

**Michigan Department of Environmental Quality
Water Bureau
August 2007**

**Macroinvertebrate Total Maximum Daily Load for
Frank and Poet Drain
Wayne County**

INTRODUCTION

Section 303(d) of the federal Clean Water Act and the United States Environmental Protection Agency's (USEPA's) Water Quality Planning and Management Regulations (Title 40 of the Code of Federal Regulations, Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for water bodies that are not meeting water quality standards (WQS). The TMDL process establishes the allowable loadings of pollutants for a water body based on the relationship between pollution sources and in-stream water quality conditions. TMDLs provide states a basis for determining the pollutant reductions necessary from both point and nonpoint sources to restore and maintain the quality of their water resources.

The purpose of this TMDL is to identify the appropriate actions to achieve the biological (macroinvertebrate) community targets, specifically through reduction in sediment loadings from sources in the Frank and Poet Drain watershed, thereby addressing in-stream habitat loss and hydrologic changes that will result in WQS attainment.

PROBLEM STATEMENT

The TMDL reach for Frank and Poet Drain appears on the Section 303(d) list as:

Frank and Poet Drain	WBID#: 061301K
County: Wayne	Size: 10 M
Location: Detroit River confluence u/s, including all tribs. Vicinity of Gibraltar.	
NHD Reach Code: 04090004000720	
Problem Summary: Macroinvertebrate community rated poor	
TMDL YEAR(s): 2007	

The Frank and Poet Drain was placed on the Section 303(d) list due to poor macroinvertebrate communities throughout the watershed. Monitoring in 2006 found poor macroinvertebrate communities at three of the five stations that were monitored in the TMDL reach. Further information regarding the results of biological surveys conducted on the Frank and Poet Drain is presented in the Data Discussion section of this TMDL.

The Frank and Poet Drain watershed is comprised of the Frank and Poet Drain and its tributaries, including Sutliff Kenope Drain and No. 1 Drain (Figure 1). The Frank and Poet Drain watershed is one of three subwatersheds that make up the Combined Downriver watershed, located within Wayne County in southeast Michigan (Figure 2). The three subwatersheds that comprise the Combined Downriver watershed are the Frank and Poet Drain, Blakely Drain, and Detroit River South. The watershed drains an area of approximately 85.9 square miles in a relatively urbanized region, including a portion of the Detroit Metropolitan Airport in the headwater region of the Frank and Poet Drain. The Combined Downriver watershed borders the Ecorse Creek watershed to the north, the Lower Huron watershed to the south and west, and the Detroit River to the east (CDWIC, 2004).

The Frank and Poet Drain watershed drains approximately 27 square miles (CDWIC, 2004) and flows through both the Southern Michigan - Northern Indiana Till Plain, and Huron - Erie Lake

Plain ecoregions in southeast Michigan (Omernik and Gallant, 1988). Soils in the watershed are generally poorly drained and are moderately fine to fine textured with the headwaters being moderately fine to coarse in texture. Clay and silt dominated soils such as those found in the watershed exhibit low permeability and percolation rates, further exacerbating the effects of urbanization on flow regimes (CDWIC, 2004).

NUMERIC TARGET

The impaired designated use addressed by this TMDL for the Frank and Poet Drain is related to the poor macroinvertebrate communities found in the watershed. The designated use rule (R 323.1100 of the Part 4 rules, WQS, promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, [NREPA]) requires the protection of, among other uses and specific to this TMDL, indigenous aquatic life (R 323.1100[1][d] and [e]).

The primary numeric target is based on the Procedure 51 biological community assessment protocol (MDEQ, 1990). This TMDL target is the reestablishment of macroinvertebrate communities that, when monitored using Procedure 51, result in a consistent acceptable or excellent rating. Macroinvertebrate communities will be evaluated based on a minimum of two Procedure 51 biological assessments conducted in successive years, following the implementation of efforts like best management practices (BMPs) to stabilize runoff discharges and extremes in stream flow conditions, and minimize sediment loadings to the watershed.

