areas contain smaller diameter sewers discharging to DWSD interceptors.
Pump Stations	None
Outfalls	None
Major Control Structures	None
CSO or Equalization Basins	None

5.0 Oakland County

There are four sewage disposal districts in Oakland County that are served by DWSD: the Evergreen-Farmington Sewage Disposal District (EFSDD), the Southeast Oakland County Sewage Disposal District (SOCSDD), and the Clinton-Oakland Sewage Disposal District (COSDD). In addition to these districts, the City of Farmington has an individual contract with DWSD to discharge part of its wastewater into the DWSD Sewer System.

The three sewage disposal districts mentioned above are operated and maintained by the Operations and Maintenance Division of the Oakland County Drain Commissioner. Also, a fourth area, the Huron-Rouge Sewage Disposal District, a very small section of the North Huron Valley - Rouge Valley Sewer District, is maintained by this division. The facilities maintained by the Division include:

- 97 sewage pumping facilities
- 2 sewage retention basins
- 4 CSO retention treatment basins (Acacia Park, Birmingham, Bloomfield Village, George W. Kuhn)
- County interceptors and 15 local municipal collection systems
- 2 municipal wastewater plants and 13 private wastewater treatment facilities

Each district has a separate contract with DWSD, and sewage rates are set by district. However, Oakland County is considered a "first-tier" customer of DWSD and the districts are "second-tier".

5.1 Evergreen-Farmington Sewage Disposal District (EFSDD)

5.1.1 General Description and History

The Evergreen-Farmington Sewage Disposal District (EFSDD) is directly north of the west side of the City of Detroit, and is located entirely in Oakland County. The system serves approximately 130 square miles (83,090 acres) in the following communities:

- City of Auburn Hills (part)
- City of Birmingham (part)
- City of Bloomfield Hills (part)
- City of Farmington (part)
- City of Farmington Hills
- City of Keego Harbor
- City of Lathrup Village
- City of Orchard Lake (part)
- City of Southfield (part)
- City of Sylvan Lake (part)
- City of Troy (part)
- Village of Bingham Farms
- Village of Beverly Hills (part)
- Village of Franklin
- Bloomfield Township
- West Bloomfield Township (part)

To the north of the district are the Clinton-Oakland Sewage Disposal District and the City of Pontiac. The southern boundary is the Rouge Valley Sanitary District and the City of Detroit. The Southeast Oakland Sewage Disposal District lies to the east of the EFSDD and the west side of the EFSDD is bounded in part by the Rouge Valley Sanitary District and in part by Commerce Township. (See Figure 5.1.)

The City of Farmington lies within the Farmington sub-district of the EFSDD. The western portion of the City of Farmington is served by EFSDD, but the rest of the city is a separate district with an independent contract with DWSD. The City of Farmington sewer system is discussed further in Section 5.2.

The district lies in the Rouge Valley basin. The topographic features of the district were formed by glacial lake deposits and glacial till. The area slopes generally to the southeast and varies in elevation from more than 1000 feet in West Bloomfield to less than 640 feet in Southfield.

There are two subdistricts in the Evergreen-Farmington Sewage Disposal District, defined by the service area of the Evergreen and Farmington Interceptors. The Evergreen subdistrict is located east of Inkster Road, and the Farmington subdistrict is located to the west of Inkster Road.

The major highways through the district are: I-696, which crosses the entire district east to west, I-75 in the northeast corner, and I-10, or the John C. Lodge Expressway, which traverses the area from Eight Mile Road at the City of Detroit boundary north to the middle of the district. There are several multi-lane north-south roads such as Haggerty, Telegraph, Inkster, Southfield, and Evergreen Roads, and Eight Mile. East-west roads generally follow the mile road system, from Eight Mile to Maple Road (Fifteen Mile).

Land use in the district is primarily residential, with some commercial and office facilities. The eastern part of the District has been nearly built out, although there are still small areas that are not sewered (for example, small portions of the city of Southfield were, until recently, still on septic systems). Most of the housing in this area was built starting in the 1950's and continuing into the 1980's, with some current in-fill development of small remaining plots. Some areas, such as the City of Birmingham, are also experiencing significant redevelopment and replacement of older residences and commercial buildings. The western part of the district, particularly the northwest, is still undergoing development.

Industry within the district consists of warehousing and light manufacturing, rather than heavy industry. The largest concentration of industry is in the westernmost part of Farmington Hills in the Tarabusi sewer subdistrict. High-rise and low-rise office developments are located along the major highways in Southfield, Farmington Hills, and Bloomfield Hills. There are large retail developments in several areas, as well as numerous golf courses and parks.

Until the 1970's, the entire district was considered a rural area, with only a few established cities, such as the City of Birmingham. Birmingham was settled in the late 1800's. The City first constructed a wastewater plant in 1924, and rebuilt it in a new location in 1936. In 1952, this plant was cited by the State Water Resources Commission for inadequate treatment, and the decision was made to limit the service area to areas north of 14 Mile Road. Expansion of the interceptor system was chosen by the communities in the area rather than the expansion of the Birmingham WWTP and construction of additional wastewater plants. Eventually, the communities signed agreements with the Oakland County Department of Public Works for the collection and transport of sewage to the Detroit Water and Sewerage Department. The Birmingham WWTP was eventually closed.

The first agreement between the City of Detroit and Oakland County for EFSDD sewage flow and treatment was established in December 1958. The agreement for sewage treatment was subsequently amended in June 1963 and August 1984. According to a document entitled "System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan" (April 1998), 109.9 MGD (170 cfs) represents the peak flow allowed for discharge from the EFSD sewers into the City of Detroit sewer system.

The Evergreen-Farmington Sewage Disposal District is now administered by the Oakland County Drain Commissioner's Office. The county maintains major facilities

in the district such as interceptors and some pump stations, but local sewers are maintained by each municipality.

5.1.2 Physical Characteristics of the Sewer System

There are approximately 913 miles of sewers in the Evergreen-Farmington Sewage Disposal District, ranging in size from 8 inches to 78 inches. Of this, about 203 miles are trunk sewers and interceptors, and 710 miles are local sewers. There are an estimated 692 miles of house leads.

Most of the EFSDD sewer system has separated sewers, with a small area of combined sewers (approximately six square miles) in the City of Birmingham, parts of Bloomfield Hills, Bloomfield Township, and the Village of Beverly Hills. Although nearly all sewers are separated, there are some sections of Beverly Hills, Southfield, Lathrup Village, and Farmington Hills that have footing drains connected to the sanitary sewers.

Dry weather flow from EFSDD is conveyed by interceptors extending south from the Farmington and Evergreen Sub-Districts to the East-West Interceptor on Eight Mile Road. The East-West Interceptor is connected by the Evergreen–Farmington Relief Sewer to the First-Hamilton Relief Sewer in the City of Detroit.

Originally the EFSDD discharged to the Southfield Sewer in the City of Detroit. However, this outlet was limited in capacity and as a result there were frequent overflows to the Rouge River. In the early 1980's, there was a proposal to construct a Northwest Interceptor - West Arm, partially to take flow from the district. However, this plan was abandoned in favor of a connection to the First-Hamilton Relief Sewer.

In 1984, the Evergreen–Farmington Relief Sewer was constructed in the City of Detroit. This diverted flow to the First–Hamilton Relief Sewer, giving the EFSDD an outlet with more capacity, resulting in fewer wet weather overflows to the Rouge River. This diversion also freed up capacity in the Southfield Sewer and Northwest Interceptor for flows from western Wayne County (34).

A connection was constructed between the First-Hamilton Sewer and the North Interceptor/ East Arm to transport dry as well as wet weather flows to Detroit's Wastewater Treatment Plant. This connection became operational after completion of the Pump Station 2A project at the treatment plant in 1995. The connection to the Southfield Sewer is operable during dry weather, though it is normally closed.

The areas with combined sewers discharge to new CSO control basins that provide screening, settling, and disinfection of the discharges to the Rouge River. The following basins are located in the district:

- ***Birmingham Retention Basin and Tunnel:*** The Birmingham Basin is located east of Shirley Drive and north of Lincoln Avenue in Linden Park adjacent to the Upper Main Rouge River. The basin has a volume of 5.5 MG and was sized for the 1 year-1 hour design storm with a peak flow of 1,065 cfs and 30 minutes of detention. The

basin serves an area of 1,185 acres. The basin has eliminated 33 combined sewer overflow (CSO) outfalls. A new collector sewer intercepts flow going to the outfall and connects to an 11-foot diameter tunnel sewer, adding an additional 4.1 MG of in-system storage. The tunnel sewer conveys flow to the dewatering and dry weather pump station. The pump station transfers dry weather flows to the Evergreen Interceptor at a maximum rate of 4.9 cfs, and the remainder overflows to the basin. There are two compartments in the basin that fill sequentially and have the ability to dewater the facility in 13 hours. Dewatered flow is pumped to the Evergreen Interceptor. Effluent from the basin discharges to the Rouge River after it is screened and disinfected. Operation of the Birmingham Basin began in December 1997.

- ***Acacia Park Retention Treatment Basin:*** This basin is located within the Douglas-Evans Nature Preserve, north of Ronsdale Drive, west of Evergreen Road. The basin is owned by the Village of Beverly Hills. The basin has a volume of 4.0 MG and was sized for the 1 year-1 hour design storm with a peak flow of 660 cfs and 30 minutes of detention. The basin serves an area of 816 acres. It operates by gravity, except during dewatering and decanting pumped flow. The basin has eliminated one CSO outfall. Both compartments of the basin can dewater in 12.5 hours. Dewatered flow is pumped to the Evergreen Interceptor. Overflow from the basin enters the Upper Main Rouge River after settling, skimming, screening, and disinfection. Operation of the Acacia Park Retention Treatment Basin began during January 1997.

- ***Bloomfield Village Retention Treatment Basin:*** This basin is located below the 8th fairway at the Lincoln Hills Golf Course. The basin has a volume of 10 MG and was sized for the 1 year-1 hour design storm with 30 minutes of detention, with a peak flow of 700 cfs. The basin serves an area of 2,325 acres. It contains three compartments that fill sequentially. Dewatered flow from the basin is pumped to the Evergreen Interceptor. Overflows from the basin are settled, skimmed, screened, and disinfected before discharge to the Rouge River. Construction of the basin was completed in July 1997.

- The ***Lathrup Village Equalization Basin*** is located at Evergreen Road and I-696. This equalization basin, owned by Lathrup Village, began operating in 1992. The basin is a sanitary retention tank and therefore has not eliminated any CSO outfalls. The basin has a volume of 3.0 MG and was sized for the 25 year-24 hour design storm with a peak flow of 18 cfs (the influent pumping rate). The basin serves an area of 950 acres. During dry weather flow, flows up to 3.3 cfs bypass the basin. During wet weather flow, or when flows exceed 3.3 cfs, the flows above 3.3 cfs are pumped to the basin. Dewatered flow from the basin is pumped to the Evergreen Interceptor. The basin can dewater in 33 hours. There is no overflow from the basin.

The ***Murwood Pump Station*** is located at Murwood and Eight Mile Road in Southfield. The station has five pumps, with a combined total flow capacity of 100 cfs (155 mgd). The function of the pump station is to pump wastewater to DWSD's First-

Hamilton Relief Sewer via the Evergreen-Farmington Relief Sewer. From there, the flow goes to the North Interceptor/ East Arm and to Pump Station 2A at the Detroit Wastewater Treatment Plant. Flow from the EFSDD is metered at the connection with Detroit Sewer System using a sixty-six inch sonic meter.

There is a regulator structure at the connection of the Evergreen-Farmington system with the Southfield Sewer. This regulator is normally closed, but it can be operated to divert flows to the Southfield Sewer if needed for maintenance or other reasons.

The following additional pump stations in the district are designated as critical facilities by the Oakland County Drain Office:

- ***Morris Lake Arm Relief Pump Station,*** 5100 Old Sanbargo Way, West Bloomfield- two pumps.
- ***Walnut Lake Pump Station #1,*** 7498 Inkster Road, West Bloomfield - 3 pumps.
- ***Walnut Lake Pump Station #2,*** 7498 Inkster Road, West Bloomfield - 3 pumps.
- ***Walnut Lake Pump Stations #3,*** 2008 Long Lake Road West, Bloomfield Hills - 2 pumps.
- ***Amy Relief Pump Station,*** 1865 Stonycroft Lane, Bloomfield Hills - 3 pumps.
- ***Biddestone Subdivision Pump Station,*** 26430 Farmington Road, Farmington Hills - 2 pumps.
- ***Drake Road Pump Station,*** 26579 Drake Road, Farmington Hills - 4 pumps.
- ***Inkster Road Lift Station,*** 22500 Inkster Road, Southfield - 2 pumps.
- ***Thornbrook Subdivision Pump Station,*** 34633 Thornbrook Drive, Farmington Hills - 4 pumps.
- ***Twelve Mile & I-696 Pump Station,*** 34189 Twelve Mile Road West, Farmington Hills - 4 pumps.

There are an additional 16 small pump stations in Farmington Hills not considered critical facilities.

There are three overflow structures to the Rouge River (Wastewater System Collection Map, DWSD, 1995). The first bypass is located upstream of the Murwood Pump Station at the Rouge River, and consists of two box sections with tide gates that can be fitted with stop logs. The other two bypasses discharge to the Eight Mile Road storm drain that discharges to the Evans Branch of the Rouge River. One of these bypasses is a 42-inch connection on Eight Mile Road west of Evergreen Road. The other bypass is a 36-inch sewer located at the discharge side of the Murwood Pump Station. Sanitary sewer overflows to the Rouge River are an ongoing problem in the

district, particularly in low-lying areas and where pump station backups and outages can occur. See the Interim Report on SSO Characterization (DWSD Wastewater Master Plan Interim Report, 2002) for a more complete description of current SSOs. According to news reports, the Evergreen-Farmington Relief Sewer will require an estimated $250 million in construction to remedy this problem (35).

5.1.3 Sources

The Oakland County Drain Commissioner's Office provided GIS maps of the wastewater infrastructure in the county, including interceptors, district boundaries, and some pump stations. Additional information on county facilities was provided by Lloyd Lewis, Jerry Sweetland, and Jerry Silagyi of the Operations Division of the Oakland County Drain Office. Information was also provided by Jim Porter, Special Projects Engineer in the Drain Office.

Maps of the district were also obtained from two previous reports (32, 33): Segmented Facilities Plan-Book VII-Existing Waste Collection & Treatment Facilities (1978) and the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (1975). Additional maps and facilities information were found in the Comprehensive Facilities Plan - Evergreen-Farmington (1982), Evergreen Farmington Pollution Control Facilities - Amendment to Comprehensive Facilities Plan (1985), Evergreen-Farmington SSES Report (1989), and Basic Requirements Report - Evergreen-Farmington Relief Outlet (1985).

WASTEWATER SYSTEM COMPONENTS Evergreen-Farmington Sewage Disposal District	
Area	83,090 acres (130 square miles)
Miles of Sewers	913 miles total (Facilities Plan, 1982) Interceptors estimated from GIS: 180 miles
Pump Stations	Murwood Morris Lake Arm Relief Walnut Lake #1 Walnut Lake #2 Walnut Lake #3 Amy Relief Biddestone Subdivision Drake Road Inkster Road Lift Station Thornbrook Subdivision Twelve Mile & I-696 Farmington Hills pump stations (16)
Outfalls	3 overflow structures to Evans Ditch, overflows to Rouge River
Major Control Structures	Regulator (at Southfield Sewer)
CSO or Equalization Basins	Birmingham Retention Basin and Tunnel Acacia Park Retention Treatment Basin Bloomfield Village Retention Treatment Basin Lathrup Village Equalization Basin

5.2 City of Farmington Sewer District

5.2.1 General Description and History

The City of Farmington was first settled in 1824, incorporated as a village in 1867, and then as a city in 1926. About three-quarters of the City of Farmington is directly connected to the Detroit sewer system, with the rest served by the Evergreen-Farmington Sanitary District.

The City of Farmington is bounded by the Evergreen-Farmington Sanitary District on its north, east, and west sides. The City of Detroit is adjacent to the City of Farmington on its south side. (See Figure 5.2.)

The area of the city is 1,424 acres. The community is primarily residential and commercial with no significant industrial discharges. Land use in the city is 66% residential (single and multi-family), 21% commercial, institutional, and office, 4% industrial, and the remaining 9% transportation, utilities, recreation, and other uses (SEMCOG, 1995). The housing stock is a mixture of older homes from the late 19th and early 20th centuries, and new homes.

Major roads through the city are Grand River Avenue, Eight Mile, Nine Mile, and Ten Mile Roads. There are no freeways through the city.

A sewage flow and treatment agreement was first established between the Cities of Detroit and Farmington in September 1956. The sewage flow agreement was later amended in December 1958. According to a document entitled "System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan" (April 1998), 3.9 MGD (6 cfs) represents the peak flow allowed for discharge from the City of Farmington sewers into the City of Detroit sewer system.

5.2.2 Physical Characteristics of the Sewer System

The sewer system in the City of Farmington consisted originally of approximately 60% separated and 40% combined sewers. The system included a retention basin with primary treatment facilities (settling and skimming) for treating overflows to the Rouge River. This basin included automatic grit removal and disinfection systems, but by the early 1990s, these systems were not operating. There was also an Interceptor Pump Station located at Nine Mile Road and Grand River Avenue that pumped all flow from the district to the DWSD metering station near Eight Mile Road and Berg.

In the early 1990s, a sewer separation project was completed that converted the combined portion of the Farmington sewer system into a completely separated system. As part of this sewer separation project, a new retention basin and pump station were completed in 1993.

The ***Farmington Nine-Mile Retention Basin*** is a 3.2 million gallon sewage retention basin within the City of Farmington, located at Nine Mile and Grand River Avenue.

The retention basin treats flows through settling, skimming, and disinfection. During wet weather events, the retention basin discharges to the Rouge River. Separation of the sewers and construction of the retention basin eliminated 10 CSO discharges to the Rouge River. There are three pump stations in Farmington, also operated by the city:

- ***Nine Mile Road***: This pump station is located at Nine Mile and Orchard Lake Road at the Farmington Nine-Mile Retention Basin Facility. It was completed in 1993, along with the retention basin. There are three 1600 gpm pumps in the station, for a total capacity of 10.7 cfs (6.9 mgd).

- ***Twin Valley***: This pump station is located at Farmington and Shiawassee. There are two 100 gpm pumps in this station, for a total capacity of 0.4 cfs (0.3 mgd).

- ***Chesley***: This pump station is located at Eight Mile and Farmington Roads. There are two 800 gpm pumps in this station, for a total capacity of 3.6 cfs (2.3 mgd).

The Nine Mile Road Pump Station discharges through a force main to the Farmington Sanitary Outfall Interceptor. This four-mile long interceptor starts northeast of the retention basin and follows Shiawassee Street to the southeast, until it joins the Detroit system at Eight Mile Road.

The flow from the City of Farmington sewer system is metered at FA-S-1, as it discharges to the Northwest Interceptor at the intersection of Berg Road and Hessel Avenue, near Eight Mile Road (location shown on map in Section 5.1 - Evergreen-Farmington Sewer District).

5.2.3 Sources

A map of the City of Farmington sewer system was obtained from the report entitled Segmented Facilities Plan-Book VII-Existing Waste Collection & Treatment Facilities (1978) (36). Additional maps and information were found in the report Farmington, MI - Sewer Improvements Program Project Plan, 1992.

City of Farmington Public Works personnel (Kevin Gushman) were contacted for information on the sewer system.

WASTEWATER SYSTEM COMPONENTS City of Farmington Sewer District	
Area	1,424 acres or 2.2 square miles
Miles of Interceptors	1.2 within the district (estimated from GIS) Approximately 4 miles of interceptor and force main between the Nine Mile Pump Station and the connection to DWSD.
Pump Stations	City of Farmington Pump Stations: • Nine Mile Road • Chesley • Twin Valley
Outfalls	Overflow outfall from Nine-Mile Retention Basin to the Rouge River
Major Control Structures	None
CSO or Equalization Basins	Farmington Nine-Mile Retention Basin (City of Farmington

5.3 Southeast Oakland County Sewage Disposal District (SOCSDD)

5.3.1 General Description and History

The Southeast Oakland County Sewage Disposal District (SOCSDD) is directly north of the City of Detroit in Oakland County. This district consists of approximately 41,960 acres and serves the following communities:

- City of Berkley
- City of Birmingham (part)
- City of Clawson
- City of Ferndale
- City of Hazel Park
- City of Huntington Woods
- City of Madison Heights
- City of Oak Park
- City of Pleasant Ridge
- City of Royal Oak
- City of Southfield (part)
- City of Troy (part)
- Village of Beverly Hills (part)
- Township of Royal Oak

SOCSDD is currently administered through the office of the Oakland County Drain Commissioner.

The SOCSDD is bounded by the Clinton-Oakland Sanitary District on the north. The southern boundary is Eight Mile Road in the City of Detroit. The City of Warren and the Macomb County Sewer District lie to the east of the SOCSDD. To the west of the SOCSDD is the Evergreen-Farmington Sewage Disposal District. (See Figure 5.3.)

The major highways through the district are I-75, which crosses the entire district from north to south, and I-696 which crosses the district from east to west . Woodward Avenue, Route 1, is a multi-lane highway that crosses the district starting in Birmingham and runs southeast to Ferndale at the edge of the City of Detroit.

The SOCSDD is in the southeastern portion of Oakland County, which was settled in the mid-1800's. This portion of the county is in the Clinton River watershed and is generally flat and poorly drained. The district covers "inner ring" suburbs with little vacant land remaining. Before the 1950's, most of these cities were independent municipalities surrounded by farmland on the outskirts of Detroit. The vacant land between the cities has filled in over time with housing and commercial development built from the 1950's on, generally with older housing in the downtown areas of these cities. Some redevelopment is occurring in scattered areas throughout the district, but populations have remained stable or declined. Land use is primarily medium to high density, single dwellings and commercial and light industrial.

The original agreement between the City of Detroit and Oakland County for SOCSDD sewage flow and treatment was established in November 1962. The agreement was later amended in December 1962. Under the agreement, the maximum rate allowed for discharge into Detroit's Sewer System is 168 MGD (260 cfs). According to a document entitled "System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan" (April 1998), 168 MGD (260 cfs) is the peak flow allowed for discharge from the SOCSDD sewers into the City of Detroit sewer system.

5.3.2 Physical Characteristics of the Sewer System

There are approximately 136 miles of sewer in the SOCSDD service area, ranging in size from 8 inches to 15 feet. Combined sewers serve about 60% of the service area. The smaller sewers are generally vitrified clay, and the larger sewers are concrete.

The SOCSDD discharges through the Dequindre Interceptor to the Conant-Mt. Elliott Relief Sewer for transport via the North Interceptor-East Arm and Detroit River Interceptor to the Detroit Wastewater Treatment Plant. Under the agreements with DWSD, Oakland County has to regulate and measure the sanitary flow as it enters the DWSD Sewer System. Measurement is through a 66-inch magnetic flow meter located at the intersection of Dequindre and Conant, just south of Eight Mile Road.

The original combined sewer portion of the SOCSDD discharged to a branch of the Red Run Drain that ultimately drains to the Clinton River. This was known as the Twelve Towns Drain, because portions of twelve municipalities discharged their combined sewage to it. Interceptor sewers were constructed later to carry the dry weather flow to the City of Detroit's sewer system. The system can still overflow to the Red Run Drain under wet weather conditions. The Red Run Drain was first enclosed in the 1950s to store some of these overflows for subsequent dewatering back into the interceptor sewers. In 1973, the Twelve Towns Retention Treatment Facility was constructed to eliminate additional CSO discharges. The name of this facility was recently changed to the George W. Kuhn Retention Treatment Facility.

The original ***George W. Kuhn Retention Treatment Facility*** has a volume of 62 MG, but has 32 MG of in-system storage upstream of the inlet weir. The original RTF was a two-mile long underground structure with an outside cross-section of 65 feet wide and 22 feet deep. Its inlet is located at 12 Mile Road and Stephenson Highway, and its outlet is located at Dequindre Road, north of 13 Mile Road. During dry weather, flow from the Twelve Towns Drain is diverted from the inlet structure and transported to the Dequindre Interceptor and ultimately the DWSD WWTP. During wet weather, flow that exceeds the in-system storage capacity overflows the inlet weir and enters the basin. Storage is controlled by the outlet structure at Dequindre. The basin dewaters to the Dequindre Interceptor, which drains to the Conant-Mt. Elliott relief sewer in Detroit. Overflows from the basin discharge, by way of a 950-foot long outlet weir and baffle structure at Dequindre, to the Red Run Drain, tributary to the Clinton River.

Modifications now underway at the George W. Kuhn Retention Treatment Basin include an increase to the volume of the basin to 126 MG, including an additional 33 million gallons of in-system storage upstream from the construction of a new inlet weir structure. The total in-system storage will increase to 65 MG but the basin storage will decrease in volume from 62 to 57 MG. The basin will still be sized for the 10 year-1 hour design storm, but the peak flow will be 6700 cfs and the detention time will be 31 minutes. Also, a new dewatering pump station, weir modifications, new sodium hypochlorite storage building and disinfection system, automatic flushing system, and a new fine screen system will be added to the basin. In addition, inflow to the facility will be rerouted as follows: Madison Heights stormwater directed to the Red Run Drain through new parallel storm sewers; Madison Heights CSO flows rerouted to new dewatering pump station; and rerouting of Hazel Park sanitary flows to the Dequindre Interceptor. These modifications will eliminate two to four additional CSO outfalls. The contractor for this project was selected in 2001, and construction is scheduled to be completed by 2005.

When the new facility is completed, flows to the Dequindre Interceptor will be from the three drainage areas described below:

- Twelve Towns Drainage District: The Twelve Towns Drainage District drains facilities upstream of and including the inlet weir to the Twelve Towns (George H. Kuhn) Retention Treatment Facility (RTF). The drainage area of the Twelve Towns Drainage District is approximately 24,000 acres.

- George W. Kuhn Drainage District: This drainage district is downstream of the existing inlet weir to the to the Twelve Towns (George H. Kuhn) Retention Treatment Facility (RTF), including the existing facility the new intermediate weir structure. The district also includes the Hazel Park 10-Mile Sewer, the Madison Heights parallel storm sewers, and the Madison Heights CSO reroute.

- Separated sewer area in the cities of Troy, Hazel Park and Madison Heights.

There is a ***Septage Receiving Station*** at 29132 Stephenson Highway, within the fenced area of the George W. Kuhn Retention Treatment Facility. This septage receiving site is used for the disposal of holding tank waste from recreational vehicles, and has been in operation for approximately 30 years.

The North Arm Relief Drain construction in Birmingham and Royal Oak was also recently completed. The purpose of the project was to reduce basement flooding. A brief history of the infrastructure of the SOCSDD is summarized in Table 5.3A, as described in the Volume 1 Technical Report, Initial Improvements Projects, Draft NPDES Settlement Permit, Southeastern Oakland County Sewage Disposal System for George W. Kuhn, Drain Commissioner (July 1988).