A secondary numeric target based on Total Suspended Solids (TSS) concentration will be used to assess improvements in the Frank and Poet Drain watershed. This secondary target is a mean annual in-stream TSS concentration of 80 milligrams per liter (mg/L) for wet weather events. Achievement of the biological target will override this secondary target; however, if the TSS target is met, but the biological target not achieved, then the TSS target may be reevaluated.

The secondary numeric target is intended to help guide proper control over excessive suspended solids loads from runoff, as well as excessive runoff discharge rates and volumes that cause increased stream flow instability, stream bank erosion, and increased suspended solids concentrations. The secondary numeric target is intended to link a measurable in-stream parameter to the hydrologic changes in the watershed and the resultant habitat changes that are heavily impacting the biological communities in this system.

The mean annual target concentration of 80 mg/L TSS is based on a review of existing conditions and published literature on the effects of TSS to aquatic life. Vohs indicated that a chemically inert suspended solids concentration of 100 mg/L appears to separate those streams with a fish population from those without (Vohs et al., 1993). Gammon (1970) demonstrated decreases in the standing crop of both fishes and macroinvertebrates in river reaches continuously receiving suspended solids loadings of less than 40 mg/L. The European Inland Fisheries Advisory Commission stated that, in the absence of other pollution, a fishery would not be harmed at suspended solids concentrations less than 25 mg/L (EIFAC, 1980).

Alabaster and Lloyd (1982) provided the following water quality goals for suspended solids for the protection of fish communities:

Optimum	=	≤ 25 mg/L
Good to Moderate	=	> 25 to 80 mg/L
Less than Moderate	=	> 80 to 400 mg/L
Poor	=	> 400 mg/L

Because the purpose of this TMDL is to identify possible steps to restore the biological community to an acceptable condition, thereby working toward attaining WQS, a value of 80 mg/L as a mean annual target for wet weather events was chosen for the Frank and Poet Drain watershed as a secondary target.

DATA DISCUSSION

Biological surveys conducted in the Frank and Poet Drain watershed indicate that the macroinvertebrate communities are not meeting biological integrity requirements of the Michigan WQS (Goodwin, 2007 [*in draft*]; Goodwin, 2002; MDNR, 1992; Evans, 1991; and Jones, 1991).

Biological surveys conducted in 2006 in the Frank and Poet Drain watershed indicated that the macroinvertebrate communities at three of the five stations rated poor (Goodwin, 2007 [*in draft*]). The macroinvertebrate communities at Grange, Van Horn, and Vreeland Roads rated poor, while the communities at King and Inkster Roads rated acceptable. Habitat conditions at the three stations rated marginal. Habitat metrics at all five stations indicated a flashy hydrologic regime. In addition, the three stations in which the macroinvertebrate community received poor scores either lacked substrate/habitat suitable for fish and macroinvertebrate colonization and/or had heavy deposits of sediment.

Biological surveys conducted in 2001 in the Frank and Poet Drain watershed indicated that the macroinvertebrate communities at all four stations rated poor (Inkster, Telegraph (M-24), Pennsylvania, and West Roads) (Goodwin, 2002). Habitat conditions for the four stations rated fair. Habitat conditions indicated a lack of hard, heterogeneous substrate and habitat suitable for fish and macroinvertebrate colonization, while the existing stable habitat was heavily silted. In addition, flow stability scores in the surveyed reaches indicated a relatively flashy hydrologic regime, likely due to heavy suburban development and storm water runoff.

A biological survey conducted in 1991 in the Frank and Poet Drain watershed indicated that the macroinvertebrate community at one of the four stations surveyed rated poor (MDNR, 1992). The macroinvertebrate community at M-24 rated poor, while communities at Gibraltar, West, and Pennsylvania Roads rated fair. Habitat conditions at all four stations rated poor. The aquatic habitat was limited by unstable flow regimes, erosion, and sedimentation.