Table 5.3A: History of SOCSDD Infrastructure

Mid-1800's to 1920s	Area first settled. As the area grew, frequent flooding problems caused residents to petition the government in 1916 for improvements.
1922	To reduce flooding, the Red Run Branch of the Clinton River was cleaned, widened, and deepened. Soon after, this drain became the outlet for several combined sewers, including the Campbell, Lawson, Royal Oak, and Clawson drains, all constructed in the 1920's and still used today.
1920s	A wastewater treatment plant was constructed in Royal Oak in the 1920s and discharged to the Red Run Drain into the 1940s.
1942	The SOCSDD was formed in 1942 to address the growing pollution problem.
1944	The Royal Oak Sewage Treatment Plant was abandoned when sewage flow from the area was connected to the Detroit system through the newly-constructed Southeastern Oakland County Stephenson Interceptor.
1949 - 1954	Red Run Drain hydraulics improved through channel enlargement project.
1953	Twelve Towns Relief Drains Project underway to address sewer backups due to inadequate sewers in the upper Red Run drainage basin and combined sewer overflows to the Red Run Drain
1955 - 1962	Network of relief drains constructed, Red Run Drain enclosed to Stephenson, and weir structure constructed at Stephenson.
1958	Plan submitted to the state for construction of a new Dequindre Interceptor, including Twelve Mile Arm, to serve Twelve Towns area and the City of Troy. This reduced CSOs to the Red Run Drain.
1969	Twelve Towns Retention Treatment Facility (RTF) proposed. Additional discharge capacity obtained from DWSD. Original facility included a 11,000 foot long double box retention treatment basin with a capacity of 62 MG, sodium hypochlorite disinfection system, outfall weir and baffle structure, dewatering pump station, and flushing system. Total system storage was 94 MG including 32 MG of in-system storage.
1973	Twelve Towns RTF completed.
1974	First NPDES permit issued for Twelve Towns RTF.
1994	Large rainfall event on 6/13/94 prompts concerns about adequacy of retention/treatment system and impact of CSO discharges on the Clinton River and Lake St. Clair.
1996	Michigan Department of Environmental Quality issues a more stringent NPDES discharge permit.
2001 - 2005	Construction of the expanded, renovated, and renamed George H. Kuhn Retention Treatment Facility underway.

5.3.3 Sources

The Oakland County Drain Commissioner's Office provided GIS maps of the wastewater infrastructure in the county, including interceptors, district boundaries,

and some pump stations. Additional information on county facilities was provided by Lloyd Lewis, Jerry Sweetland, and Jerry Sologgi of the Operations Division of the Drain Commissioner's Office. Information was also provided by Jim Porter.

Maps of the districts are found in two reports, the Segmented Facilities Plan-Book VII (1978) and the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (1975) (37, 38). Additional information was obtained from Volume 1 Technical Report, Initial Improvements Projects, Draft NPDES Settlement Permit, Southeastern Oakland County Sewage Disposal System for George W. Kuhn, Drain Commissioner (July 1988) and Retention Treatment Facility Improvements - Oakland County, Michigan Basis of Design Report (April 2001).

WASTEWATER SYSTEM COMPONENTS **Southeast Oakland County Sewage Disposal District**	
Area	41,960 acres
Miles of Sewers (estimated from GIS)	136 miles 120.146 miles interceptor, estimated from GIS
Pump Stations	None
Outfalls	None. Overflows not held by George W. Kuhn Basin enter Red Run Drain and go to the Clinton River and Lake St. Clair
Major Control Structures	None (other than at GWK CSO basin)
CSO or Equalization Basins	George W. Kuhns (Twelve Towns) CSO Basin

5.4 Clinton-Oakland Sewage Disposal District (COSDD)

5.4.1 General Description and History

The Clinton-Oakland Sewage Disposal District covers a large section of northwest Oakland County. The district is operated by the office of the Oakland County Drain Commissioner, and serves the following areas:

- City of Auburn Hills
- City of Clarkston
- City of Rochester
- City of Rochester Hills
- Village of Lake Orion
- Village of Oxford
- Independence Township
- Oakland Township
- Orion Township
- Oxford Township
- West Bloomfield Township
- Waterford Township

To the north of the COSDD are the Townships of Brandon and Addison (both in Oakland County) and Metamora in Lapeer County. South of the COSDD is the City of Pontiac and the Southeast Oakland and Evergreen-Farmington Sewage Disposal Districts. The Macomb Sanitary District lies to the east of the COSDD, and the communities of Commerce, White Lake, and Springfield, all of which are located in Oakland County, border its west side. The district does not include the City of Pontiac, which is served by the county-operated Pontiac Wastewater Treatment Plant. (See Figure 5.4.)

The Clinton-Oakland SDD covers the largest area of any district in the DWSD system. The estimated total area is 146,430 acres (229 square miles), with a total of 119,813 acres (187 square miles) considered tributary sewered area.

The Clinton-Oakland District includes many of the "outer ring" suburbs in Oakland County that are still being developed. Construction is generally newer (1960's and more recent) and less dense than in the Southeast Oakland and Evergreen-Farmington Districts, with some areas still served by septic systems or other facilities (the areas shown in white on the map are unsewered areas).

A sewage disposal and treatment agreement for the COSDD was first established between the City of Detroit and Oakland County in February 1968. The agreement was later amended in January 1973. The peak discharge rate is based on population in the District (0.4 cfs per 1000 population). The COSDD discharges directly to the City of Detroit owned sewers, though these sewers are located outside the City of Detroit in Macomb County. According to a document entitled “System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control

Plan" (April 1998), 51.9 MGD (80.3 cfs) represents the 1998 peak flow allowed for discharge from the COSDD sewers into the City of Detroit sewer system, while 113 cfs is estimated as the projected peak flow in 2020. The sewer system in the district will remain sanitary per agreement with DWSD.

5.4.2 Physical Characteristics of the Sewer System

The sewers in this district receive sanitary flows only, as all sewers are separated. The 1994 study mentioned above estimates the total length of interceptors to be 57 miles and the length of community sewers to be 888 miles. There is also 4,289 feet of force main (10 to 66-inch diameter) from the Elizabeth Lake Pump Station.

Most areas discharge to the two major interceptors in the COSDD, the Paint Creek Arm and the Clinton Arm, constructed in the late 1960's and early 1970's. The Paint Creek Arm is adjacent to Paint Creek and the Clinton Arm runs along the Clinton River. They join just prior to entering the Oakland Arm of the Oakland-Macomb Corridor Interceptor. Near Avon and Dequindre Roads there is 5' 6" diameter connection, and a Parshall flume with a capacity of 162 cfs to measure flows. Flows through these interceptors enter the Edison Corridor Interceptor and eventually end up at the Northeast Pump Station (see description under Fox Creek District).

A third interceptor, known as the Avon Arm, serves a smaller area of the district. This interceptor connects to the Oakland Arm Interceptor of the Oakland-Macomb interceptor system at Dequindre near South Boulevard in Macomb County. The connection at this point is through a 30-inch pipeline. An 18-inch Parshall flume with a capacity of 24 cfs measures the flow.

A very small portion of the district, 5100 acres in southeast Rochester Hills, flows to Southeast Oakland County Sewage Disposal District interceptors.

Elizabeth Lake Pump Station, the largest pump station operated by Oakland County, is located at 3302 Elizabeth Lake Road (10 Hillcliff) in Waterford at the southern portion of the Clinton Arm. All of the flow from this interceptor goes through this pump station. This station was constructed in 1968. The station has a firm design capacity of 30.5 cfs (19.7 mgd) and a maximum capacity of 57 cfs (37 mgd). The station contains five centrifugal pumps rated at 2100, 4100, and 5500 gpm, and two 7000 gpm pumps. Its tributary sewered area in Bloomfield Township and a large portion of Waterford Township is estimated at 10,100 acres. The average dry weather flow through the station is 9 cfs.

One report lists a total of 101 pump stations in the district, with an estimated total capacity of 190 cfs (Clinton-Oakland SDD Analysis Report, 1994), located in the table below.

The county has also constructed the ***Pontiac Septage Receiving Station*** to process septage from surrounding communities.

Community	No. of Pump Stations
City of Auburn Hills	1
City of Rochester Hills	1
Village of Lake Orion	16
Independence Township/Clarkston Village	9
Orion Township	14
Oxford Township	7
Waterford Township	50
West Bloomfield Township	3
TOTAL	101

5.4.3 Sources

The Oakland County Drain Commissioner's Office provided GIS maps of the wastewater infrastructure in the county, including interceptors, district boundaries, and some pump stations. Lloyd Lewis, Jerry Sweetland, and Jerry Sologgi of the Operations Division in the Drain Commissioner's Office provided additional information on county facilities. Information was also provided by Jim Porter, Special Projects Engineer in the Drain Commissioner's Office.

Maps of the districts are found in two reports, the Segmented Facilities Plan-Book VII (1978) and the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (1975)(39, 40). Additional information was obtained from the following reports: Clinton-Oakland Sewage Disposal District System Analysis Report with Operational Information, Vol. 1, September 1994 (Oakland County Drain Commissioner & CTE), and Clinton-Oakland Sewage Disposal District Interceptor Study, October 1991.

WASTEWATER SYSTEM COMPONENTS Clinton-Oakland County Sewage Disposal District	
Area	146,480 acres (229 square miles) total; 119,813 acres (187 square miles) estimated sewered area
Miles of Sewers	Interceptors estimated from GIS: 54.4 miles Interceptors estimated in 1994 report: 57 miles Community sewers estimated in 1994 report: 888 miles
Pump Stations	Elizabeth Lake Pump Station Total of 101 pump stations (see list above)
Outfalls	None
Major Control Structures	None
CSO or Equalization Basins	None

6.0 Macomb County

The Detroit Water and Sewerage Department service area in Macomb County consists of two sewer districts and one municipality. These are the Macomb County Wastewater Disposal District (MCWDD), the Southeast Macomb Sanitary District (SEMSD), and the City of Center Line. Each district has a separate contract with DWSD, and sewage rates are set by district. MCPWC and the City of Center Line are considered "first-tier" customers of DWSD, while SEMSD is considered a "second-tier" customer through the Northeast Wayne County Sewer District. Southeast Macomb Sanitary District covers the communities of Eastpointe, Roseville, and St. Clair Shores.

The Macomb County Wastewater Disposal District covers the largest portion of the county, and is operated and maintained by the Macomb County Public Works Commission (MCPWC). The Detroit Water and Sewerage Department originally built the interceptors in the MCWDD, up to the connection with Oakland County on the west, and 21 Mile Road in the central and east part of the county. Records of these contracts are maintained in the department files, as ownership of these interceptors remains with DWSD (41). Macomb County is reimbursing DWSD for the cost of these interceptors through rates.

The following facilities are owned and maintained by the MCWDD in Macomb County in the area outside of the Southeast Macomb Sanitary District:

- Lenox Pump Station
- Chesterfield Interceptor

Within the service area of the Southeast Macomb Sanitary District, the ownership and maintenance of facilities is very complex. Facilities are owned and maintained by Macomb County, the Southeast Macomb Sanitary District, and the three municipalities of Eastpointe, Roseville, and St. Clair Shores. In some cases, inter-agency agreements have provided for sharing of maintenance and improvement costs. For example, a March 2000 agreement provides for funding of Nine Mile throttling gates and drain cleaning through the Southeast Macomb Sanitary District, while Nine Mile canal aeration and bypass improvements is covered by Macomb County.

The following summary and descriptions in subsequent chapters are based on current information available, as obtained from the sources listed at the end of each chapter.

The following facilities are owned and maintained by Macomb County Wastewater Disposal District, but are located in the Southeast Macomb Sanitary District:

- Eight and One-Half Mile Drain
- Two CSO retention basins:
    - Chapaton Retention Basin

  - Martin Retention Basin

- Pump Stations:
  - Chapaton Pump Station
  - Bon Heur Pump Station
  - Violet Pump Station

The following facilities are owned and operated by the Southeast Macomb Sanitary District:

- Three major sewers:
  - Martin Drain
  - Nine Mile Drain
  - Martin/ Jefferson Interceptor
- Pump Stations:
  - Martin Drain Pump Station (administered by Martin Drainage Board, along with the Martin Drain sewer)
  - Hoffman Pump Station

The Southeast Macomb Sanitary District discharges to the Northeast Wayne County Sewer District. Sewer service for this area is under the contract for the Northeast Wayne County Sewer District (NEWCSD), which is administered by the Wayne County Department of Environment, even though the area is located in Macomb County.

The City of Center Line has an independent "first tier" contract with DWSD and will be discussed separately in this chapter. The facilities maintained by the City of Center Line include:

- 133,000 feet of sanitary sewer
- Stephens Pump Station

6.1 City of Center Line Sewer District

6.1.1 General Description and History

Center Line has an area of 1,060 acres (1.7 square miles) and is surrounded by the City of Warren (an area not served by the Detroit Water and Sewerage Department). The boundaries of the City of Center Line are 11 Mile Road/ I-696 on the north, Stephens Street on the south, Lorraine on the east, and a railroad (Conrail) on the west. (See Figure 6.1.)

Center Line was incorporated as a village in 1925 and as a city in 1936. The city is primarily residential with significant industrial and commercial land use. Land use in the city is 52% residential, 22% commercial, institutional, and office, 20% industrial, and the remaining 6% is transportation, utilities, recreation, and other uses (SEMCOG, 1995).

The original agreements for sewage flow and treatment between the Cities of Detroit and Center Line were established in September 1960 and amended in December 1960. According to a document entitled "System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan" (April 1998), 3.6 MGD (5.5 cfs) represents the peak flow allowed for discharge from the Center Line sewers into the City of Detroit sewer system.

6.1.2 Physical Characteristics of the Sewer System

The City of Center Line has 133,000 linear feet of sanitary sewer and 120,000 linear feet of storm sewer. 83,000 linear feet of sanitary sewer was constructed prior to 1950. The sewer system in Center Line was separated in the 1970s. Footing drains are connected to the sanitary sewers, but downspout disconnection has been enforced. In 1998, a $10,000,000 bond issue was passed to further the sewer infrastructure repairs.

The sanitary trunk sewers in Center Line discharge to a 48-inch diameter interceptor under Van Dyke Avenue. This sewer typically flows only one-quarter full. The interceptor flows from north to south and discharges into the Stephens Pump Station at the southern city limits. From there, wastewater discharges to a 24-inch sewer from Center Line to the DWSD system that passes through the City of Warren along Van Dyke. The connection with the DWSD sewer system is just south of Eight Mile Road and east of Savage Street on Conner Avenue.

There are three primary storm sewers in the City of Center Line:

- Lorraine Drain: This 11-foot diameter sewer passes along the eastern city limits of Center Line and discharges to Bear Creek immediately north of 13 Mile Road. This sewer drains the area in Center Line south of 10 Mile Road.

- Center Line Tile Drain: A 24-inch diameter sewer located in Van Dyke Road that flows into the Center Line Relief Drain at the intersection of Van Dyke

and the I-696 Service Drive. This was formerly an old combined sewer reused as a storm drain, and serves a portion of Center Line north of 10-Mile Road.

- Center Line Relief Drain: Varies in size from 54-inch diameter at 10 Mile Road to 84-inch diameter at the northern city limits. Originally constructed in the 1920's as a combined sewer to a wastewater treatment plant that was never built.

There is one pump station in Center Line, the ***Stephens Pump Station***, located at the intersection of Stephens and Van Dyke Highways. The lift station consists of three pumps with capacities of 800-gpm, 1,900-gpm, and 2,700-gpm at 40-feet TDH. In addition, there is a 5,400-gpm pump powered by a diesel generator that is utilized in the event of a power failure.

The Stephens Pump Station went through a two-phase investigation and rehabilitation program as the result of the 1998 bond infrastructure bond issue. Phase I consisted of the emergency replacement of the three main pumps. Phase II was the primary renovation of the station to increase the operational efficiency. This included the installation of mag-meters on the three main pump discharge lines and a "Muffin Monster" grinder preceding the pump inlets to eliminate the coarse screen manual cleaning and the required confined space entry.

The sewage exits the Stephens Pump Station in an 80-foot long, 30-inch diameter pipe. Under dry weather conditions, the sewage continues due south along Van Dyke in a 24-inch diameter pipe en route to the Detroit wastewater treatment plant. However, during wet weather conditions, sewage can overflow a weir and discharge into a 36-inch diameter pipe. This pipe empties into a 78-inch diameter storm sewer pipe. The 78-inch diameter pipe empties into the Lorraine Drain, an 11-foot diameter storm drain that discharges into Bear Creek. Bear Creek in turn discharges into the Clinton River and then to Lake St. Clair. The city is currently addressing sewer overflows into the Lorraine Drain (43).

In October 2000, high bacterial levels were found in Bear Creek. An investigation revealed that a bulkhead to route flows to DWSD was supposed to be constructed during the sewer separation work, but was never completed. For 30 years, sewage was running into Bear Creek instead of flowing into the DWSD system (44). This construction error has been corrected, but sewer overflows continue to be a problem and are currently being investigated.

6.1.3 Sources

The interceptor map for the City of Center Line was obtained from the report entitled Segmented Facilities Plan-Book VII-Existing Waste Collection & Treatment Facilities (1978) (42). Additional information was obtained from the City of Center Line Sanitary Sewer System Capacity Analysis and Study (draft), April 2001.

WASTEWATER SYSTEM COMPONENTS City of Center Line Sewer District	
Area	1,060 acres or 1.7 square miles
Miles of Sewers (estimated from GIS)	2.9 miles interceptor, estimated from GIS
Pump Stations	Stephens Pump Station (City of Center Line)
Outfalls	None - sanitary sewer overflows to Bear Creek (discharging to the Clinton River and Lake St. Clair)
Major Control Structures	None
CSO or Equalization Basins	None

6.2 Southeast Macomb Sanitary District

6.2.1 General Description and History

The Southeast Macomb Sanitary District (SMSD) was formerly called the South Macomb Sanitary District. The district serves the communities of Eastpointe, Roseville and St. Clair Shores. South Macomb Sanitary District was originally formed in 1943. Its replacement, the Southeast Macomb Sanitary District, was officially incorporated on March 8, 2000.

The district is a customer of the Northeast Wayne County Sanitary District (NWCSD), which is administered by the Wayne County Department of Environment, Public Works Division (WCPWD). Ownership and operation of wastewater facilities in the Southeast Macomb Sanitary District are complex, involving agreements and operating arrangements among the district, the three city governments, the Macomb County Public Works Office (MCPWC), and the Wayne County PWD.

The Macomb County Wastewater Disposal District is located to the north of the SMSD, whereas to the south is the City of Detroit and the Northeast Wayne County Sanitary District. Lake St. Clair lies to the east of the SMSD and to the west is the City of Warren. (See Figure 6.2.)

The service area of SMSD totals approximately 24 square miles, slightly less than the estimated total of 26.2 square miles (additional "water" acreage is included in the land use acreage). The three communities that comprise the district are primarily residential, with mainly ranches and bungalows built in the 1940s through 1970s. Characteristics of the communities in the district are as follows:

COMMUNITY INFO	EASTPOINTE	ROSEVILLE	ST. CLAIR SHORES
Total Area (square miles)	5.1	9.5	11.6
Date Created or Incorporated	1929 (formerly called East Detroit)	1958	1951
Land Use (SEMCOG, 1995):	--	--	--
Residential	78	61	78
Commercial, Office, Institutional	18	17	13
Industrial	1	12	1
Transportation, Communication, Utility	1	5	2
Cultural, Outdoor Recreation, Cemetery, Open Land	2	5	6

Major highways in the district include I-94, which crosses the district north to south, and I-696, which crosses it west to east. Other major roads include Jefferson Avenue along the shore of Lake St. Clair, and Nine through Fourteen Mile Roads.

An agreement for sewage flow and treatment dated January 1944 was made between the City of Detroit and Wayne County. This agreement covered the easterly portions of Wayne County and areas of Macomb County (now comprising the SMSD). The agreement was amended twice, in March 1957 and February 1961. The SMSD has an agreement with the Wayne County Department of Public Works to use the Wayne County Grosse Pointe Interceptor (WCGPI) for its sewage disposal. According to the Phase III GDRSS Model Update Report (March 2001), this agreement allows the SMSD to discharge up to 102 cfs to the Northeast Wayne County Sewer District. The NWCSD currently has an agreement with DWSD to transport and treat 82.1 MGD (127 cfs) of wastewater ("System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan", (April 1998)). This flow represents the total amount of flow coming from both the SMSD and the NWCSD.

6.2.2 Physical Characteristics of the Sewer System

The Southeast Macomb Sanitary District and the Northeast Wayne County Sewer District were described to function as a single unit in the Segmented Facilities Plan (1978), with regards to discharge to the DWSD system, as the sewage flows from both districts eventually discharge to the Fox Creek Enclosure and the Detroit River Interceptor in the City of Detroit. The wastewater from the SMSD is conveyed to the Jefferson Interceptor through the district's major sewers listed below (along with their ownership):

Sewer	Ownership/Operation
9 Mile Drain	Southeast Macomb SD
Martin Drain	Southeast Macomb SD
Frazho Lateral	Southeast Macomb SD
Beaconsfield Relief Sewer	Southeast Macomb SD
Jefferson Interceptor (to Hoffman Pump Station)	Southeast Macomb SD
8 ½ Mile Relief Sewer	Macomb Co. PWC
Northeast Relief Sewer	Macomb Co. PWC
Jefferson Interceptor (North of Hoffman Pump Station)	City of St. Clair Shores
Northwest Relief Sewer	City of Roseville

The Beaconsfield and Northeast Relief Sewers were constructed in the early 1980's to relieve wet weather flows to the Jefferson Interceptor. The Southeast Macomb Sanitary District Overflow Study and Improvement Plan (1996) estimates the total service area of SMSD to be 15,098 acres, of which 11,839 acres (78%) have separated sewers, and 3,259 acres (22%) have combined sewers. This proportion will change with completion of separation projects currently underway (see below).

The Jefferson Interceptor empties into the Wayne County Grosse Point (WCGP) Interceptor at Eight Mile Road. The ***Marter Road Booster Pump Station***, operated by Wayne County, and located at the intersection of Marter and Eight Mile Roads, boosts the flow into the WCGP Interceptor during high flows to the maximum allowed by DWSD contract. Flow to DWSD is metered at the Wayne/ Macomb County line. The

pump station has three pumps each rated at 55 cfs (36 mgd), for a maximum total capacity of 167 cfs (108 mgd).

Flow from the Southeast Macomb Sanitary District is combined with flow from the Northeast Wayne County Sewer District and ends up at Kerby Road Pump Station in Grosse Pointe Farms. At the pump station, the wastewater is pumped to the Fox Creek Enclosure and the remainder of the DWSD transport system to the wastewater plant. The outlet of the Wayne County Grosse Pointe Interceptor to the Fox Creek Enclosure may be closed during storms to protect the downstream communities. When this occurs, SMSD experiences flooding problems and the excess flows are pumped directly into Lake St. Clair. Personnel from the Southeast Macomb SD, the Macomb County PWC, the Wayne County PWD Marter Road facility, and the local municipalities communicate during wet weather events to balance flows throughout the system.

During storms, the wet weather flows from the SMSD system enter two retention and treatment basins operated by the Macomb County Public Works Office - the Chapaton and Martin Retention Basins. Both basins were constructed in 1969, and provide primary treatment and disinfection of effluent before discharging to Lake St. Clair. When these basin capacities are exceeded, the combined sewage overflows to Lake St. Clair. The Southeast Macomb Sanitary District controls the regulator gates to the Jefferson Interceptor from the two drainage areas served by the basins.

The Chapaton Retention Basin is located at 9 Mile and Jefferson, and has a storage capacity of 28 MG. This basin serves the area tributary to the 8 ½ and 9 Mile Drains and can also accept sanitary flows from the Jefferson Interceptor.

The ***Chapaton Pump Station***, located near the basin, and also operated by the Macomb County PWC, pumps flows from the 8 ½ and 9 Mile drainage area into the Jefferson Interceptor and the Chapaton Retention Basin. There are four gates in the Chapaton system, as follows:

- Between 9 Mile Drain and the Jefferson Interceptor
- Between 9 Mile Drain and the Chapaton Retention Basin
- Between 9 Mile Drain and the 8 ½ Mile Drain (Station Gate)
- Downstream end of 9 Mile Drain (Lake Gate)

The ***Martin Retention Basin*** (8.6 MG) is located at 10 1/ 2 Mile and Jefferson, and has a storage capacity of 8.6 MG. This basin serves the area tributary to the Martin Drain.

The ***Martin Drain Pump Station***, located near the retention basin, and operated by the Southeast Macomb Sanitary District, was constructed in 1991 to pump combined sewage overflows from the Martin Retention Basin into Lake St. Clair. There are two gates in the system:

- Located on Martin Drain, directs flow to Martin Retention Basin
- Between Jefferson Interceptor and the Martin Drain

The ***Hoffman Pump Station*** is also operated by the Southeast Macomb Sanitary District. It is located on the Jefferson Interceptor in St. Clair Shores, and is currently undergoing renovation.

There are four overflow pump stations that are manually operated by the City of St. Clair Shores to relieve backups in the system: ***Masonic Boulevard, Hoffman Street, Lake Boulevard,*** and ***12 Mile Road Emergency Overflow Pump Stations.*** The City of Roseville operates the ***Mayflower*** and ***Washington Avenue Pump Stations.*** The City of Eastpointe operates the ***Pleasant*** and ***Eastpointe-N.E. Relief Pump Stations.*** The Michigan Department of Transportation also operates the ***I-94 Stormwater Pump Station*** in Eastpointe.

The Macomb County Public Works Office operates the ***Bon Heur Pump Station***, located in St. Clair Shores, and the ***Violet Pump Station***, located in Roseville.

The Southeast Macomb Sewer District recently began a $65 million construction program, including sewer system improvements, to be completed in 2003. Part of this program will be the construction of a four-foot relief sewer paralleling the Jefferson Interceptor. This new sewer will route some excess flows to DWSD rather than to Lake St. Clair (46). St. Clair Shores is spending an estimated $49 million to separate sewers and eliminate three overflows to Lake St. Clair. Dry weather I/ I removal is also planned in the three cities that make up the district.

The March 2000 agreement entitled "Southeast Macomb County Combined Sewer Overflow Control Program Agreement" between the cities of Eastpointe, Roseville, and St. Clair Shores, Macomb County, Southeast Macomb Sanitary District, and the Lake St. Clair Clean Water Initiative (Drainage District) describe the proposed projects to be undertaken to meet NPDES permit requirements. The list of sewer and wastewater projects in this document, along with the owner and operator of the completed facility, are listed in the table below.

Project	Ownership/Operation
9 Mile Throttling Gates	Southeast Macomb SD
Martin Throttling Gates	Southeast Macomb SD
Relief Sewer from 9 Mile to Martin Road P.S.	Southeast Macomb SD
Hoffman Pump Station Improvements	Southeast Macomb SD
Relief Sewer from Hoffman to Bon Brae	Southeast Macomb SD
Relief Sewer along 11 Mile Road	Southeast Macomb SD
Martin Drain Outfall Project	Southeast Macomb SD
9 Mile Drain Cleaning	Southeast Macomb SD
Chapaton RTB – Miscellaneous Improvements	Macomb Co. PWC
Martin RTB – Miscellaneous Improvements	Macomb Co. PWC

Project	Ownership/Operation
9 Mile Canal Aeration	Macomb Co. PWC
9 Mile Bypass Improvements	Macomb Co. PWC
Replace Control System and Telemeter System	SMSD & MCPWC
District Dry Weather I/I Removal	Cities of St. Clair Shores, Eastpoint, Roseville
St. Clair Shores Wet Weather I/I Removal	City of St. Clair Shores
Relief Sewer – North End to Hoffman	City of St. Clair Shores
St. Clair Shores Improvements	City of St. Clair Shores
Roseville Separation Project	City of Roseville (sanitary), Macomb Co. PWC (storm)
Eastpointe Separation Project	City of Eastpointe (sanitary), Macomb Co. PWC (storm)

6.2.3 Sources

Maps and operation/ ownership information for the Southeast Macomb Sanitary District were obtained from the Southeast Macomb Sanitary District Overflow Study and Improvement Plan (1996), the Basis of Design for the Lake St. Clair Clear Water Initiative (2000), and the "Southeast Macomb County Combined Sewer Overflow Control Program Agreement" (3/ 8/ 00). Spalding DeDecker Associates verified their "Facilities Location Map" from the 1996 and 2000 studies. Older sewer and interceptor maps for the SMSD were obtained from the report entitled Segmented Facilities Plan-Book VII-Existing Waste Collection & Treatment Facilities (1978) (45).

Additional information on the operation of the Southeast Macomb Sanitary District was obtained from R. Marlin Sumner, engineering representative for the district, and the SEMSD lead plant operator. Macomb County Wastewater Disposal District operational information was obtained from Ken Bonin and Brent Avery of the Macomb County Public Works Office.

WASTEWATER SYSTEM COMPONENTS Southeast Macomb Sanitary District	
Area	15,098 acres (23.6 square miles)
Miles of Sewers (estimated from GIS)	37 miles of interceptor, estimated from GIS
Pump Stations	Marter Road (Wayne Co. PWD) Bon Heur (Macomb Co. PWC) Violet (Macomb Co. PWC) Chapaton (Macomb Co. PWC) Martin Drain (Southeast Macomb SD) Hoffman (Southeast Macomb SD) Hoffman Street (City of St. Clair Shores) Lake Boulevard (City of St. Clair Shores) 12 Mile Road (City of St. Clair Shores) Masonic Boulevard (City of St. Clair Shores) Mayflower (City of Roseville) Washington Avenue (City of Roseville) Pleasant (City of Eastpointe) Eastpointe-N.E. Relief (City of Eastpointe) I-94 Stormwater Pump Station (Michigan Dept. of Transportation.)
Outfalls	B-165 (Chapaton Retention Basin) B-166 (Martin Retention Basin)
Major Control Structures	4 gates in the Chapaton Retention Basin and 2 gates in the Martin Retention Basin service areas
CSO or Equalization Basins	Chapaton Retention Basin (Macomb Co. PWC) Martin Retention Basin (Macomb Co. PWC)

6.3 Macomb County Wastewater Disposal District (MCWDD)

6.3.1 General Description and History

The Macomb County Wastewater Disposal District (MCWDD) encompasses the central half of Macomb County, and is operated by the Macomb County Public Works Commission. The original contract with DWSD provided service to the communities of Fraser, Sterling Heights, and Utica, and the townships of Macomb, Chesterfield, Clinton, Harrison and Shelby. Subsequently, the agreement was expanded to include the Townships of Washington and Lenox and the Village of New Haven.

The preliminary report, The Macomb County Sanitary Sewer Interceptor Extension Plan (1997) (47), describes the sewer system required to extend the MCWDD service area to include the Townships of Ray, Bruce, Armada, Richmond and the Villages of Memphis and Romeo. These communities do not have an agreement with Macomb County for sewer service, but are part of the Macomb County service area, according to existing DWSD contracts. Construction of interceptors to these areas would only be considered in the event these communities request service.

To the north of the MCWDD are the counties of Lapeer and St. Clair , and to the south are the City of Warren and the Southeast Macomb Sanitary District Lake St. Clair and St. Clair County lie to the east of the MCWDD, and its west side is bounded by the Clinton-Oakland Sanitary District. (See Figure 6.3.)

The total sewered area in the district is 103,865 acres (162 square miles). The area covered by MCWDD was primarily rural until the 1960's. The southern part of this area is now heavily developed, with a mixture of residential, commercial, and industrial land use. The northern part of the district is still partly rural, but experiencing rapid development starting from the 1980s and continuing today.

The original agreement for sewage disposal and treatment between the City of Detroit and Macomb County was established in March 1967. The agreement was between DWSD and the Macomb County Public Works Commissioner, who in turn entered in agreements with the communities it serves. The maximum flows in the agreement were based on population (0.4 cfs per 1000 population). According to a document entitled "System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan" (April 1998), 79.4 MGD (122.8 cfs) is the 1998 estimated peak flow discharged from the Macomb County system into the City of Detroit sewer system.

6.3.2 Physical Characteristics of the Sewer System

DWSD constructed and now maintains the interceptors in the MCWDD (with the exception of the Chesterfield Interceptor in Chesterfield Township) and three pump stations. These were built under an agreement whereby Macomb County pays for the cost of service and operation and maintenance through sewer rates.

The DWSD interceptors include the Lakeshore, Garfield/ Romeo Arm, 15 Mile Interceptor, Oakland Arm, and Avon Arm. These flows discharge to the DWSD sewer system through the Edison Corridor interceptor. The 12' 9" diameter Edison Corridor interceptor extends from Fifteen Mile Road to the Northeast Sewage Pump Station at Eight Mile Road located in the City of Detroit. All flow from the MCWDD and the Clinton-Oakland District in Oakland County is directed through the Edison Corridor and this pump station to the Detroit system.

The Northeast Pump Station is located in Detroit, and serves the MCWDD and the Clinton-Oakland Sewer District in Oakland County. It is located at 11000 East Eight Mile Road, south of the Northeast Water Treatment Plant and between Van Dyke and Hoover Roads in Detroit. It was constructed to convey flows from the Macomb and the Clinton-Oakland Sanitary Districts to the North Interceptor-East Arm. Additional information on this pump station can be found in the section on the Conner Creek District.

The Oakland Arm runs from the intersection of 15 Mile Road and Dodge Park to Utica Road and then along Utica Road to Hall Road (M-59). At M-59, the Oakland Arm branches northwest and west. The northwest branch is still called the Oakland Arm, whereas the western branch is called the Avon Arm. The Romeo Arm follows 15 Mile Road east to Garfield Road, then north along Garfield to 21 Mile Road. At the corner of 15 Mile and Garfield, the 15 Mile Interceptor extends east to the Clintondale Pump Station. The Clintondale Pump Station receives flow from the Lakeshore and Chesterfield Interceptors. The Lakeshore Interceptor extends generally north from the Clintondale Pump Station to 21 Mile Road where the Chesterfield Interceptor joins the Lakeshore Interceptor. The Chesterfield Interceptor is owned by the MCWDD.

As mentioned above, a report was prepared by Macomb County Public Works to describe the sewer system required to extend services to the Townships of Ray, Bruce, Richmond and Armada and the Villages of Memphis and Romeo. Gravity interceptors (Utica, Chesterfield/ Macomb, Armada, Richmond, North Gratiot and Memphis Arms) could serve these areas. Sewer extensions will not occur to these areas unless requested by the communities and approved by the MCWDD.

The replacement of the Romeo Arm Interim Interceptor (24 inch force main) with a 7-foot gravity interceptor (Garfield Interceptor) in Macomb and Clinton Townships was completed in 2003. The Garfield Pump Station and the 24 " force main will be abandoned.

A new interceptor (North Gratiot), is proposed to be built following Gratiot Avenue from 21 Mile to 31 Mile Roads. It will serve Chesterfield and Lenox Townships and New Haven Village. The MCWDD is willing to consider a septage receiving station that could be served by this interceptor. Macomb County has a group working on septage disposal needs.

The three pump stations located in the district are described below:

- ***Clintondale Pump Station***: The station is located at 35029 Union Lake Road, in Clinton Township, Macomb County, and is operated by DWSD. This station receives flow from Harrison, Clinton, Lenox and Chesterfield Townships, New Haven Village, and Mt. Clemens through the Chesterfield and Lakeshore Interceptors, and pumps it to the 15 Mile Road Interceptor. All wastewater from the 11-foot diameter Lakeshore Interceptor flows into a 5-foot diameter influent line at the pump station. The wastewater then either flows through two Dimminutors or is diverted through two manually cleared bar screens before being pumped by the station into the 15-Mile Road Interceptor. The original Birminutors did not perform as planned, and were replaced recently by Dimminutors. There are three pumps in the station each rated at 40 cfs (26 mgd): Sanitary Pump No. 1 is for emergency use only and cannot be controlled from the System Control Center. Pumps Nos. 2 and 3 are controlled through telephone-line transmission to the DWSD System Control Center. The current capacity is 80 cfs with an ultimate capacity of 120 cfs. Evaluation of this pump station for renovation is currently underway.

- ***Garfield Pump Station***: This pump station will be abandoned when the new 84-inch Garfield Interceptor is completed in 2002. This pump station has a capacity of 161.3 cfs. The station was constructed at 21 Mile and Garfield Roads in Macomb Township to pump sewage from Macomb, Shelby, and Washington Townships into the Romeo Arm. Wastewater is pumped through a 24-inch force main south for three miles to 18 Mile Road where it empties into the Romeo Arm of the Edison Corridor Interceptor. From there, it flows from the Edison Corridor Interceptor to the Northeast Pump Station. Three Garfield Station pumps, rated at 8.7 cfs (5.75 mgd), are operated as required to maintain flow levels. The station operation is normally controlled automatically by the System Control Center based on the elevation of the sewage in the wet well.

- ***Lenox Pump Station*** is owned and operated by the MCWDD. It is located at 26 Mile Road, east of New Haven Village. The Lenox Pump Station is tributary to and upstream of the Clintondale Pump Station and discharges its flow to the Chesterfield Interceptor, a 15-inch sewer with a capacity of 2.6 cfs. The Chesterfield Interceptor connects to the Lakeshore Interceptor at 21 Mile Road. Current maximum pump station capacity is about 0.78 cfs. There is a flow meter at the station.

The MCWDD sewer system has nearly all separated sewers. However, sanitary sewer overflows (SSOs) are a problem in two communities. (See the "Interim Report on SSO Characterization" for more information on SSOs). Regional solutions to SSOs are being developed under this Master Plan and local solutions are being considered by MCWDD.

6.3.3 Sources

There are three sewer and interceptor maps for the MCWDD - one from the Segmented Facilities Plan-Book VII-Existing Waste Collection & Treatment Facilities

(1978), one from the Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System (1975)(48, 49), and the most recent is part of the Interceptor Extension Plan by AEW (1997).

Macomb County Wastewater Disposal District operational information was obtained from Ken Bonin and Brent Avery of the Macomb County Public Works Office.

WASTEWATER SYSTEM COMPONENTS Macomb County Wastewater Disposal District	
Area	103,865 acres sewered area (162 square miles)
Miles of Interceptor (estimated from GIS)	146
Pump Stations	Clintondale (DWSD) Garfield (DWSD - to be abandoned) Lenox (Macomb Co. WDD)
Outfalls	None - SSO overflows to Clinton River
Major Control Structures	None
CSO or Equalization Basins	None

7.0 Footnotes and References

7.1 Footnotes

Figures listed at end of citation (example: Map (Figure 23)) refer to figure numbers in used in draft document completed by Sigma Associates.

1. "Figure 2-2: Wastewater Districts" from DWSD Greater Detroit Regional System Report (June 1994). Map (Figure 23).

2. "Natural Drainage Basins - Detroit Metropolitan Area", City of Detroit, Department of Public Works, City Engineer's Office, Advance Plan, Sanitary Division, 1944. Map (Figure 1).

3. "Figure 2 - City of Detroit Sewer Districts" from the Segmented Facilities Plan, 1978. Map (Figure 4).

4. "Public Sewers in the City of Detroit to the End of the Year 1900", City of Detroit, Department of Public Works, City Engineers Office. Map (Figure 2).

5. "Public Sewers in the City of Detroit to the End of the Year 1920", City of Detroit, Department of Public Works, City Engineers Office. Map (Figure 3).

6. Interceptor System and Major Control Facilities Schematic, Segmented Facilities Plan, 1978. Map (Figure 5).

7. "Rouge River, Southfield and Hubbell Districts" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 6).

8. "General System - Proposed Sewers of Advanced Plan Program - Diagramatic (sic.) Plan", City of Detroit, Department of Public Works, City Engineer's Office, April 1945. Map (Figure 8).

9. "Northwest District Cover Sheet", City of Detroit, Department of Public Works, City Engineer's Office, revised July 1964 (original date not shown). Drawing (Figure 11).

10. "General System - Proposed Sewers of Advanced Plan Program - Diagramatic (sic.) Plan", City of Detroit, Department of Public Works, City Engineer's Office, revised February 1958. Map (Figure 9).

11. "General System - Proposed Sewers of Advanced Plan Program - Diagramatic (sic.) Plan", City of Detroit, Department of Public Works, City Engineer's Office, revised January 1961. Map (Figure 10).

12. "General System - Proposed Sewers of Advanced Plan Program - Diagramatic (sic.) Plan", City of Detroit, Department of Public Works, City Engineer's Office, revised January 1965. Map (Figure 12).

13. "Fig. 5-3: Oakwood District" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Drawing (Figure 15).

14. "Fig.4 - Baby Creek Sewer District" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 16).

15. "Fig. 5 - Connor Creek Sewer District" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 17).

16. "Fig. 7 - Central City Sewer District" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 18).

17. "Fig. 6 - Fox Creek and East Jefferson Sewer Districts" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 19).

18. "Detroit, Mich. - Fox Creek Drainage District - Sub-areas and Percentage of Impervious Surface Used in Design", April 1, 1926, Metcalf and Eddy.

19. Report on Metropolitan Environmental Study - Sewerage and Drainage Problems - Administrative Affairs - Six-County Metropolitan Area Southeastern Michigan and A Report on Sewage Disposal Problems - Six-County Metropolitan Area Southeastern Michigan, National Sanitation Foundation for the Supervisors Inter-County Committee, 1964.

20. "Rouge Valley District" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 38).

21. "Rouge Valley District" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 39).

22. DWSD Greater Detroit Regional System Final Report, June 1994.

23. "Fig. 12 - Suburban Sewer District - City of Dearborn" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 41).

24. "Fig. 10 - Suburban Sewer District - City of Allen Park" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 42).

25. "Fig. 17 - Suburban Sewer District - City of Melvindale" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 43).

26. "City of Highland Park" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 21).

27. "City of Hamtramck" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 22).

28. "Fig. 14 - Sewer District - Grosse Pointe Communites" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 44).

29. "Panel OKs Settlement for Sewage Overflow" (12/ 18/ 97) and "After 50 Years of Waste, Fox Creek Suit Settled" (1/ 23/ 98), Detroit Free Press.

30. "Fig. 4 - Suburban Sewer District - Northeast Wayne County" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 40).

31. "Fig. 3-2: Tributary Wastewater Districts and Contracted Communities", DWSD Greater Detroit Regional Sewer System Report (Final), March 1, 2001.

32. "Fig. 9 - Suburban Sewer District - Evergreen-Farmington" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 24).

33. "Overview Plan - Evergreen Farmington & City of Farmington District" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 25).

34. North Huron Valley/ Rouge Valley Program, Engineering Report - Volume II - Evergreen-Farmington Relief Output (May 1985).

35. "Sewage Spill are Rife in Metro Detroit, State", Detroit News, March 1, 2000.

36. "Fig. 13 - Suburban Sewer District - City of Farmington" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 31).

37. "Fig. 7 - Suburban Sewer District - Southeast Oakland County" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 26).

38. "Overview Plan - S. E. Oakland County District" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 27).

39. "Fig. 8 - Suburban Sewer District - Clinton-Oakland" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 28).

40. "Overview Plan - Clinton - Oakland District" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 29).

41. Map - DWSD Interceptors in Macomb County. Detroit Water and Sewerage Department, MOB 13 (Mapping Section). Map (Figure 34).

42. "Fig. 11 - Suburban Sewer District - City of Center Line" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 37).

43. "A Tide of Pollution; State Presses Cities to Stop Overflows", Detroit Free Press, 4/ 5/ 01.

44. "Pollution Culprit Found", Detroit Free Press, 11/ 28/ 00.

45. "Fig. 5 - Suburban Sewer District - South Macomb Sanitary District" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 35).

46. "Sewer Projects Will Spur Growth", Detroit Free Press, 1/ 16/ 00.

47. Macomb County Sanitary Sewer Interceptor Extension Plan, Preliminary Report May 1997, Anderson, Eckstein and Westrick, Inc. and Metco Services Inc. for Macomb County Public Works Commissioner.

48. "Fig. 6 - Suburban Sewer District - Macomb County" from Segmented Facilities Plan, Book VII, 1978. Map (Figure 32).

49. "Overview Plan - Oakland-Macomb and Center Line Districts" from Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System, 1975. Map (Figure 33).

50. "Sewer Projects Will Spur Growth", Detroit Free Press (Gene Schabath), January 16, 2000.

7.2 References

1. **American Odyssey**, 1974 Wayne State University Press. (A history of Detroit)

2. **Design and Construction of Sanitary and Storm Sewers**, ASCE Manual on Engineering Practice No. 37, 2nd edition 1970, American Society of Civil Engineers.

3. **DWSD Greater Detroit Regional System Final Report Technical Memoranda 1 to 47**, CDM Detroit for DWSD.

4. **DWSD Greater Detroit Regional System Final Report**, June 1994, CDM Detroit for DWSD.

5. **DWSD Greater Detroit Regional System Final Report**, March 1, 2001, CDM Detroit for DWSD.

6. **Gravity Sanitary Sewer Design and Construction**, ASCE Manual on Engineering Practice No. 60, 1st edition 1982, American Society of Civil Engineers.

7. **Long Term CSO Control Plan for the Detroit and Rouge Rivers**, July 1996, Wade-Trim Associates for DWSD.

8. **Macomb County Sanitary Sewer Interceptor Extension Plan**, Preliminary Report May 1997, Anderson, Eckstein and Westrick, Inc. and Metco Services Inc. for Macomb County Public Works Commissioner.

9. **North Huron Valley / Rouge Valley Program, Engineering Report Volume II Evergreen-Farmington Relief Output**, May 1985 DWSD for Wayne County Department of Public Works.

10. **Overview Plan of Wastewater Collection and Treatment for Detroit Metro System**, July 1975, Hubbell, Roth and Clark for DWSD.

11. **Segmented Facilities Plan, Book VII Existing Waste Collection & Treatment Facilities**, January 1978, Giffels/ Black & Veatch for DWSD.

12. **Segmented Facilities Plan, Book XV Legal Institutional Relationships & Regulatory Requirements**, January 1978, Giffels/ Black & Veatch for DWSD.

13. **System Hydraulics and Treatment Capabilities Workshop Resulting from the Long Term CSO Control Plan**, April 1998.

14. **The Origins of the Urban Crisis: Race and Inequality in Postwar Detroit**, 1996 Princeton University Press.

15. **Upper Rouge Tunnel-Hydraulic Risk Analysis for the Flow-Through Mode**, June 1999 Applied Science Inc. for DWSD.

Appendix A
Description of Major Physical Features - Detroit Wastewater System

This description of the major physical features of the wastewater system is taken primarily from the DWSD Greater Detroit Regional Sewer System Report, March 1, 2001.

A.1 Wastewater Treatment Plant and System Overview

The DWSD Wastewater Treatment Plant (WWTP) provides treatment for approximately 2.9 million residential customers in Southeast Michigan. The WWTP is located near the confluence of the Detroit and Rouge Rivers. Flows enter the WWTP from three large interceptors. The Oakwood-Northwest Interceptor (O-NWI) extends north and west along the Rouge River. The Detroit River Interceptor (DRI) runs north and east along the Detroit River.

Both of these interceptors collect dry weather flows and a portion of the wet weather flows generated in these upstream areas. Flow into the interceptors is controlled through regulated inflow points. While the regulators are largely non-functional, the regulator connections themselves do provide flow control for the large events. These two interceptors meet in the WWTP at the wet well of Pumping Station 1 (PS-1).

A second interceptor, the North Interceptor–East Arm (NI-EA), serves areas north of the City of Detroit. This tributary area is completely served by separate sewer systems. Inside of the City of Detroit, however, combined sewer inflows are accepted at three control points. This interceptors enters the WWTP at the wet well of Pumping Station 2 (PS-2). PS-2 also has a connection to the O-NWI so that some wet weather flows can be pumped through this new pumping station.

The older PS-1 is currently capable of pumping up to 1,004 Million Gallons per Day (MGD). The new PS-2 provides an additional 750 MGD of capacity. Together, these pumping stations have capacity that exceeds the primary capacity of the WWTP, which was rated at about 1,200 MGD. The NPDES permit required that this capacity be increased to 1,520 MGD by July 1, 2000. To provide additional primary treatment capacity, two new primary clarifiers are being constructed, and these will increase the primary capacity to 1,700 MGD by the year 2004.

The rated secondary capacity of the WWTP is 930 MGD after PC-720 is completed. The permit for the DWSD WWTP allows wet weather flows in excess of the secondary capacity to receive primary treatment only. These flows are mixed with the final secondary effluent and disinfected prior to discharge to the Detroit River.

The flows receiving treatment at the DWSD WWTP include substantial flows from within the WWTP itself. These flows, known as recycle flows, are from dewatering

processes, incineration scrubbers, thickeners, and maintenance activities throughout the WWTP. The majority of the recycle flow is screened final effluent having received secondary treatment. This portion of the recycle flow is used as process water primarily for operation/ maintenance activities pertaining to solids handling. These recycle flows range from 50 MGD to 100 MGD depending on the processes that are operational within the WWTP. Since all these flows must receive full secondary treatment during dry weather conditions, the capacity of the WWTP to handle influent flows is reduced to about 859 MGD.

A.2 Interceptors

The DWSD WWTP is served by three major interceptors. These interceptors convey all dry weather flow to the WWTP for treatment. DWSD has also constructed interceptors in Macomb County.

A.2.1 Detroit River Interceptor (DRI)

The Detroit River Interceptor is about ten miles in length and runs along the Detroit River from Alter Road at Grosse Pointe Park to the WWTP at Zug Island. The interceptor ranges from 8'-0" at the upstream end to 16'-0" at the WWTP. Along its length, there are a number of regulated discharges into the interceptor that convey dry weather flows and a portion of wet weather flows to the WWTP. All flows that enter the interceptor are conveyed to the WWTP for treatment. There are no discharges from the interceptor to the Detroit River.

The DRI was constructed to intercept wastewater from combined sewers that previously flowed directly into the Detroit River. At that time, regulators were installed at these connections from the combined sewers to the DRI to limit the flows that would be accepted by the DRI.

There are 44 of these regulated discharges and four pumped discharges into the DRI along its length. The regulated discharges were originally designed to limit wet weather flows into the system based on water levels in the interceptor. These regulators are of the mechanical Brown and Brown and McNaulty type and operated by closing the regulator gates once the interceptor reached the 7-tenths level and provided complete shutoff at the 8-tenths level. In recent years, these regulators have not been maintained. As a result, the interceptor receives flows in excess of its capacity. This results in frequent surcharging during wet weather events.

A.2.2 Oakwood-Northwest Interceptor (O-NWI)

The Oakwood interceptor runs about 1.5 miles west along the east side of the Rouge River from the Baby Creek regulator to the WWTP. This interceptor is 12'-9" along its length. This interceptor receives flows from the Wayne County Rouge Valley Interceptor as well as three regulated discharges. There is also a discharge from the City of Dearborn near Baby Creek.

Near the upstream end of the Oakwood Interceptor, two inverted siphons convey flow from the west side of the Rouge River to the Oakwood interceptor. Upstream

from the siphons, the Northwest Interceptor begins and continues about eight miles north to the west and north to the northern boundary of the City of Detroit. The Northwest Interceptor collects flows from discharge points near the Rouge River. This section of the Northwest interceptor operates differently than a typical combined interceptor. In this area, many relief sewers discharge directly into the interceptor and many discharges to the river are directly from the interceptor. Because of this, the interceptor ranges in size from 10'-0" down to 4'-0" in diameter.

A.2.3 North Interceptor-East Arm (NI-EA)

The NI-EA is a relatively new interceptor that was constructed to convey flows from sanitary sewer areas in Oakland County and Macomb County to the WWTP. The upper portion of the interceptor, which is 17'-6", receives flows from the Northeast Pumping Station. From the NEPS, the NI-EA extends about 15 miles and traverses the City of Detroit and becomes smaller at a diameter of 12'-0". Three regulated discharges are received from the Meldrum, Conant-Mt. Elliott, and First-Hamilton Sewers. These sewers convey dry weather flows from the Evergreen-Farmington and Southeast Oakland suburban areas as well as some northern areas of the City of Detroit.

At its termination point, the NI-EA is 13'-6" in diameter at Pumping Station 2, located in the WWTP. This pumping station discharge is configured in such a way that the flows, which are predominantly suburban sanitary in nature, receive preferential secondary treatment at the WWTP.

A.2.4 Macomb County Interceptors

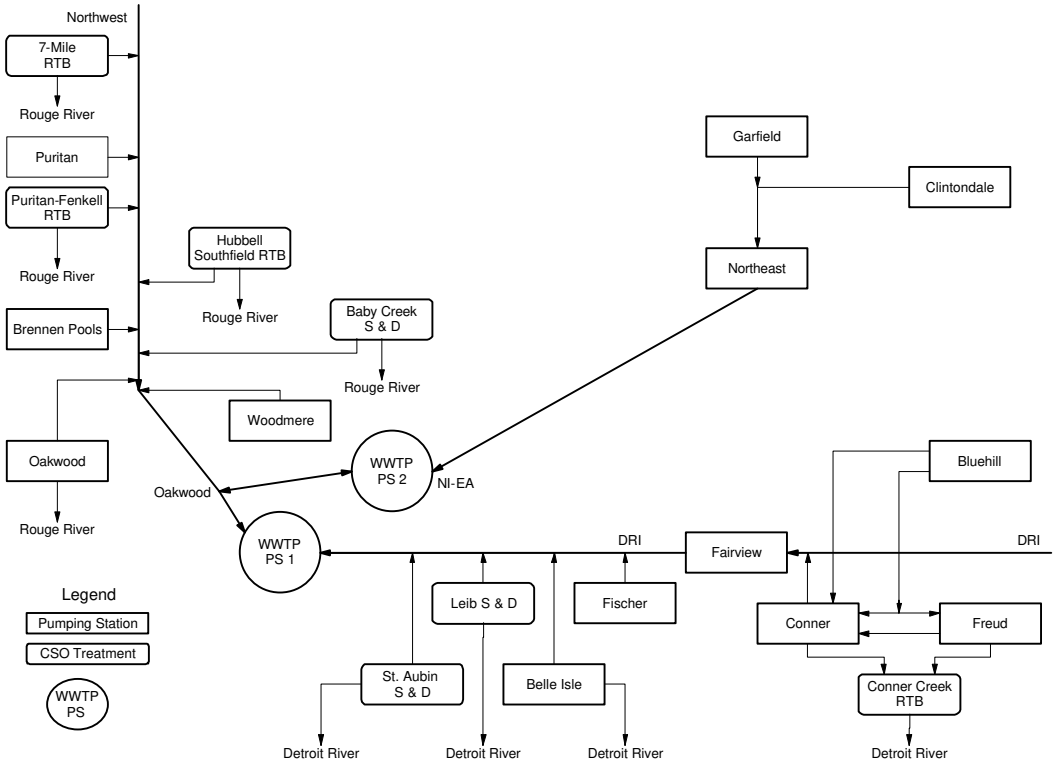
DWSD constructed sanitary conveyance interceptors in Macomb County. These interceptors were constructed to convey flows from these northern suburban customers to the Northeast Pumping station, and on to the WWTP. This interceptor, and the associated 15-Mile Interceptor, Oakland Arm Interceptor, Lakeshore Interceptor, and Romeo Interceptor, convey flows from individual customer community billing meters to the DWSD WWTP.