A biological survey conducted at Inkster Road in 1990 in the Frank and Poet Drain watershed indicated that the macroinvertebrate community rated poor (Jones, 1991). Habitat at this station also rated poor.

A biological survey conducted in 1988 in the Frank and Poet Drain watershed indicated that the macroinvertebrate communities at three of four stations rated poor. The macroinvertebrate communities at Jefferson Avenue, Vreeland Road, and Van Horn Road rated poor, while the community at West Road rated fair. The degraded biological communities were attributed to highly unstable flows and urban runoff (Evans, 1991).

Since 1988, biological surveys have been conducted at ten stations in the Frank and Poet Drain. The Procedure 51 macroinvertebrate metric was modified in 1997; therefore, macroinvertebrate scores from surveys conducted through 1997 can not be directly compared with results obtained after 1997. Only one station, Inkster Road, was assessed in both 2001 and 2006. The macroinvertebrate community at Inkster Road rated poor in 2001 and acceptable in 2006.

According to Procedure 51, macroinvertebrate communities are rated as poor, acceptable, or excellent based on the sum of nine individual metrics. Individual metrics are scored -1, 0, or +1 based on comparison to ecoregional excellent sites. The total score ranges from -9 to +9. Scores of +5 or higher are classified as excellent, and scores of -5 or lower are classified as

poor. Acceptable sites are scored between excellent and poor, in the range of +4 to -4 (Creal et al., 1996). Sites with a macroinvertebrate community score of poor are generally considered not attaining WQS, while sites with scores of acceptable or excellent are considered attaining WQS (LeSage, 2007 [*in draft*]).

Dry and wet weather TSS and stream flow monitoring were conducted at two stations in the Frank and Poet Drain watershed in 2005. The USEPA Method 106.2 was used to measure the TSS values gravimetrically as described in the Quality Assurance Project Plan for TSS and Flow Monitoring in Five Tributaries in the Rouge and Detroit River dated May 5, 2005. One laboratory blank and one duplicate were analyzed for every 20 grab samples (RTI International and Environmental Consulting & Technology, Inc., 2006). Dry weather TSS monitoring was conducted on three dates (June 21, July 12, and August 23, 2005) to determine base flow conditions and TSS concentrations during stable flow conditions (Table 1). Wet weather precipitation runoff events of 0.46 (July 23, 2005), 0.63 (September 16, 2005), 0.63 (September 25, 2005), 0.34 (September 28, 2005), and 1.89 inches (November 15, 2005) were conducted to characterize stream flow and the associated TSS response (Table 2). These data indicate that precipitation events in the watershed increase the amount of TSS in transport in the Frank and Poet Drain watershed. Substantial flow responses are also indicated from precipitation events. A more thorough discussion of sampling procedures, analytical methods, and results can be found in RTI International & Environmental Consulting and Technology, Inc. (2006).

SOURCE ASSESSMENT

The 2006 Section 303(d) listed reaches for the Frank and Poet Drain total approximately ten miles, and include all tributaries to the Frank and Poet Drain in Wayne County in southeastern Michigan. Table 3 shows the land use distribution for the Frank and Poet Drain watershed.

From 2000 to 2006, the population in the southeast Michigan seven county region increased by 1.4 percent; however, the population in Wayne County decreased by 3.6 percent (SEMCOG, 2006a). From 2005 to 2016, the population in southeast Michigan is expected to decrease 67,500 below 2005 levels. From 2016 to 2035, the population is expected to increase 3.4 percent above 2005 levels (SEMCOG, 2007). The Southeast Michigan Council of Governments (SEMCOG) predicts that the population within the Ecorse Creek watershed (Frank and Poet Drain is considered a sub watershed) is expected to decrease by 8.5 percent from 2000 to 2030 (SEMCOG, 2002).