A.3 Pump Stations

The pump stations in each district are described individually. The attached schematic shows relationship between the pump stations and interceptors in the system.

Pump station operation is controlled through the System Control Center (see section A.6). Emergency power backup generators are currently installed in the Northeast, Oakwood, Freud, and Bluehill Stations, and are planned for the Fairview and Woodmere Pump Stations. These are essential for eliminating sewer overflows and backups in portions of the system reliant on pumping.

DWSD Wastewater Pumping and Interceptor Schematic



Source: DWSD Greater Detroit Regional Sewer System Report, March 2001

A.4 Equalization and CSO Basins

The basins in the DWSD system are generally constructed to address either sanitary sewer overflow or combined sewer overflow problems. Equalization basins have been constructed to hold flows and release them for treatment in both separated and combined sewer system. Other basins constructed to address combined sewer overflows may hold these flows only long enough to ensure adequate treatment, usually screening and disinfection, and are not designed as storage facilities. None of these facilities have full primary, i.e. chemical treatment to remove solids. Individual basins are described under each district.

A.5 Mechanical Devices

A.5.1 Regulators

Regulators are flow control devices that control flow from trunk sewers into interceptors based on the wastewater level in the receiving interceptor. Most of the diversion and combined sewer regulator structures are located along the Detroit and Rouge Rivers. There are two types of regulators as follows:

Mechanical Float Regulators

There are two types of mechanical float regulator assemblies currently used within the Detroit collection system: the Brown and Brown (B&B) regulator and the McNulty regulator. The B&B regulator uses a float connected to a curved regulator gate by a lever mechanism. McNulty uses a flap gate with an attached weight connected to a float by a lever mechanism. Some of these regulators have been replaced with hydraulic or motorized sluice gates that are remotely controlled by the System Control Center (SCC). The remaining regulators are scheduled to be replaced by slide gates with totally enclosed hydraulic actuators (Self-Contained Universal Bi-Directional Actuators (SCUBA) Unit) under Task 2 of the CS-1158 Contract.

The normal settings for the float control regulators in the DWSD system cause the flow restriction through the regulators to begin when the interceptor is seven-tenths full as described in the Wastewater Collection System O&M Manual. All flow to the interceptor is restricted when the depth in the interceptor is at the eight-tenths level. When the regulator closes, combined flow is diverted into the outfall sewer.

Sluice Gates

The other type of regulating device is the sluice gate. Most sluice gates are remotely controlled by the SCC. Sluice gate diversion, as used in the DWSD system, serves two primary functions; these are to provide selective loading to the interceptors and in-system storage and flow routing. Selective loading to the interceptors is achieved through hydraulically operated or motorized sluice gates installed in regulating chambers. Sewer wastewater levels are monitored with level sensors to allow the SCC operators to open or close the gates installed in regulating chambers.

Wastewater levels are monitored with level sensors to allow the SCC operators to open or close the gates directing wastewater flow either to the interceptor or to the CSO outfalls. Most of these sluice gates are inoperable at this time. Sluice gates

installed at the relief connections are used for limited flow routing within the collection system. Flow routing within the system is achieved by modulating the sluice gates remotely, to force wastewater to flow in a different than normal direction.

A.5.2 Dams

Dams are used in the DWSD collection system to route dry weather flows, increase in-system storage, and prevent river water from entering the collection system at the outfall locations (i.e. river inflow). These dams are often located in the outfall barrel between regulating structures and the river.

Fixed Dams

Most dams are fixed concrete construction. Some of the concrete dams have flash boards installed on top to increase the dam crest height. Most of the concrete dams are equipped with electrode type sensing devices, which are intended to relay signals to the SCC indicating an overflow event. Most of these sensing devices are not operational and are scheduled for rehabilitation.

Inflatable Dams

There are three inflatable dams installed in the wastewater collection system; one in each barrel of the Hubbell-Southfield Sewers and one in the Livernois Relief Sewer at Ranspatch. The original dams, installed at these sites in 1972, were remotely controlled by the SCC. In 1987-88 the dams at the Hubbell-Southfield Sewers were removed and replaced. These dams are operated with local automatic controls that control dam air pressure based on monitored sewer wastewater levels. These dams also have the capability to be operated remotely, by the System Control Center, but remote operation is not presently used. The Livernois/ Ranspatch dam is non-functional.

In-System Storage Dams

A total of 30 inflatable dams are to be installed in various outfall and trunk sewers of the collection system. The function of the storage dams is to use in-system storage to reduce CSO, and maximize capture and treatment of CSO. Using these dams/ gates also allows additional transport without overflow to the DRI, NWI and the NIEA to the WWTP. Dams located in trunk sewers are completely deflated during dry weather flow, and during wet weather flow are regulated to maintain the HGL in the sewers upstream of the dams at the 0.8ths point of the sewer diameter. Dams located in the outfall sewers are inflated during dry weather to use the in-system storage, and during wet weather are regulated to maintain the HGL upstream of the dams at the 0.8ths point of the outfall sewer. In case of additional risk to the upstream system due to the continuous rise in HGL, the dams are deflated. To dewater the stored water, dams are deflated gradually based on downstream levels.

A.5.3 Outfall Sewers

Outfall sewers are sewers leading from regulators and/ or dams to the Detroit or Rouge River. Outfall sewers carry CSOs during certain wet weather periods and discharge into Detroit and Rouge Rivers. Until recently, there were 78 outfalls located

on the Detroit and Rouge Rivers. Five of these outfalls have been replaced by the three new CSO detention basins described above. Double leaf slide gate facilities have also been constructed in some of the discharges along the Rouge River.

A.5.4 Backwater Gates

Backwater gates are devices installed in the CSO outfalls along the Detroit and Rouge Rivers. The purpose of the backwater gates is to prevent water from the Detroit and Rouge Rivers from entering the collection system. The backwater gates are typically installed at the overflow side of the regulators (usually two sets of gates; a sewer gate and a river gate) and act as check valves when the river levels are higher than the invert elevations of the outfalls. The majority of backwater gates are constructed of timber and are hinged at the top, to allow flow from the outfall sewers into the rivers. Many of these backwater gates have stop log slots or roller gates for isolation from the river.

The gate facilities are equipped with proximity status switches. In the event of an overflow, these outfall sensors are intended to send the signal to the SCC through dedicated telephone lines and make the SCC staff aware of an overflow condition. The majority of these proximity switches are non-operational.

A.5.5 Flushing Gates

There are three flushing gates in the DWSD wastewater collection system, all located in the Conner Creek gravity sewer at Warren Avenue. At Warren Avenue, a transition occurs in the Conner Creek sewer from two 12'-0" by 17'-6" barrels to three 15'-9" by 17'-6" barrels. This transition causes a drop in the wastewater velocity. This drop in velocity, coupled with a relatively flat slope of the sewer, has caused a sedimentation and sludge build-up problem in the Conner Creek Sewer. To deal with this, three 10'-0" by 7'-0" roller gates were installed at the upstream end of the three barrels. These gates are used to route dry weather flow to a single barrel, one at a time, to flush the sewer and dislodge deposits or sediments caused by storm water storage in the sewer.

The flushing gates are remotely controlled from the SCC. Under normal operation and during moderate flow, only one gate is open at a time. Each barrel is flushed routinely for eight hours based on the diurnal flow. During major storms, all three gates are opened to prevent upstream flooding. When the storm subsides, two of the gates are lowered, forcing the remaining water through the third open gate. The increased velocity through the gate scours deposits from one channel at a time. The flushing gates are not operable at this time.

A.6 Controls - System Control Center (SCC)

The SCC is located on the second floor of the DWSD Water Board Building at 735 Randolph Street in downtown Detroit. The SCC houses control equipment for the monitoring and controlling the wastewater collection system field devices. These include pumping stations, gates, inflatable dams, and level sensors.

A.7 Metering

A wide range of metering exists within the DWSD collection system. Much of the metering currently available is related to billing requirements for the suburban customers. In addition, a number of metering programs have been undertaken to better understand the source and fate of flows generated throughout the collection system, including installation of both permanent and temporary meters. Additional work in this area is underway at this time.

Appendix B: Glossary

For the purposes of this document, the following definitions were used (adapted from Design and Construction of Sanitary and Storm Sewers, **ASCE Manual on Engineering Practice No. 37**, 2nd edition 1970, Chapter 1, Section B; **Gravity Sanitary Sewer Design and Construction**, ASCE Manual on Engineering Practice No. 60, 1st edition 1982, Chapter 1, Section B and **Long Term CSO Control Plan for the Detroit and Rouge Rivers**, Vol. 1, Part 4.0, 1996):

Sewer Types

- Combined Sewer - A sewer that carries both wastewater and storm water flows. Combined sewers are found primarily in older, urban systems in the northeast and upper Midwest, and were built until the 1950's.
- Sanitary Sewer - A sewer that carries only wastewater flows.
- Storm Sewer - A pipeline designed to carry stormwater runoff.
- Outfall Sewer – A sewer that receives stormwater and/ or wastewater from a collecting system or from a treatment plant and carries it to a point of final discharge.
- Relief Sewer – (a) A sewer built to carry the flows in excess of the capacity of an existing sewer; (b) A sewer intended to carry a portion of the flow from a district in which the existing sewers are of insufficient capacity, and thus prevent hydraulic overloading of the latter.
- Building Sewer – In plumbing, the extension from the building drain to the public sewer or other place of disposal; also called the house connection.
- Lateral Sewer – A sewer that collects sewage from homes and businesses and discharges it into a branch, trunk or other generally larger sewer. It has no other common sewer tributary to it.
- Branch Sewer – A sewer that receives wastewater from a relatively small area and discharges into a main sewer serving more than one branch-sewer area.
- Submain Sewer – A sewer into which the wastewater from two or more lateral sewers is discharged and which subsequently discharges into a main, a trunk, or other collector.
- Main Sewer – In larger systems, the principal sewer to which branch sewers and submains are tributary; also called a trunk sewer. In small systems, a sewer to which one or more branch sewers are tributary. In plumbing, the public sewer to which the house or building sewer is connected.

- Trunk Sewer – A sewer that receives flow from lateral sewers or many tributary branches and sends the flow to an interceptor. These sewers serve a large territory, and would generally only have a few connections, if any, to buildings or streets.

- Intercepting or Interceptor Sewer – A sewer that receives dry-weather flow from a number of transverse sewers or outlets and frequently additional predetermined quantities of stormwater (if from a combined system), and conducts such waters to a point for treatment or disposal.

Other Sewer System Structures

- Regulator - Flow control device that restricts flow from trunk sewers into interceptors or rivers based on the wastewater level. A sluice gate is a regulating device.

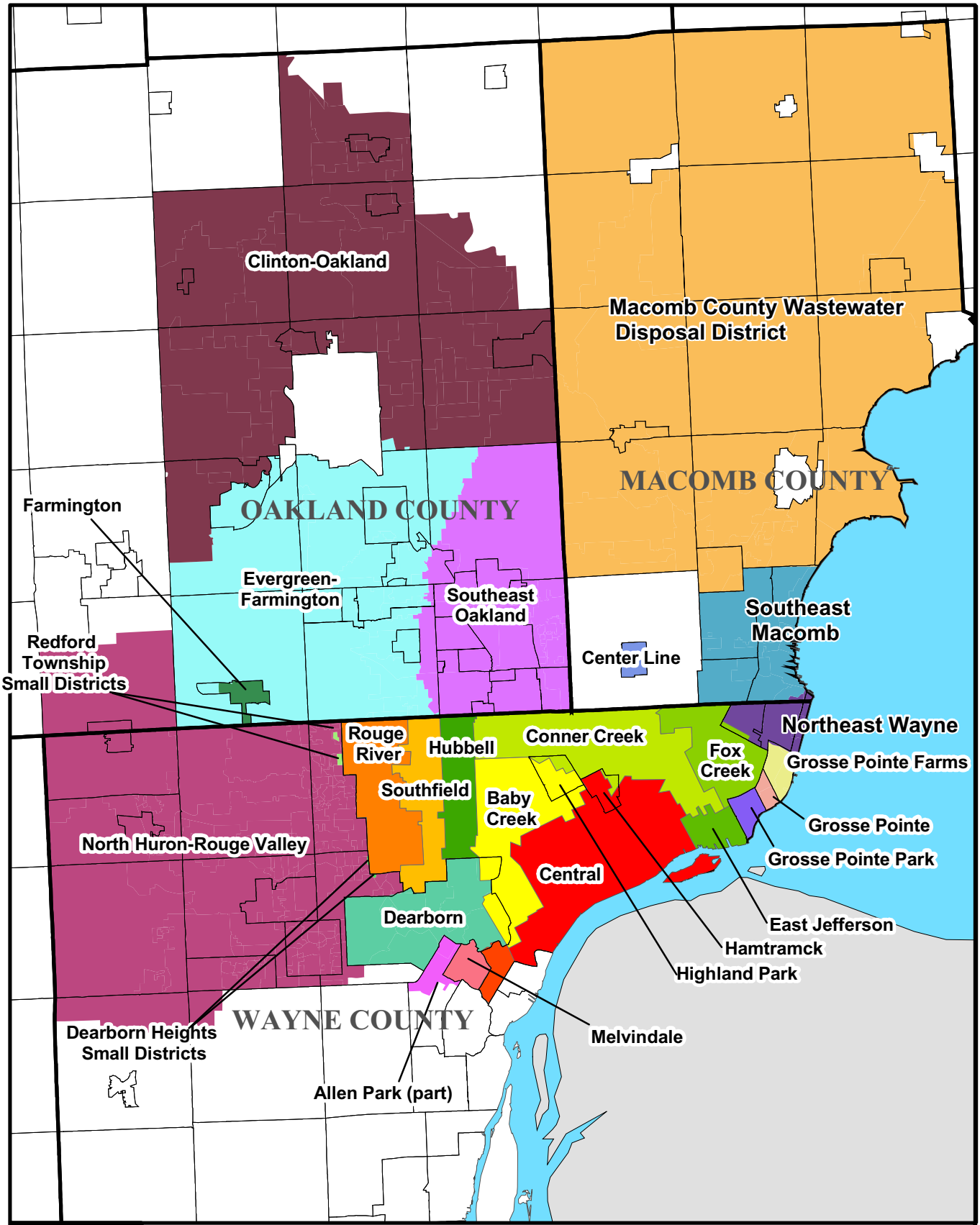
- Siphon - A closed conduit which utilizes atmospheric pressure to increase the flow through a conduit. A portion of the siphon lies above the hydraulic grade line, resulting in pressure less than atmospheric and requiring a vacuum within the conduit to start flow.

- Inflatable Dam - A balloon-like rubber dam inflated by air, used to store flow in the sewer pipe or control flow through interceptors or outfalls.

- Pump or Pumping Station - A structure containing pumps and associated piping, valves, and other mechanical and electrical equipment for pumping wastewater. Also called a lift station when it is used to lift wastewater from a low point to a higher pipe so that it can be transported by gravity.

- Parshall Flume - A calibrated device developed by Parshall for measuring the flow of liquid in an open conduit. It consists essentially of a contracting length, a throat, and an expanding length. At the throat is a stillover which the flow passes at a critical depth. The upper and low heads are each measured at a definite distance from the sill and the measurements used to calculate the flow through the flume.

- Outfall - The sewer pipe outlet where combined sewage is discharged into a lake or river, usually to prevent combined sewage backup into residential basements and streets. In Michigan, each outfall is permitted by the Michigan Department of Environmental Quality.



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

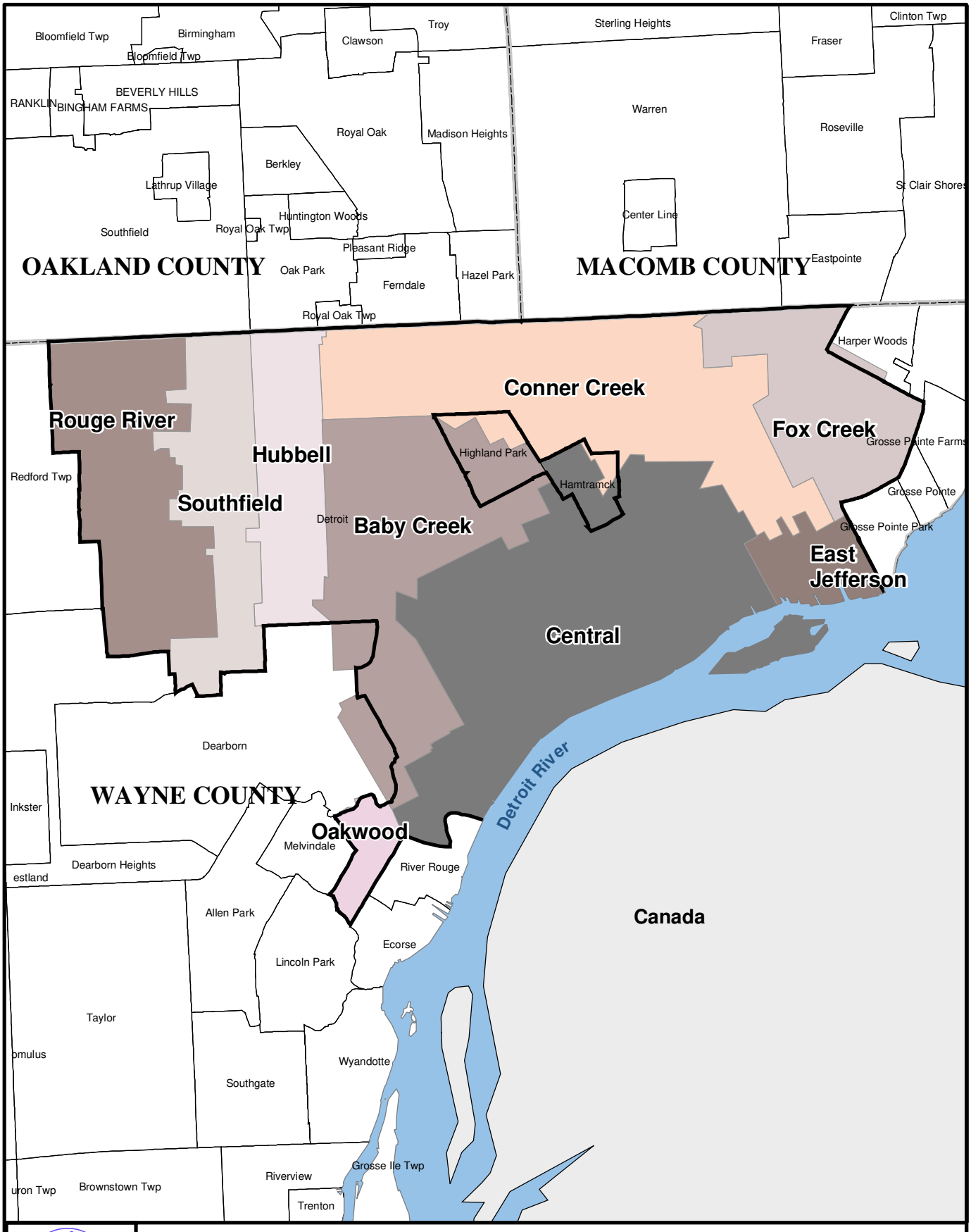
E

2 1 0 2 Miles

DWSD Sewer Service Districts

DWSD-A-013d

FIGURE : 1.0



May 30, 2003

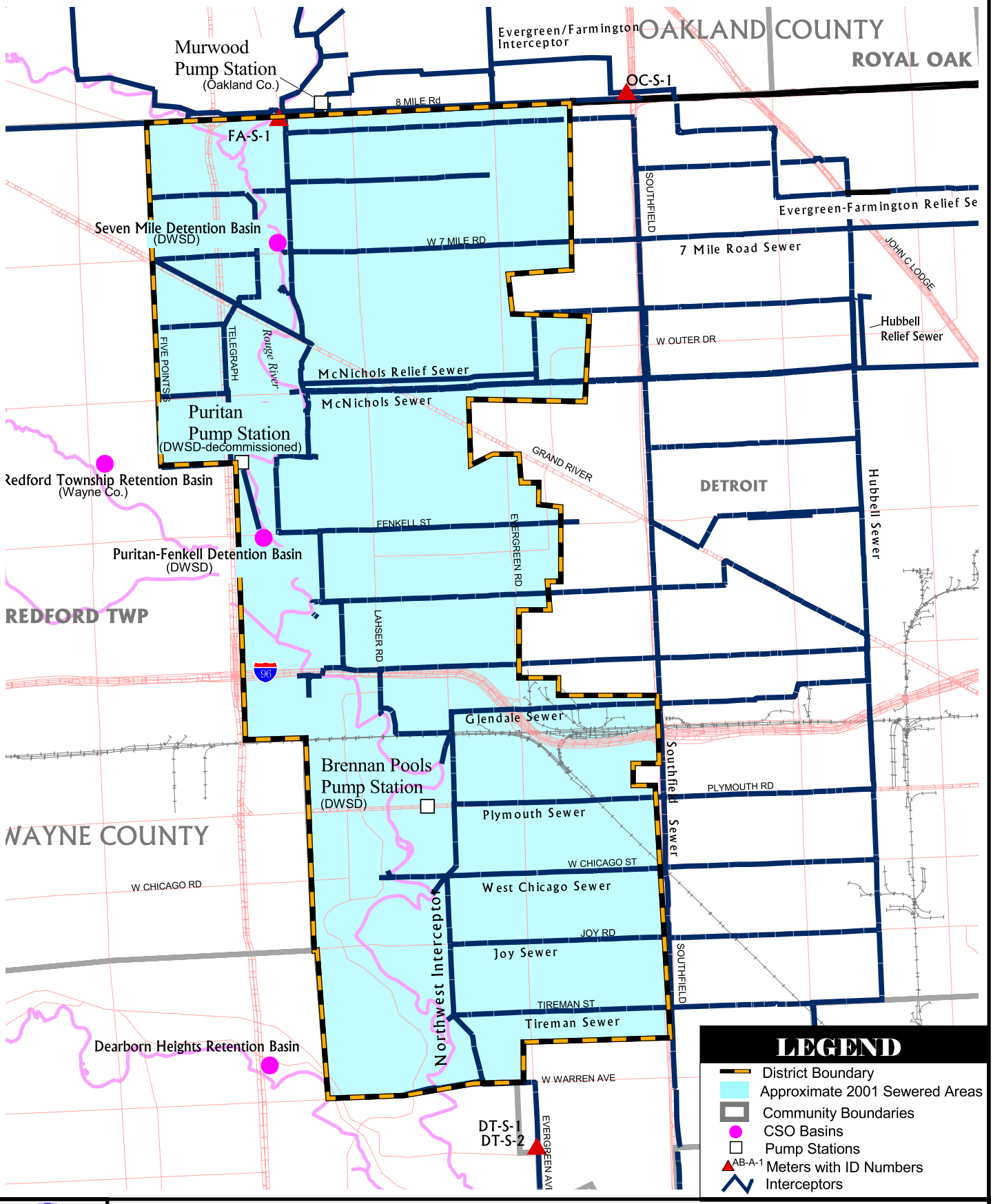
CS-1314 DWSD Wastewater Master Plan

CDM

1 0.5 0 1 Miles

City of Detroit Sewer Districts

FIGURE : 2.0



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

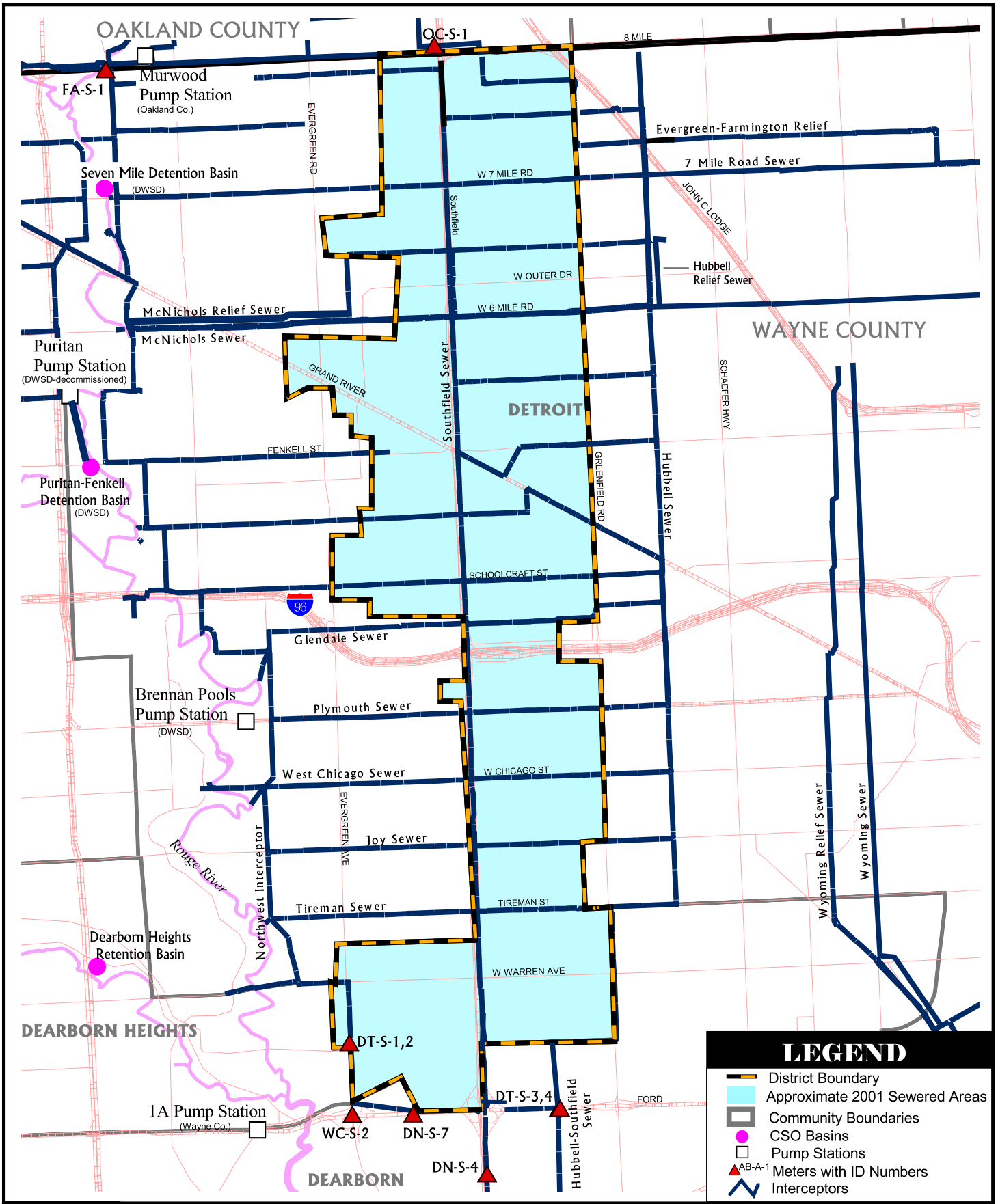
N

0.5 0 0.5 Miles

Rouge River Sewer District

DWSD-A-053c

FIGURE : 2.1



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

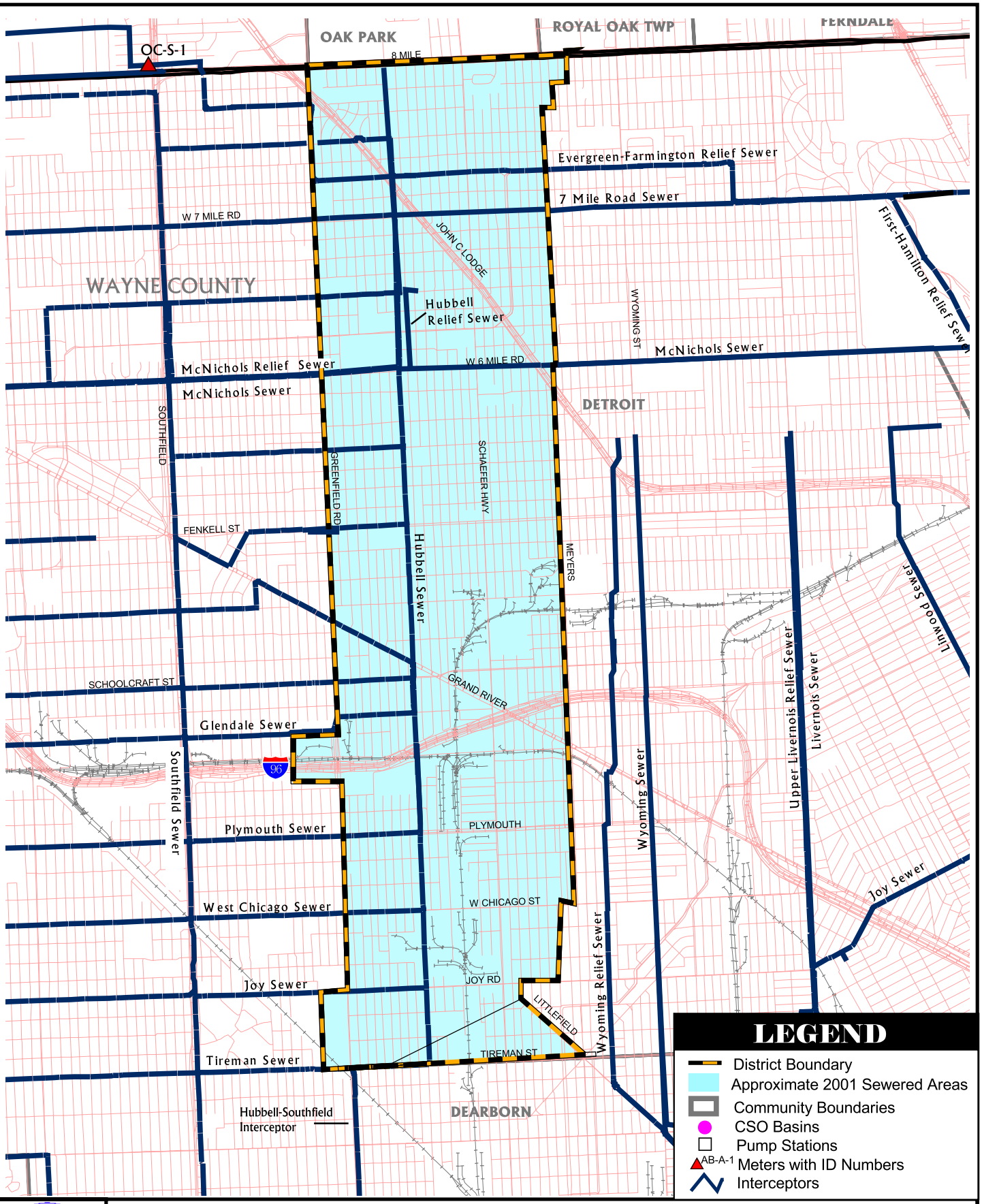
N

0.5 0 0.5 Miles

Southfield Sewer District

DWSD-A-054c

FIGURE : 2.2



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

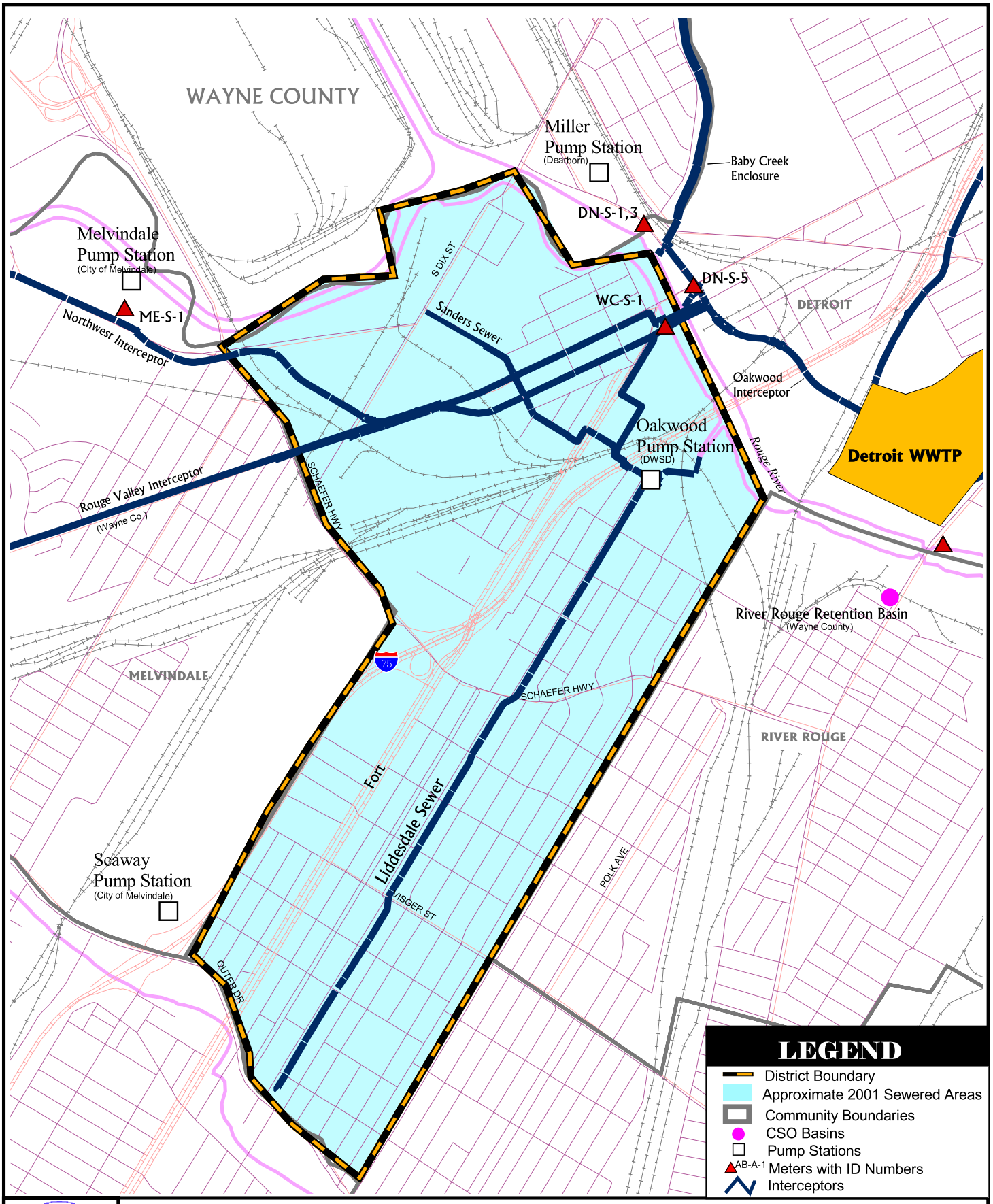
N

0 1 Miles

Hubbell Sewer District

DWSD-A-048c

FIGURE : 2.3



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

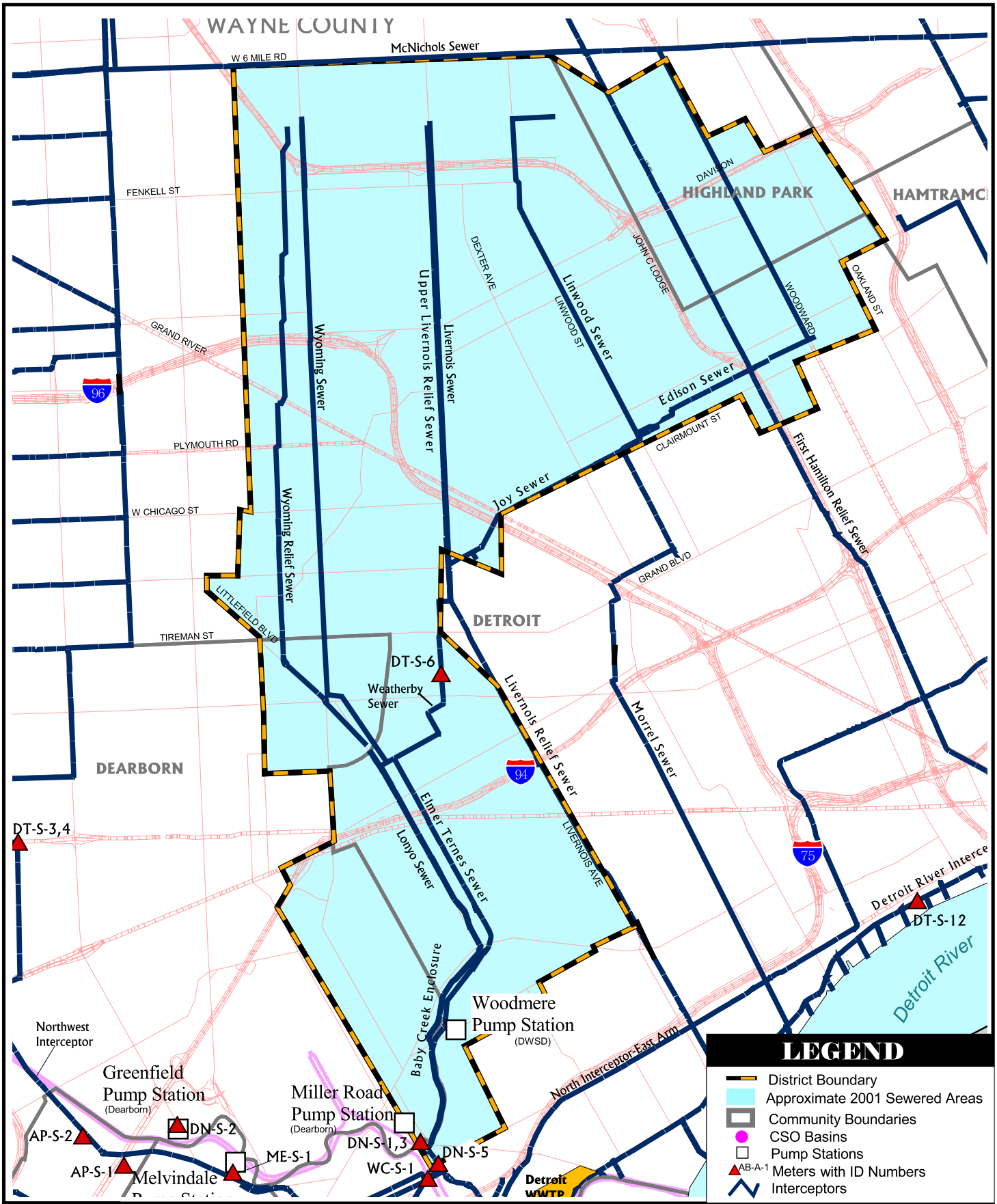
N

0.1 0 0.1 0.2 Miles

Oakwood Sewer District

DWSD-A-035c

FIGURE : 2.4



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

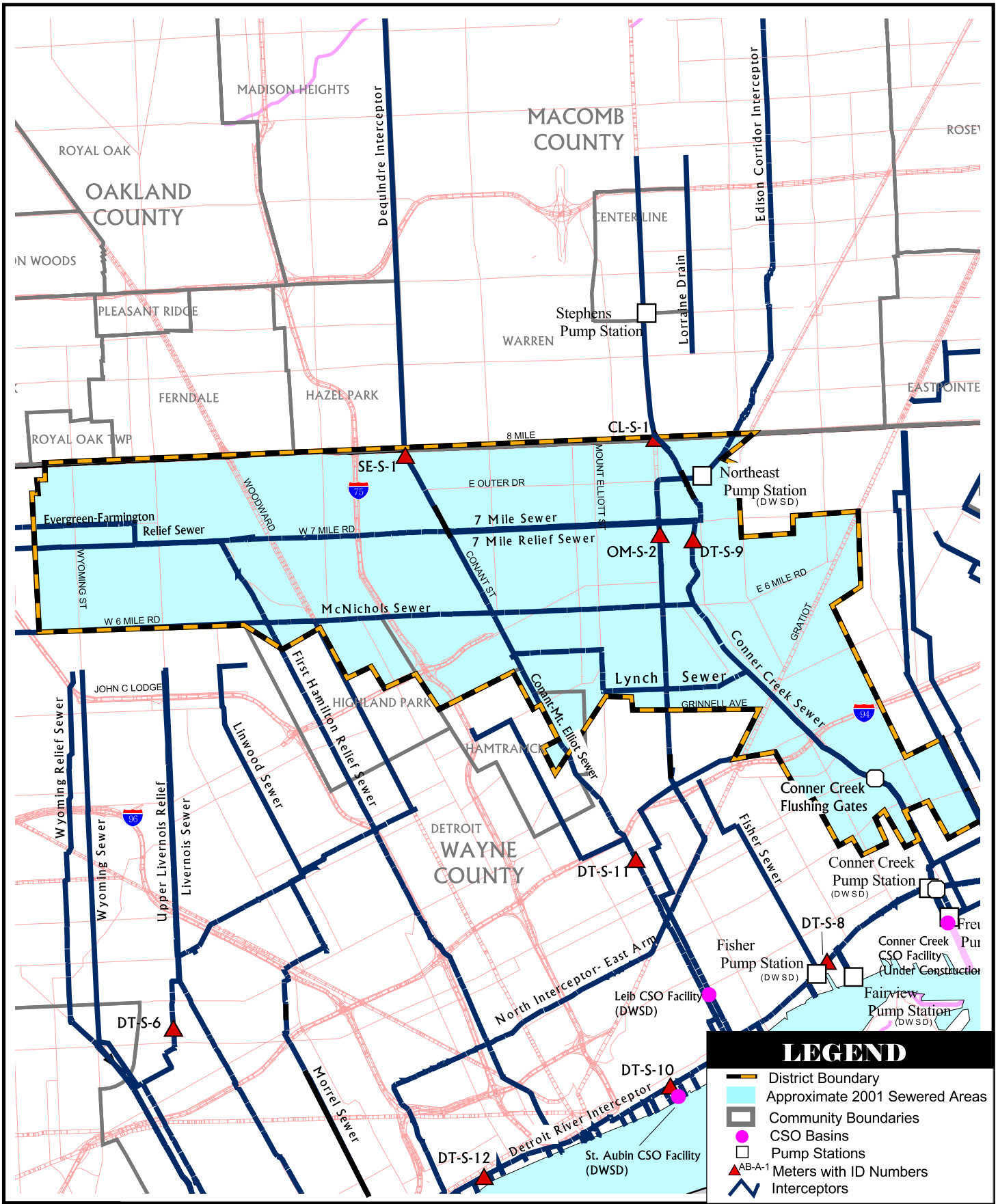
N

0 1 Miles

Baby Creek Sewer District

DWSD-A-067c

FIGURE : 2.5



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

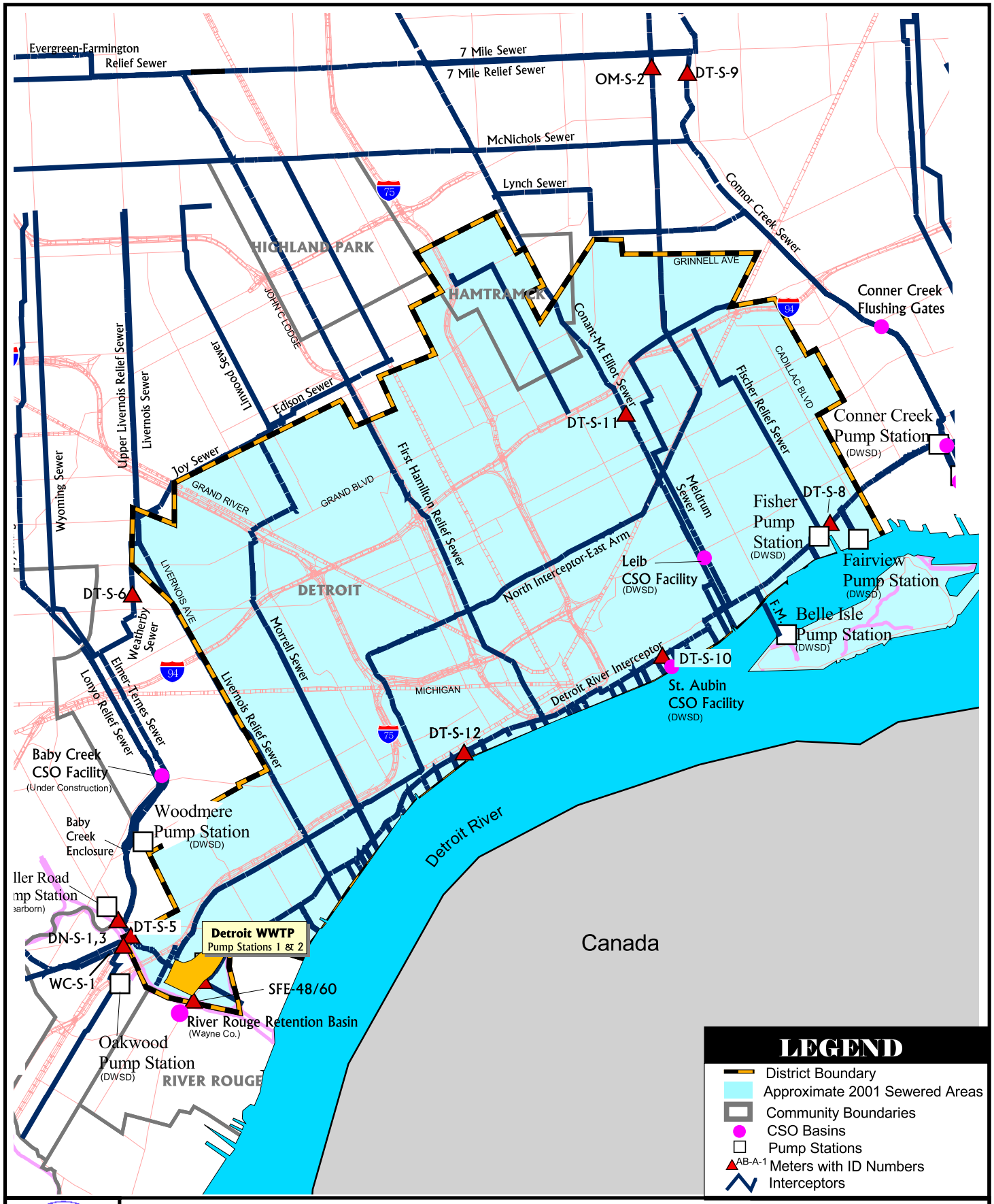
N

0 0.5 1 Miles

Conner Creek Sewer District

DWSD-A-066c

FIGURE : 2.6



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

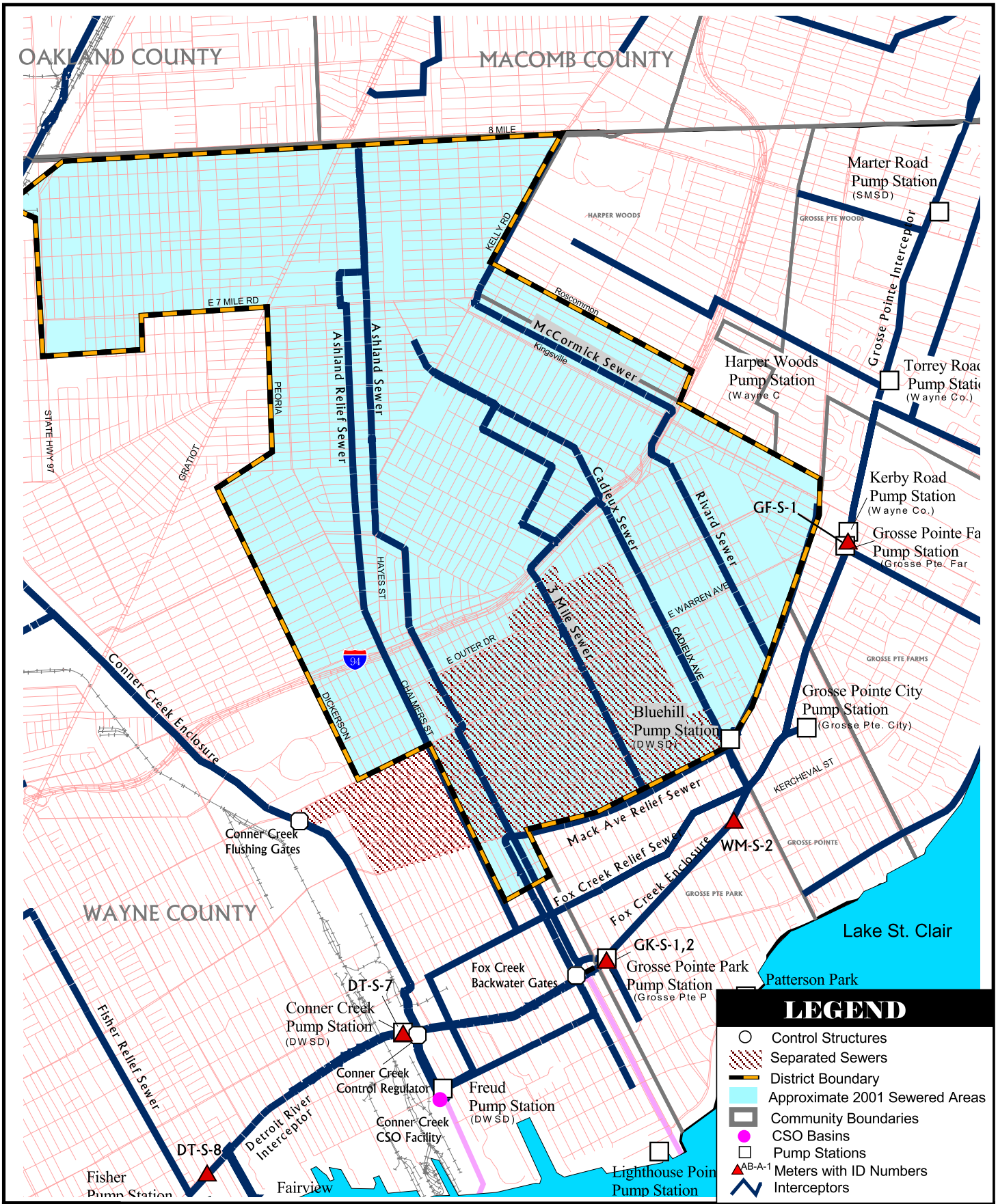
CDM

0 0.5 1 Miles

Central Sewer District

DWSD-A-042c

FIGURE : 2.7



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

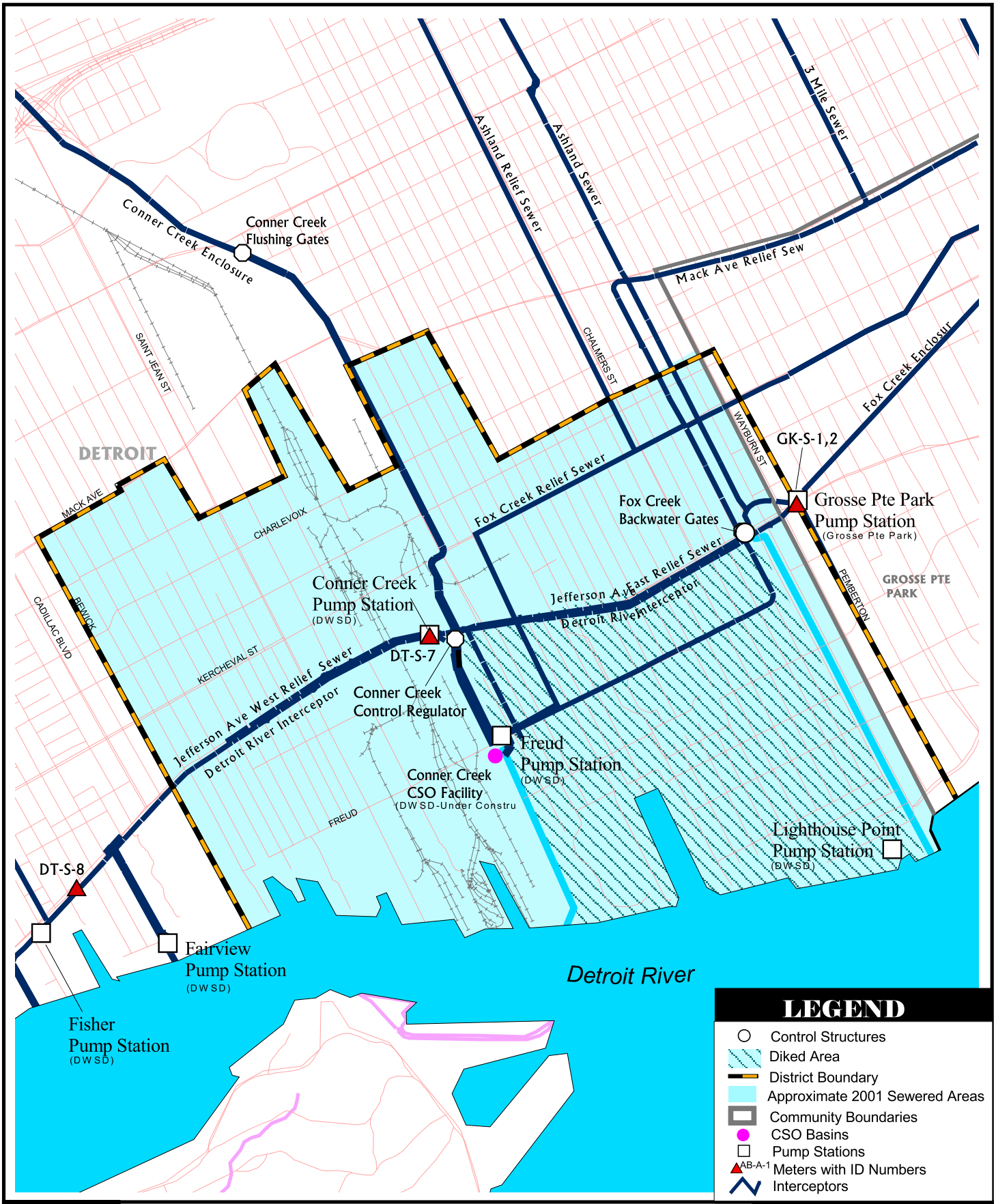
N

0 0.25 0.5 Miles

Fox Creek Sewer District

DWSD-A-057c

FIGURE : 2.8



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

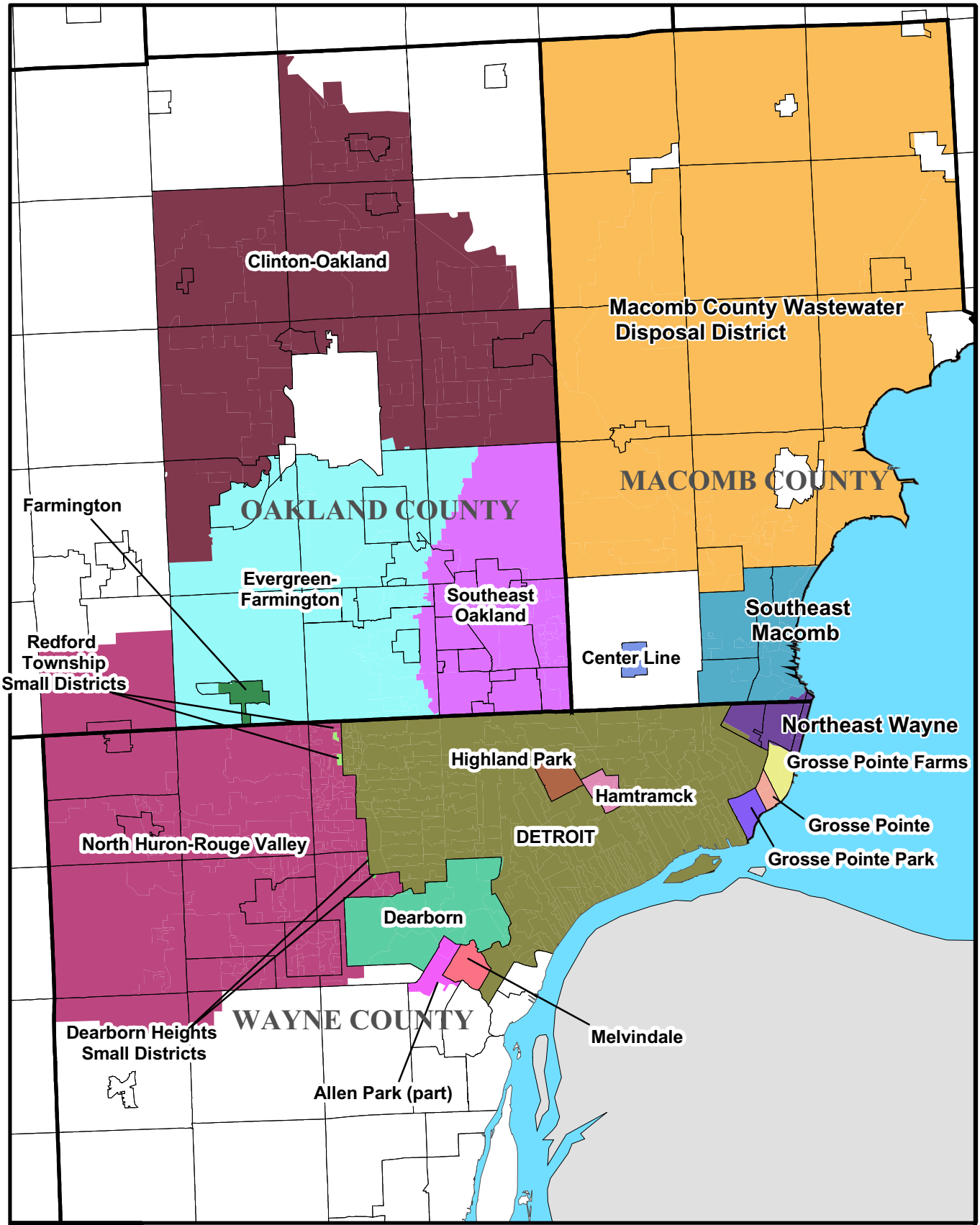
N

0 0.1 0.2 0.3 Miles

East Jefferson Sewer District

DWSD-A-058c

FIGURE : 2.9



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

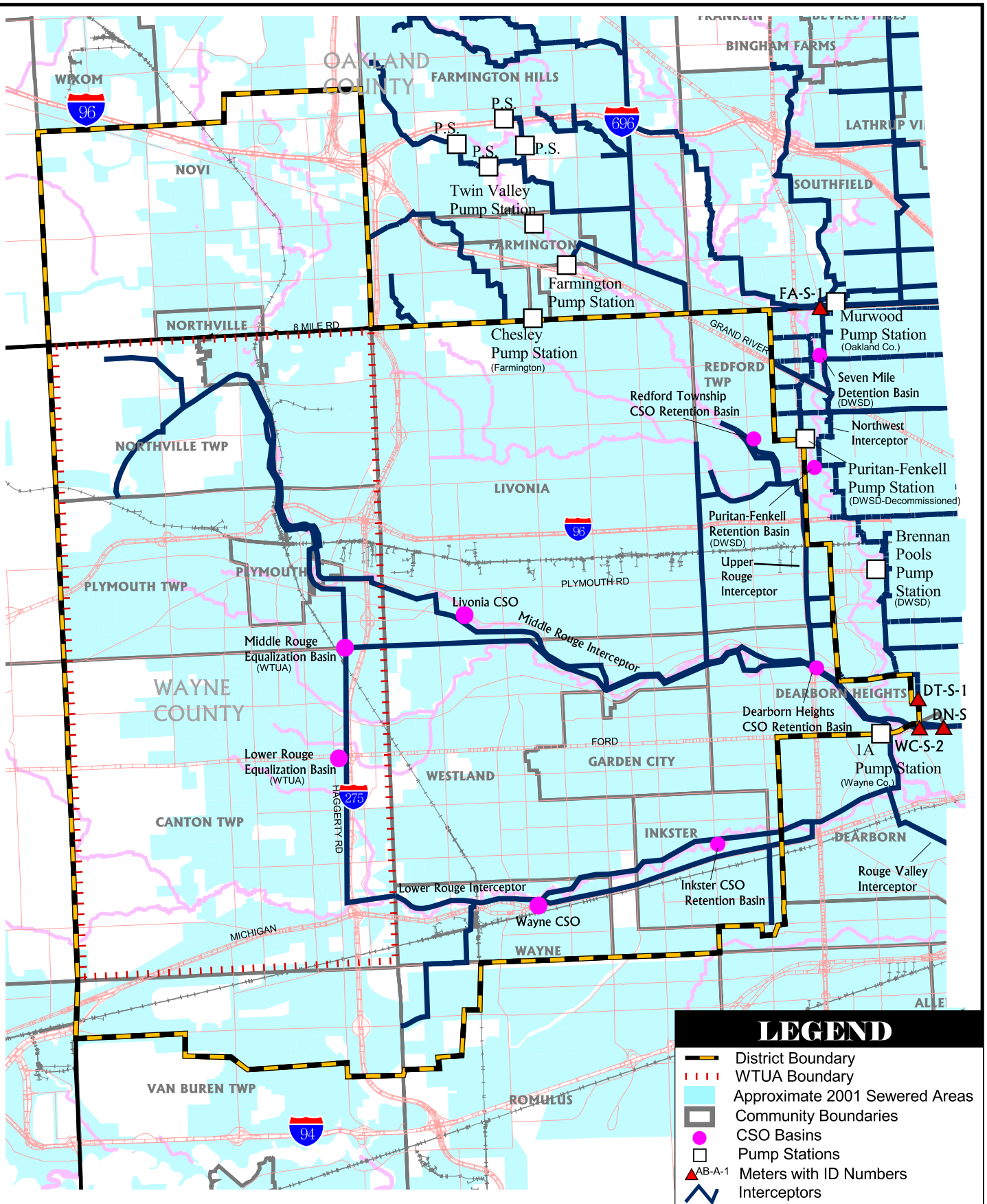
E

2 1 0 2 Miles

DWSD-A-013d

Detroit Wastewater System
Suburban Sewer Districts

FIGURE : 3.0



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

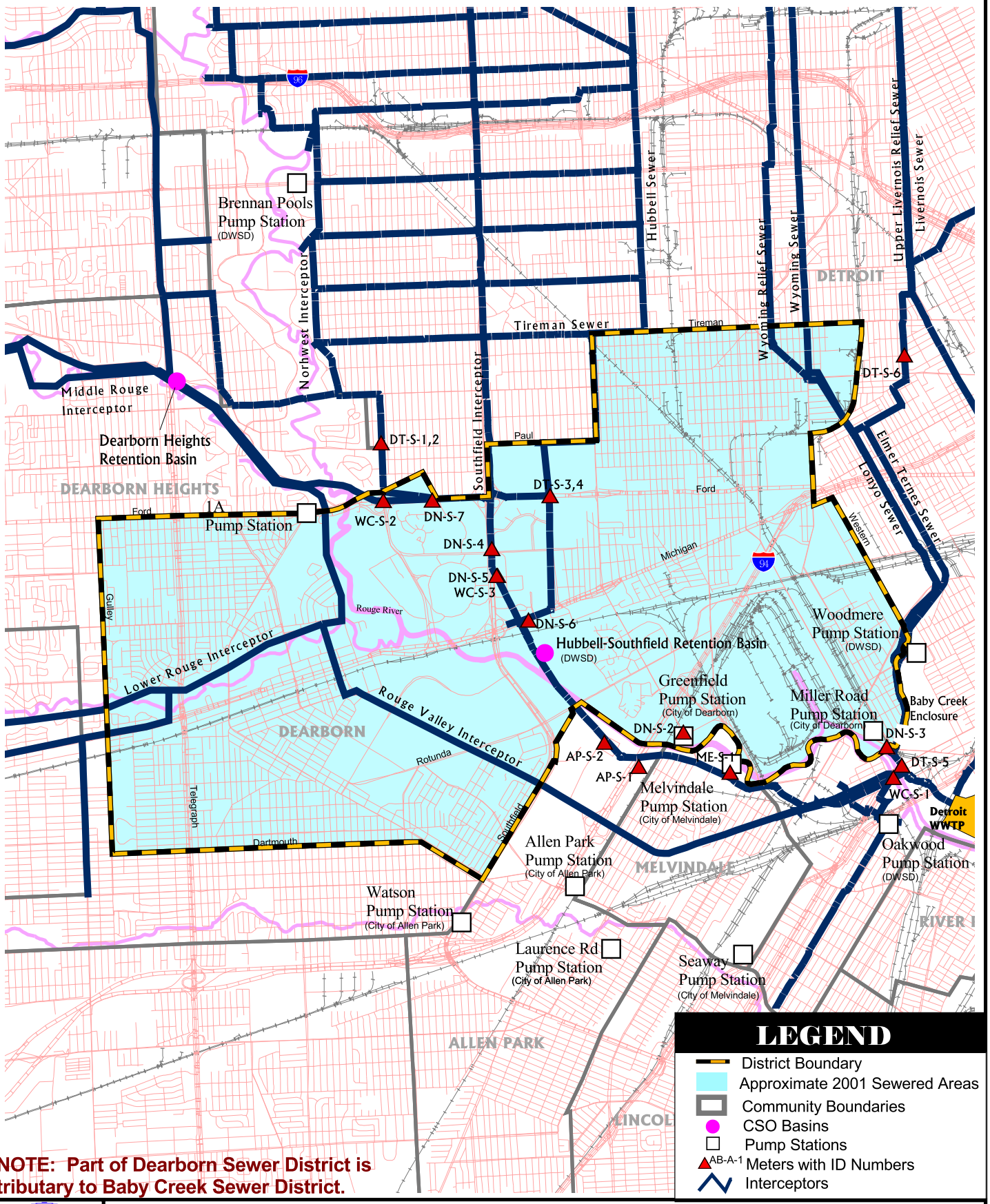
CDM

1 0 1 Miles

North Huron Valley - Rouge Valley Sewer District

DWSD-A-047c

FIGURE : 4.1



May 30, 2003

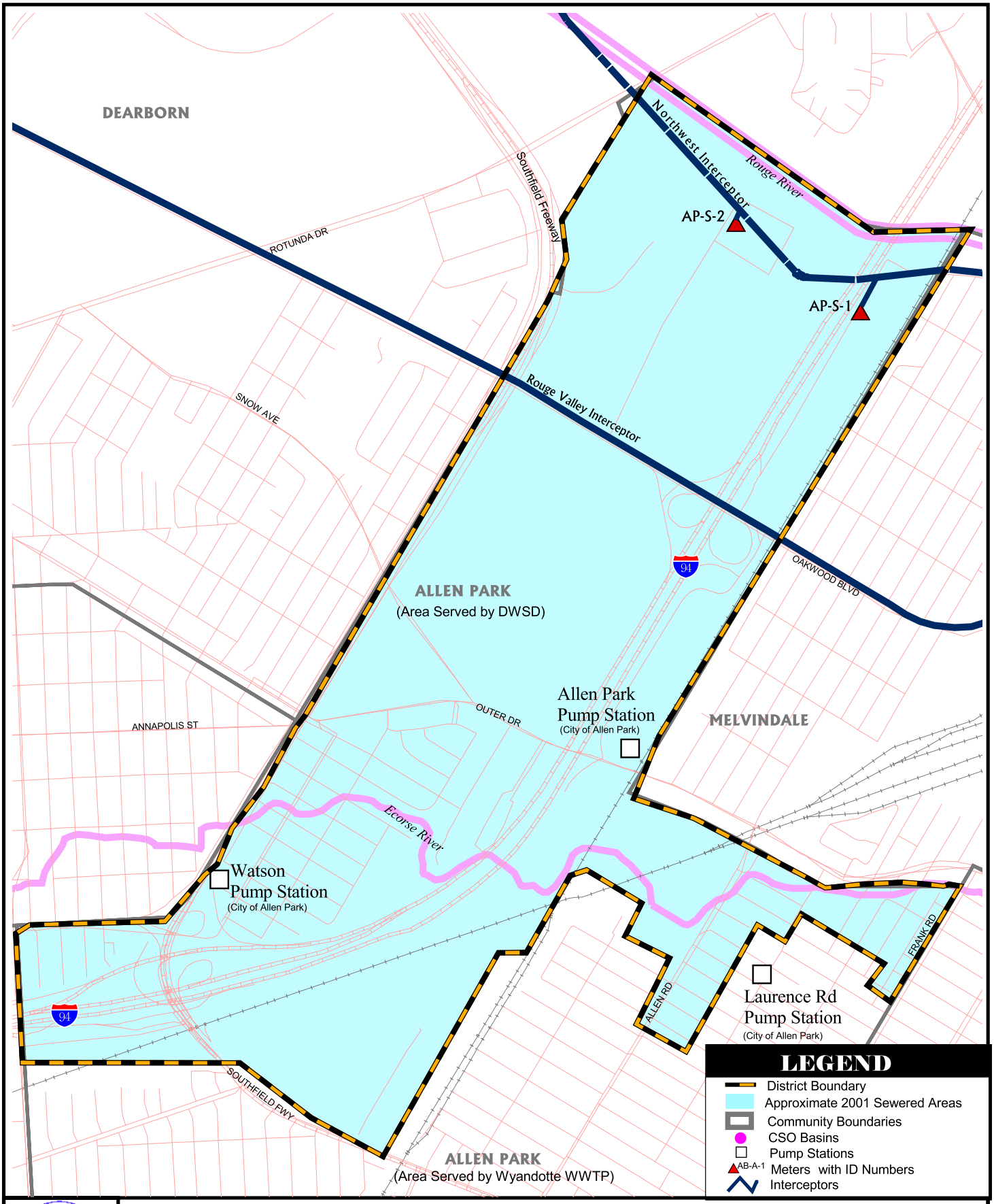
CS-1314 DWSD Wastewater Master Plan

CDM

City of Dearborn Sewer District

DWSD-A-070c

FIGURE : 4.2



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

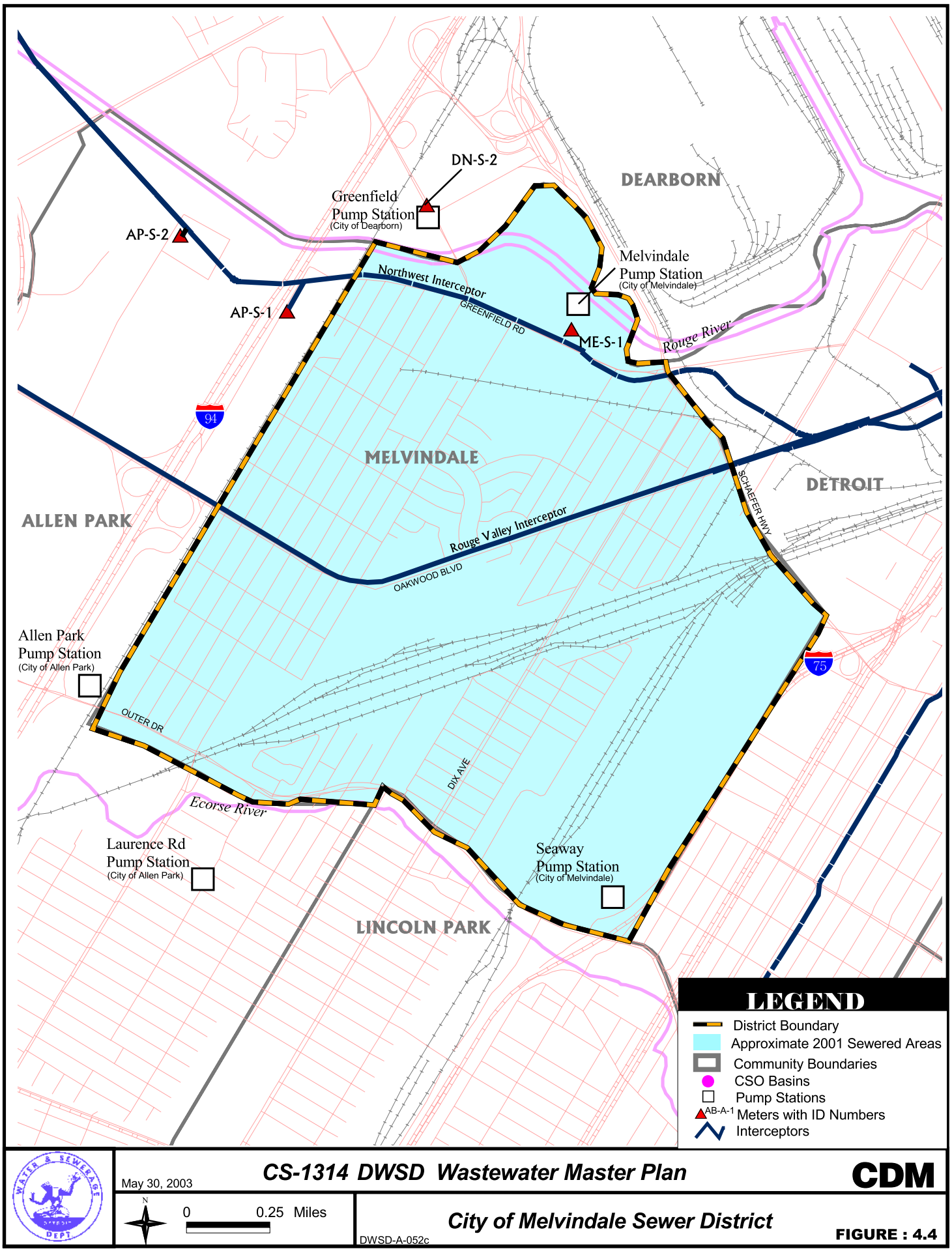
N

0.1 0 0.1 0.2 Miles

City of Allen Park Sewer District

DWSD-A-041c

FIGURE : 4.3



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

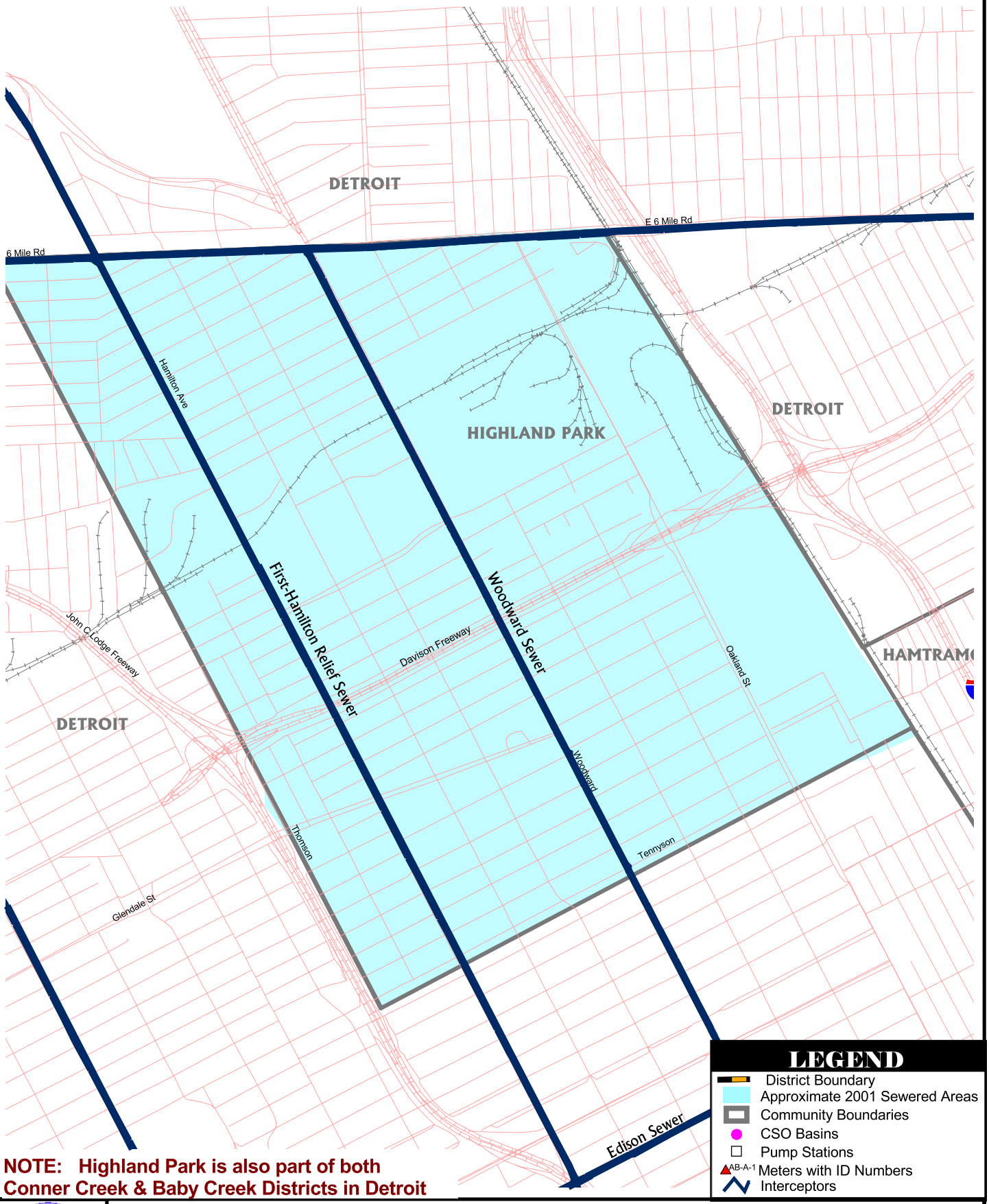
N

0 0.25 Miles

City of Melvindale Sewer District

DWSD-A-052c

FIGURE : 4.4



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

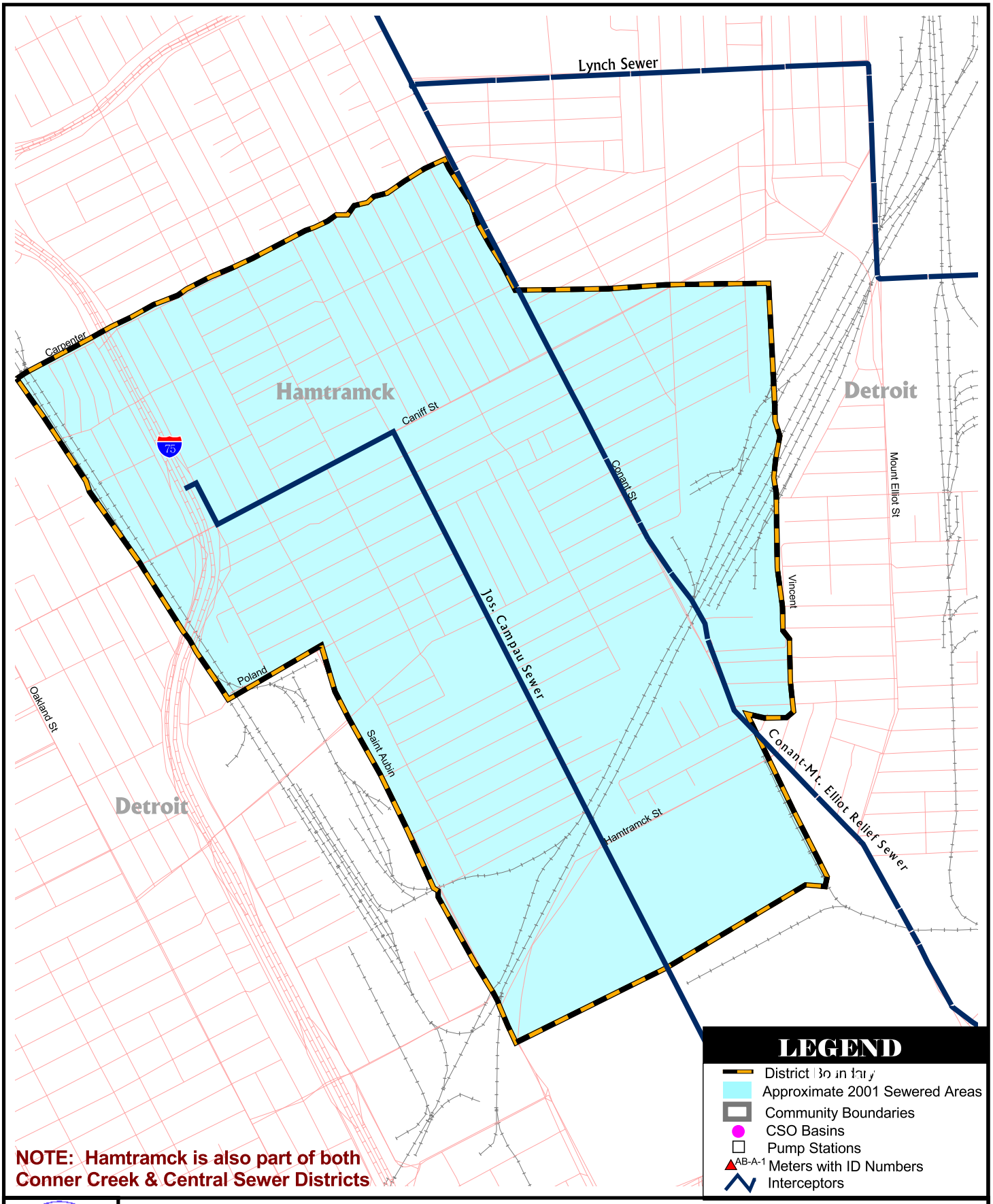
N

0 0.1 0.2 Miles

City of Highland Park Sewer District

DWSD-A-046c

FIGURE : 4.5



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

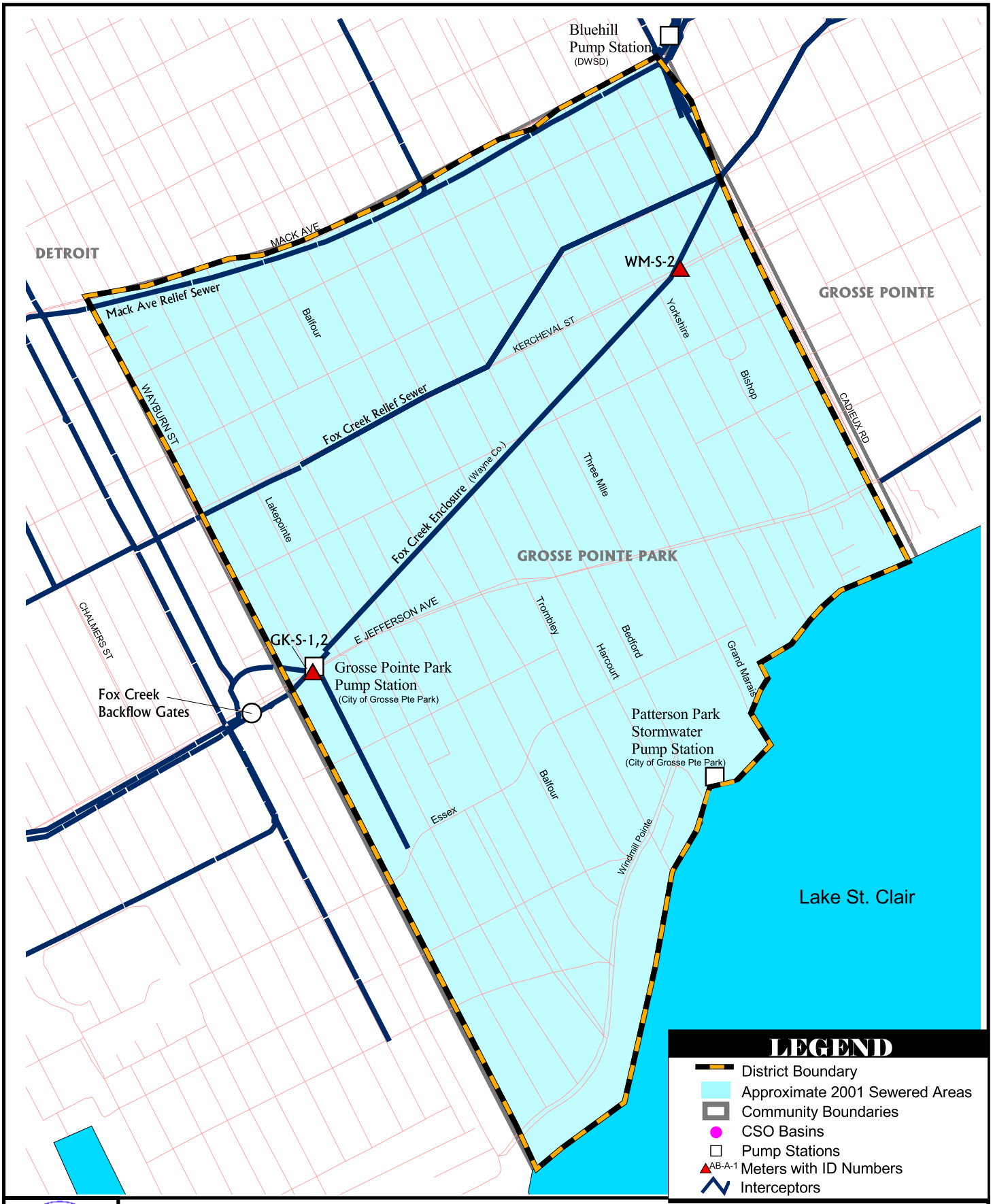
N

0 0.1 0.2 Miles

City of Hamtramck Sewer District

DWSD-A-044c

FIGURE : 4.6



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

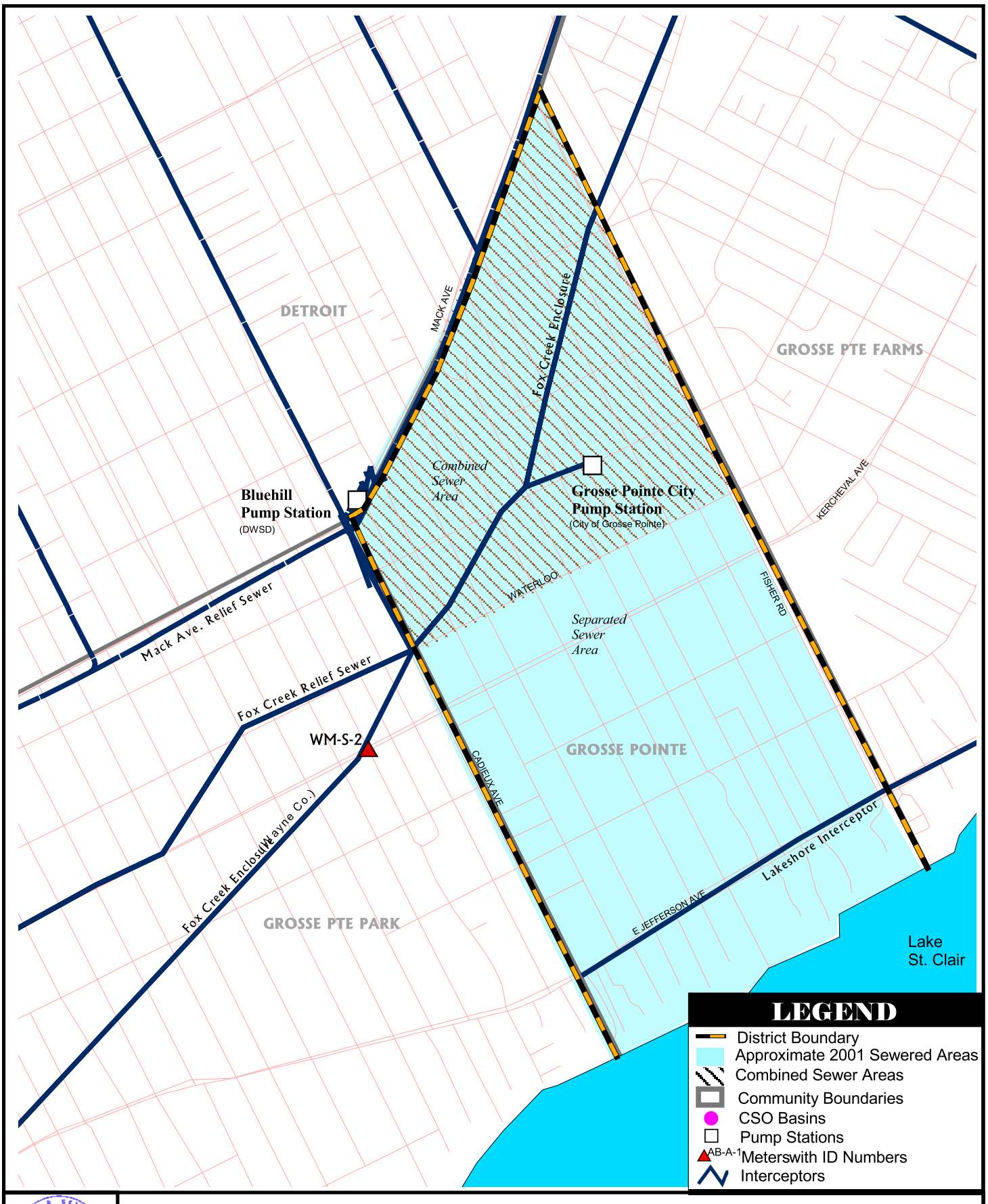
N

0 0.1 0.2 Miles

City of Grosse Pointe Park Sewer District

DWSD-A-043c

FIGURE : 4.7



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

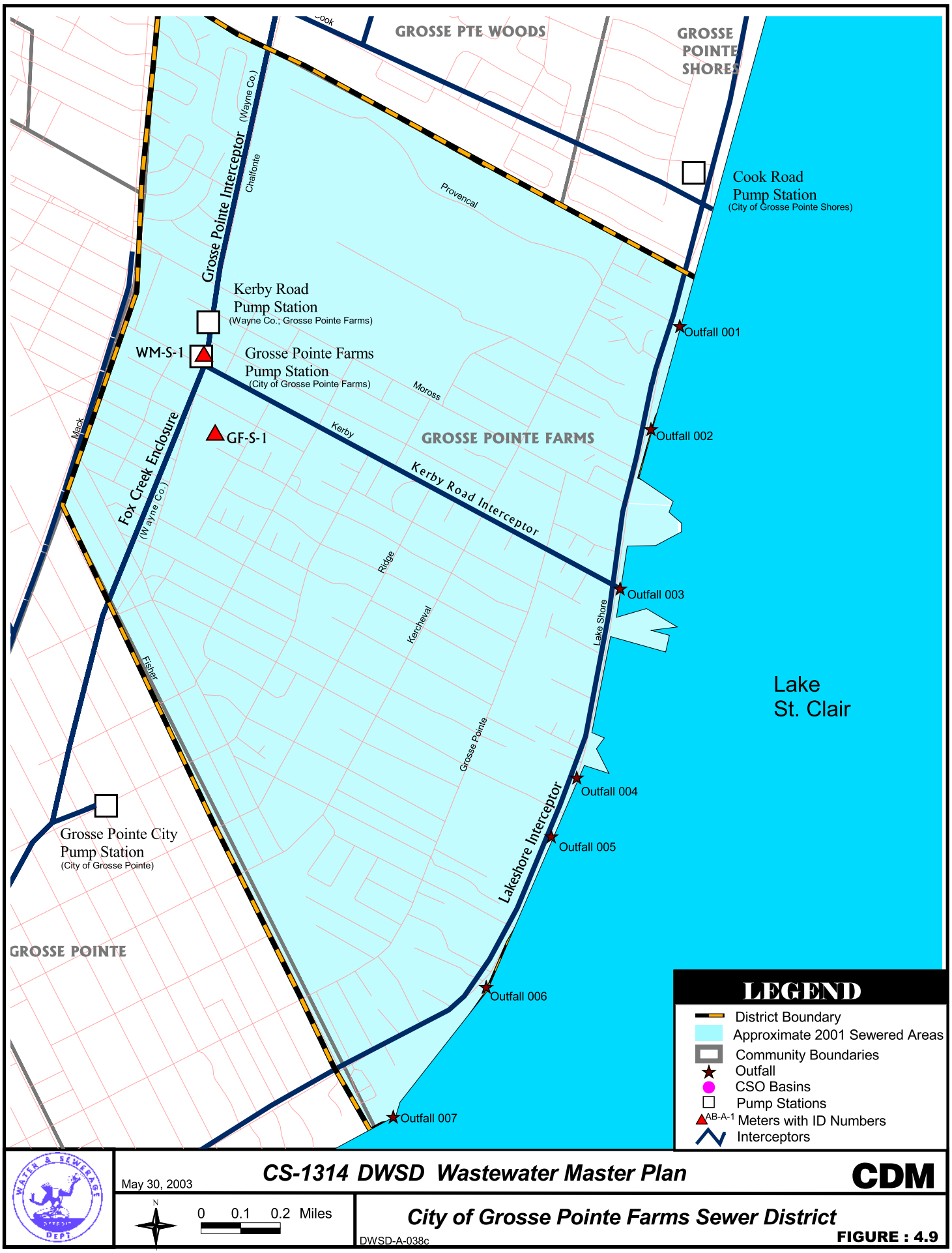
N

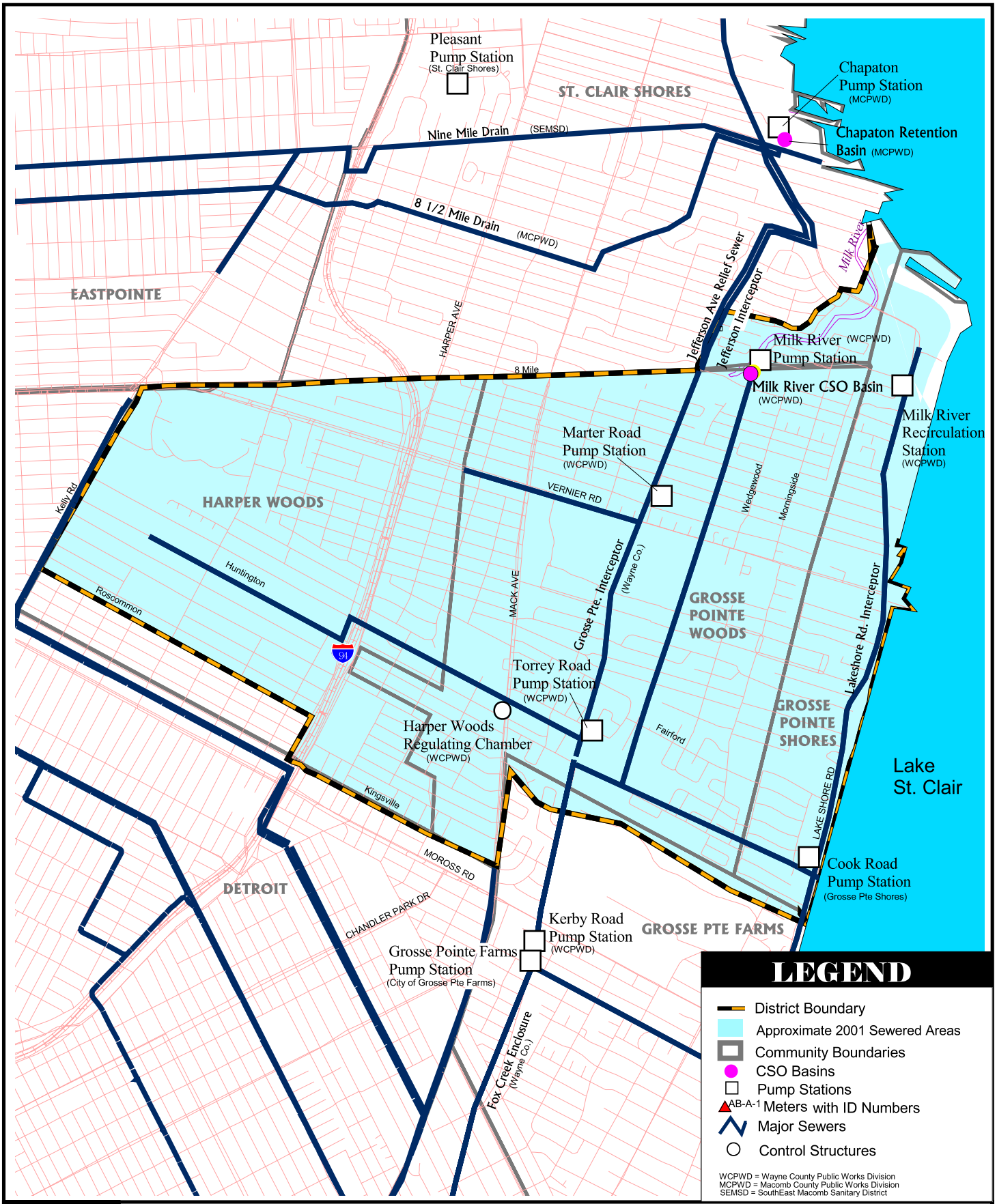
0 0.1 0.2 Miles

City of Grosse Pointe Sewer District

DWSD-A-065c

FIGURE : 4.8


GROSSE PTE WOODS
GROSSE POINTE SHORES
Cook
Grosse Pointe Interceptor
(Wayne Co.)
Chalfonte
Provencal
Cook Road
Pump Station
(City of Grosse Pointe Shores)
Kerby Road
Pump Station
(Wayne Co.; Grosse Pointe Farms)
WM-S-1
Grosse Pointe Farms
Pump Station
(City of Grosse Pointe Farms)
Moross
Outfall 001
Outfall 002
Mack
Fox Creek Enclosure
(Wayne Co.)
GF-S-1
Kerby
GROSSE POINTE FARMS
Kerby Road Interceptor
Ridge
Outfall 003
Kercheval
Lake Shore
Fisher
Lake
St. Clair
Grosse Pointe
Outfall 004
Outfall 005
Lakeshore Interceptor
Grosse Pointe City
Pump Station
(City of Grosse Pointe)
GROSSE POINTE
Outfall 006
Outfall 007
LEGEND
District Boundary
Approximate 2001 Sewered Areas
Community Boundaries
Outfall
CSO Basins
Pump Stations
AB-A-1 Meters with ID Numbers
Interceptors
May 30, 2003
CS-1314 DWSD Wastewater Master Plan
CDM
N
0 0.1 0.2 Miles
City of Grosse Pointe Farms Sewer District
DWSD-A-038c
FIGURE : 4.9



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

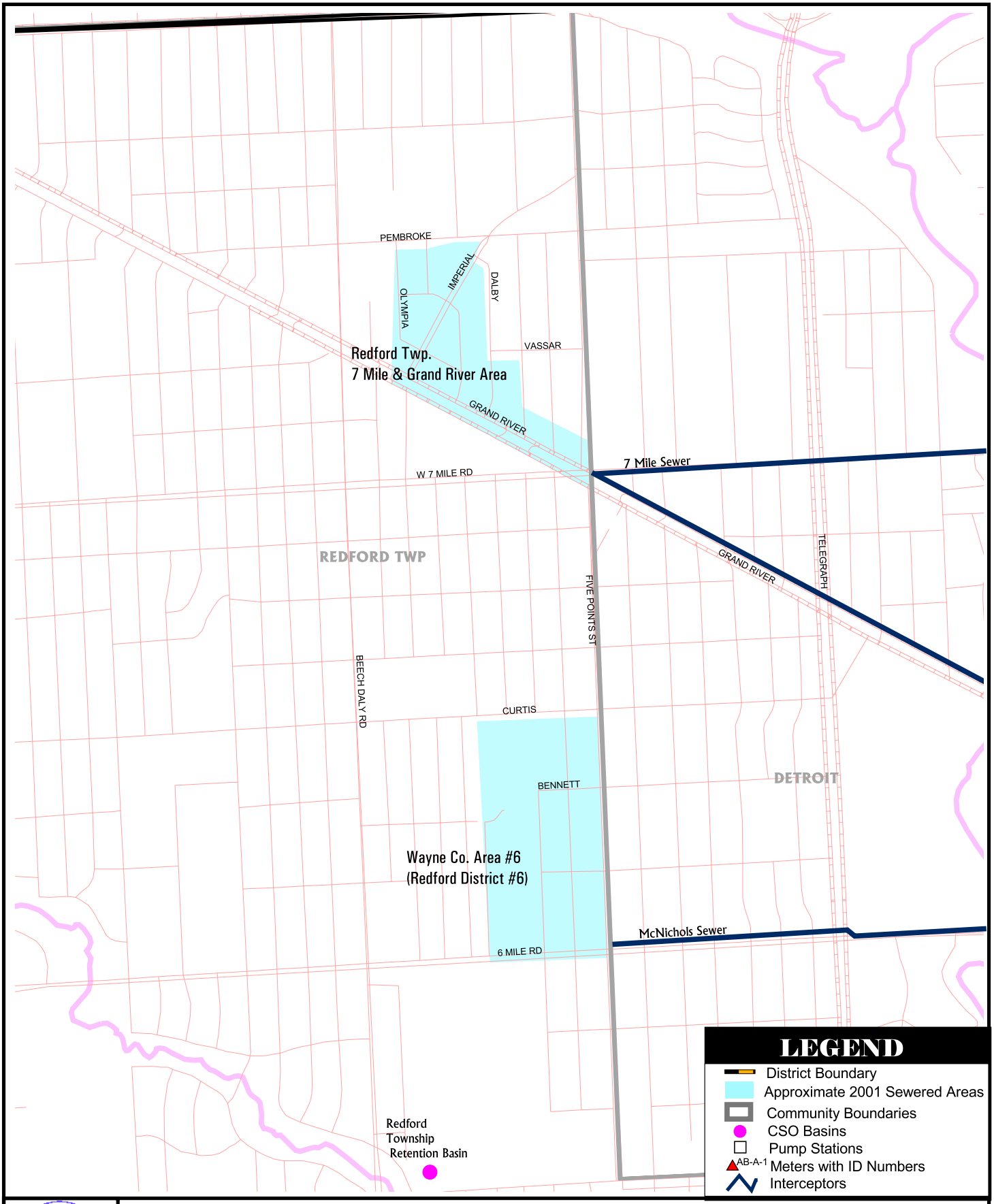
N

0 0.5 Miles

Northeast Wayne County Sewer District

DWSD-A-040c

FIGURE : 4.10



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

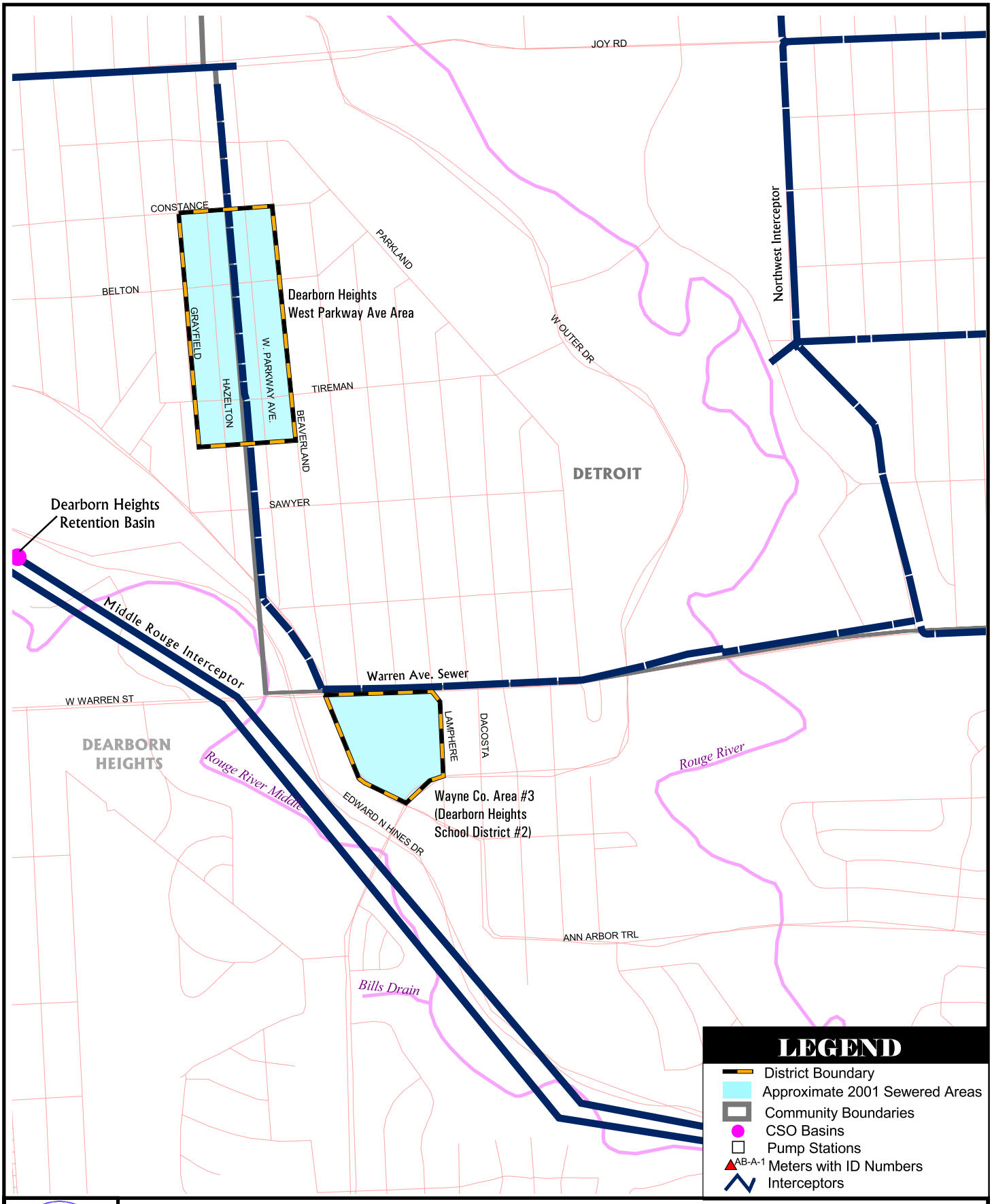
N

0 0.1 0.2 Miles

Redford Township - Small Sewer Service Contracts

DWSD-A-071c

FIGURE : 4.11A



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

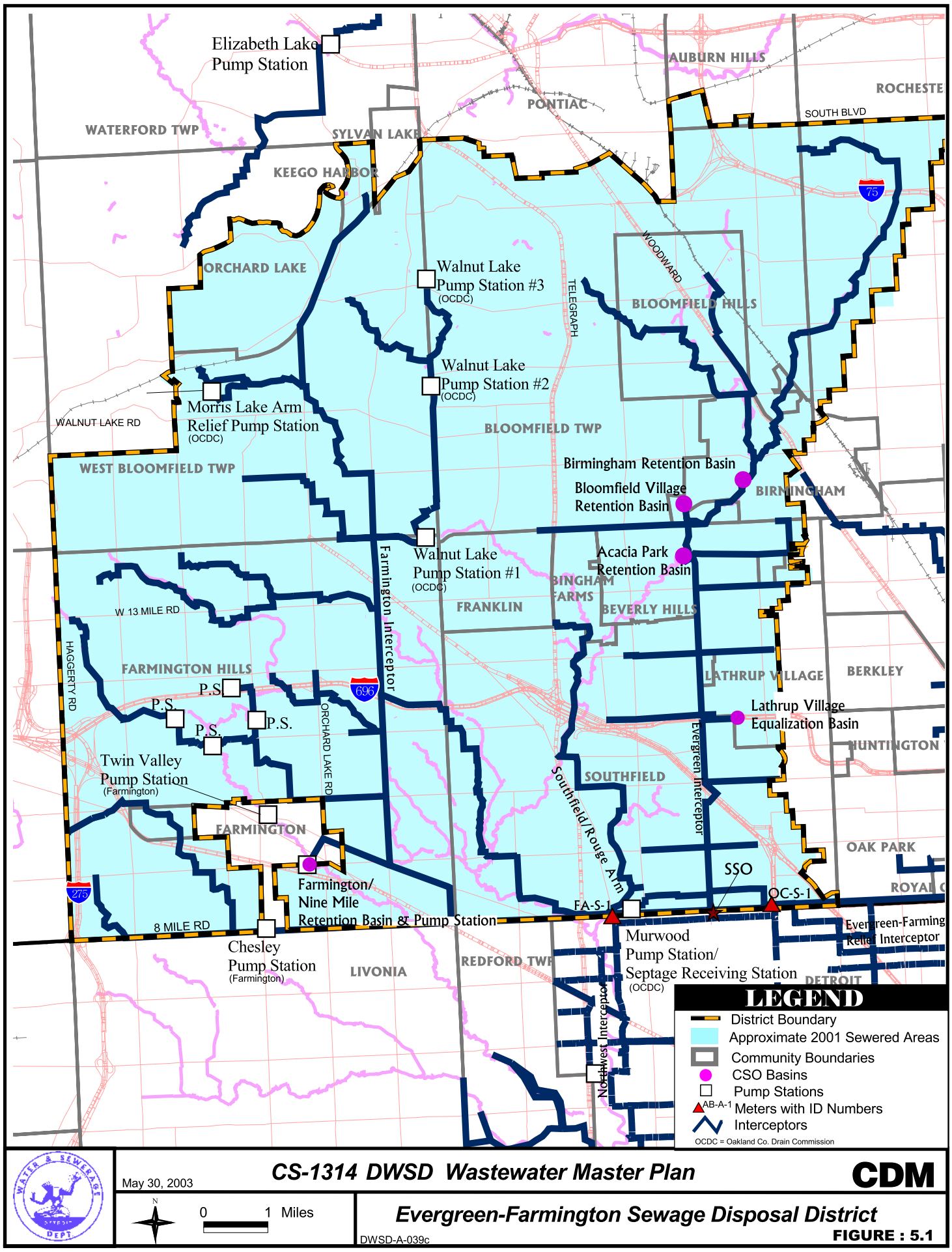
N

0 0.1 Miles

Dearborn Heights - Small Sewer Service Contracts

DWSD-A-060c

FIGURE : 4.11B



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

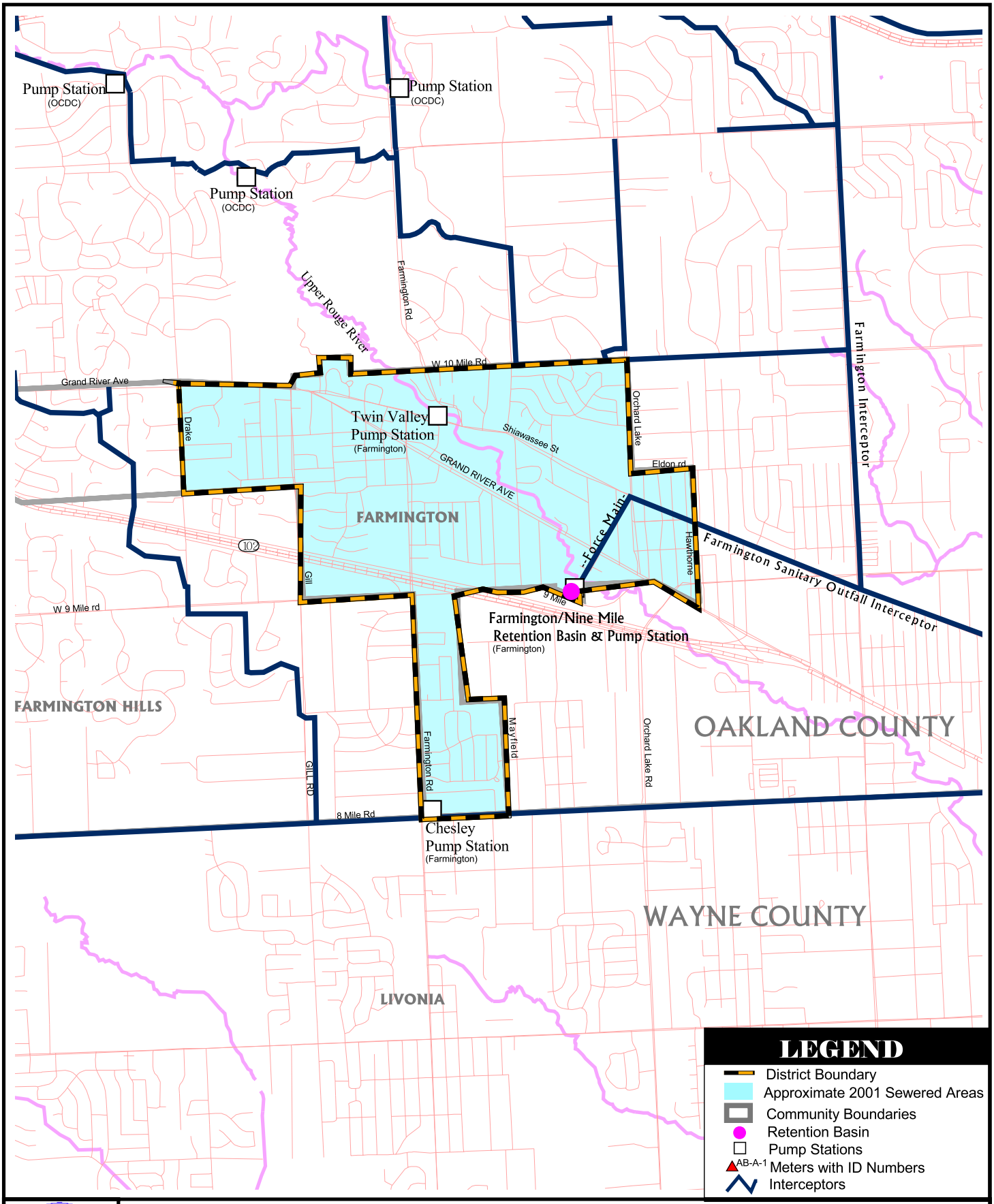
N

0 1 Miles

Evergreen-Farmington Sewage Disposal District

DWSD-A-039c

FIGURE : 5.1



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

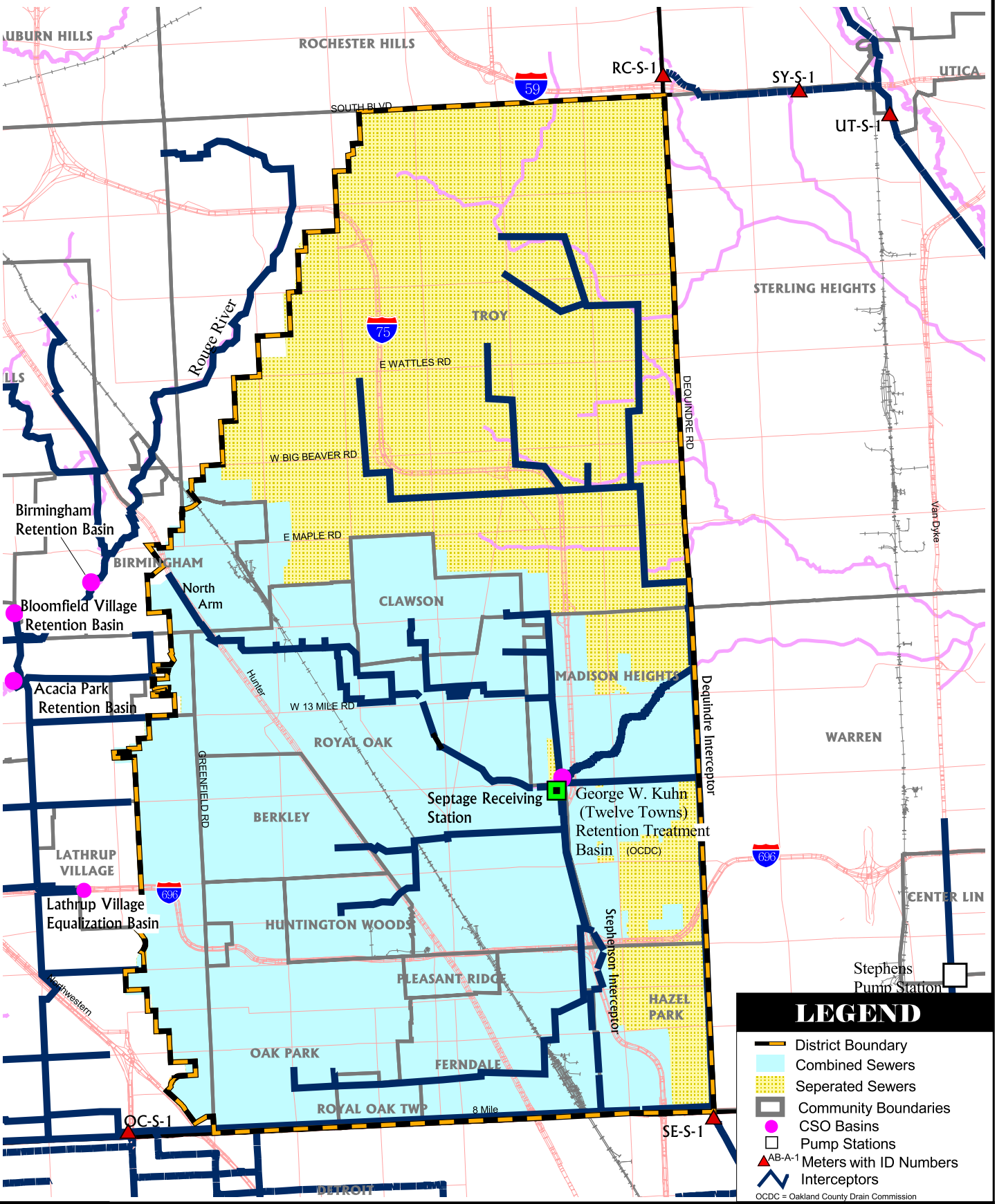
N

0 0.1 0.2 0.3 0.4 0.5 Miles

DWSD-A-068c

City of Farmington Sewer District

FIGURE : 5.2



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

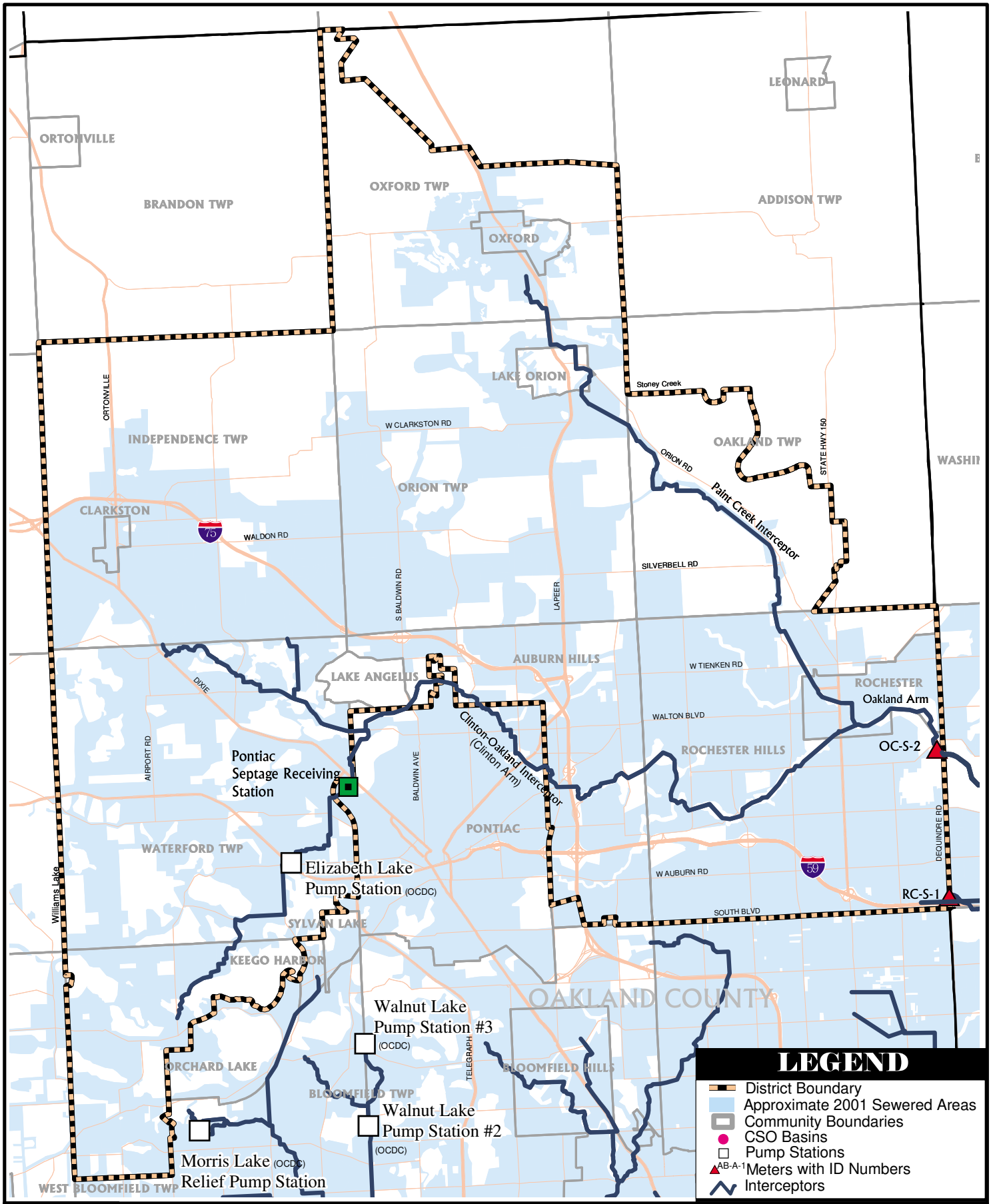
N

0.5 0 0.5 1 Miles

Southeast Oakland County Sewage Disposal District

DWSD-A-056c

FIGURE : 5.3



CS-1314 DWSD Wastewater Master Plan

CDM

May 30, 2003

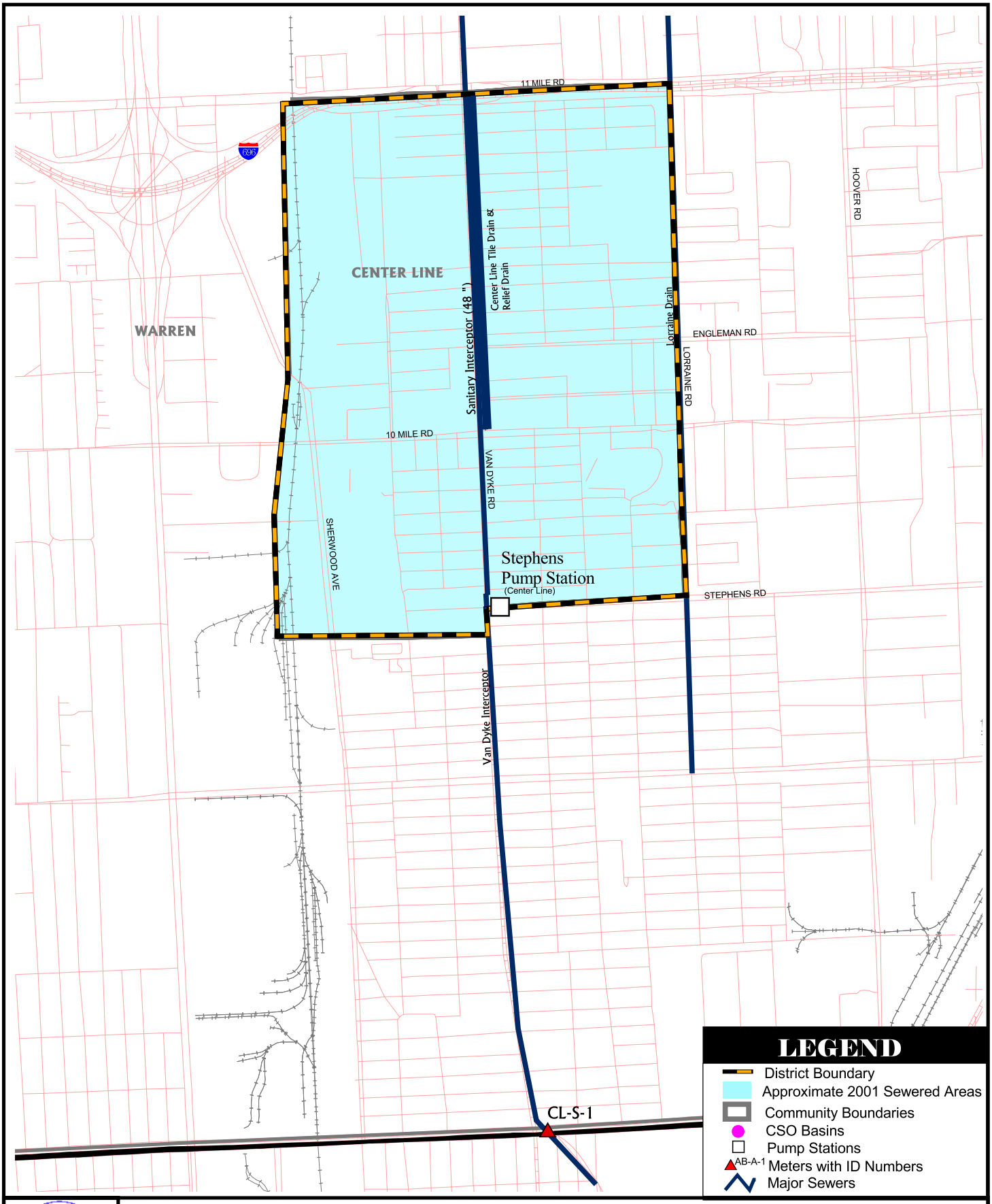
N

0 0.5 1 2 Miles

Clinton-Oakland Sewage Disposal District

DWSD-A-059c

FIGURE : 5.4



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

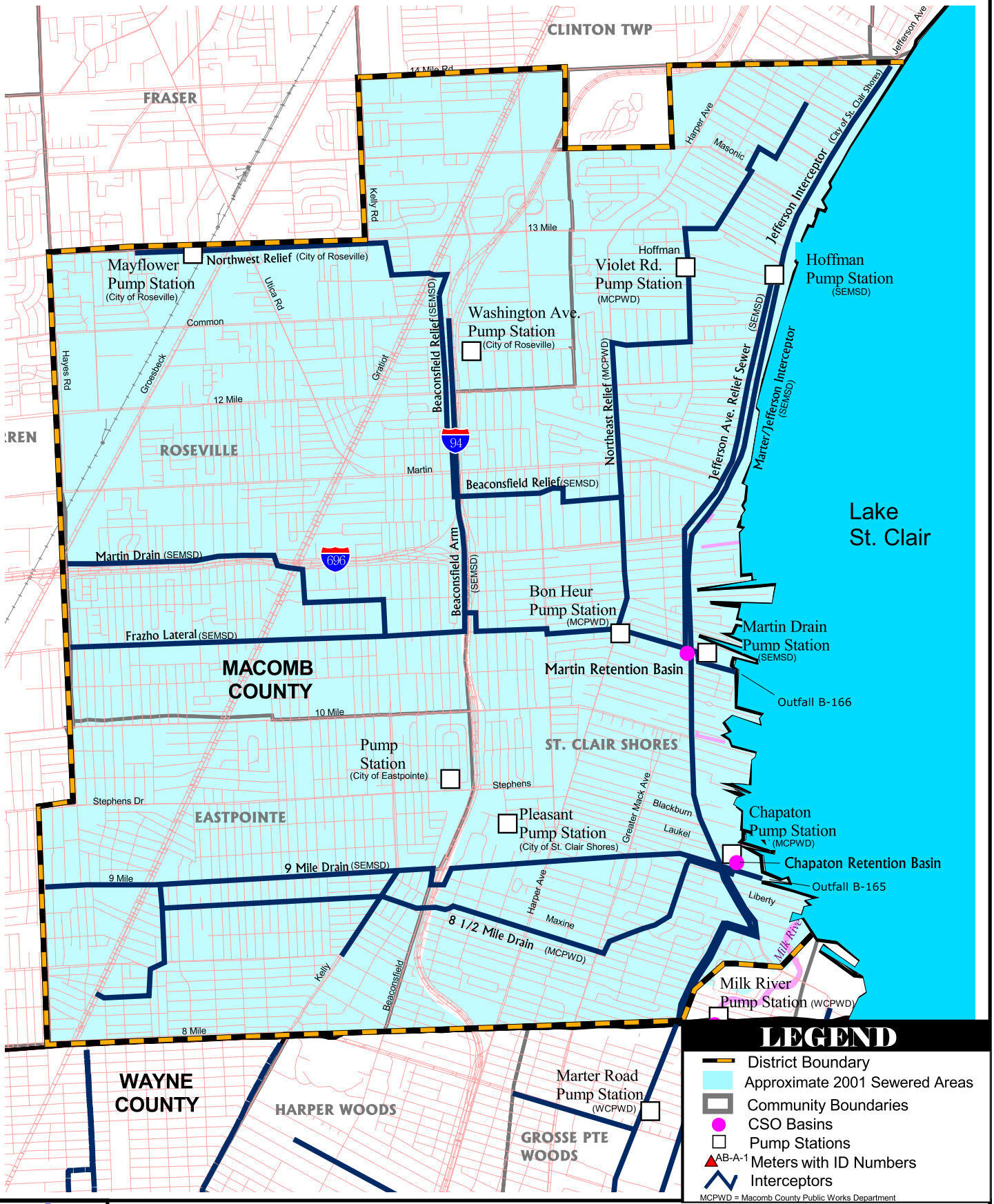
N

0.1 0 0.1 Miles

City of Center Line Sewer District

DWSD-A-049c

FIGURE : 6.1



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

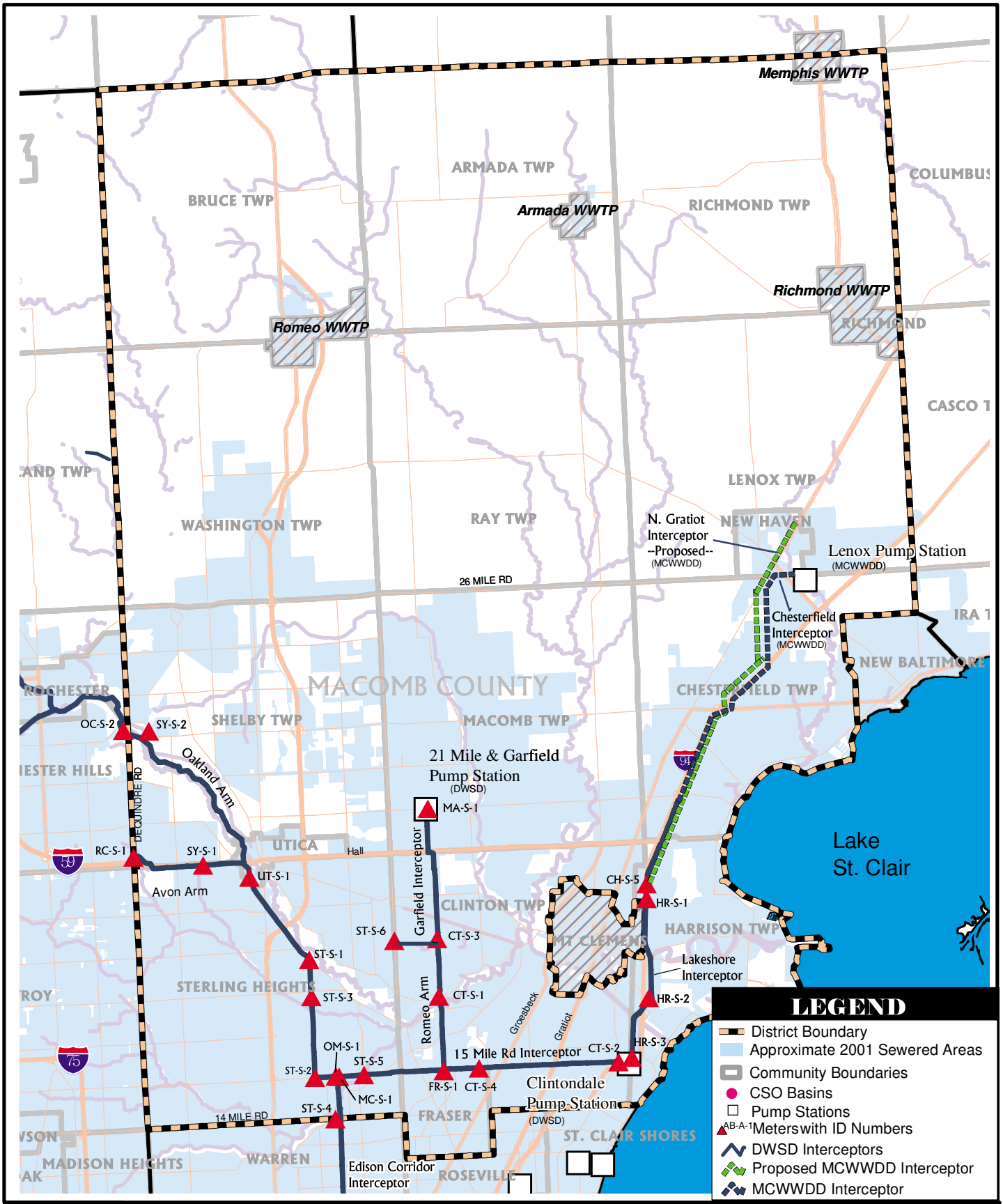
N

0 0.5 Miles

Southeast Macomb Sanitary District

DWSD-A-055c

FIGURE : 6.2



May 30, 2003

CS-1314 DWSD Wastewater Master Plan

CDM

N

1 0.5 0 1 Miles

Macomb County Wastewater Disposal District

DWSD-A-036d

FIGURE : 6.3