The types of urban and suburban development found in the Frank and Poet Drain watershed have dramatic effects on surface waters in terms of altered runoff patterns, increased flashiness/changed hydrologic response curve, increased suspended solid loading, and shifts in temperature characteristics among other effects. The loss of adequately vegetated riparian zone throughout the watershed combined with substantial land coverage by surfaces impervious to precipitation (roads, parking lots, roof tops) and a curb, gutter, and storm drain system combine to produce rapid runoff rates. This efficient movement of water directly to the stream channel results in unstable and flashy flow conditions, stream bank erosion, and sedimentation of instream habitats by new TSS loadings and resuspension of sediments previously deposited in the system. The sediment and water volume additions to the Frank and Poet Drain watershed result from residential, industrial, and agricultural lands.

This TMDL reach is in Wayne County, which is largely urbanized. Possible sources of TSS include storm water runoff, natural background conditions (this is primarily a lake plain system flowing through sedimentary, fine particle soils), and in-stream sources (erosion) exacerbated by significant flashiness.

The Michigan Department of Environmental Quality (MDEQ), Water Bureau's National Pollutant Discharge Elimination System (NPDES) permit management system found the following

permitted discharges in the Frank and Poet Drain watershed (Appendix A): five individual permits, eight municipal separate storm sewer system Phase II (MS4) certificates of coverage (COCs) under the MS4 general watershed permit (covered under MIG619000 and MIS040000), one industrial storm water COC under general permit MIS210000, 21 industrial storm water COCs under general permit MIS319000, and 46 construction sites with notices of coverage (NOCs) authorizing discharge of storm water under Permits by Rule (NMS, 2007). There are currently no Concentrated Animal Feeding Operation permitted discharges within the Frank and Poet Drain watershed.

EPA's Simple Method model was used to estimate the annual TSS loads in the Frank and Poet Drain watershed (USEPA, 2001). Simple Method is an empirical approach for estimating pollutant loadings, using the following equation:

$$L_P = \sum_u (P * P_J * R_{VU} * C_U * A_U * 2.7 / 12)$$

Where:

L_P = Pollutant load, lbs.

u = Land use type

P = Precipitation, inches/year

P_J = Ratio of storms producing runoff (default = 0.9)

R_{VU} = Runoff Coefficient for land use type u , inches_{run}/inches_{rain}, = 0.05 + (0.9 * I_U)

I_U = Percent Imperviousness

C_U = Event Mean Concentration for land use type u , mg/L

A_U = Area of land use type u , acres

A mean annual rainfall estimate of 33 inches was obtained from the Detroit Metro Wayne County Airport 1962-1991 as reported in the Watershed Management Model Manual (p. 11) on the Rouge River National Wet Weather Demonstration Project (RRNWWDP) Web site (RRNWWDP, 2006). TSS event mean concentrations for each land use category were developed for the Rouge River watershed (Cave et al., 1994). The soil types and climate in the Frank and Poet Drain watershed are similar to the Rouge River watershed; therefore, the TSS event mean concentrations developed for the Rouge River watershed were used for the Frank and Poet Drain watershed. The estimated area (acres) for each land use category was based on year 2000 land use imagery (SEMCOG, 2006b). The pollutant load for each land use type was divided by 365 days to obtain a pollutant load per day.

Figure 1 indicates the locations of four of the five individually permitted facilities. The Michigan Department of Transportation (MDOT) permit applies statewide to all drainage systems operated by the MDOT on state roadways and the discharge locations are not identified. Two of the four facilities have limits and monitoring requirements for TSS in the effluent discharged to the TMDL reach (DSC Ltd-Gibraltar and Detroit Cold Rolling Co). Refer to Table 4 for the TSS NPDES permit limits for these facilities. DSC Ltd-Gibraltar (MI0004227) is authorized to discharge a maximum of 0.75 million gallons per day (mgd) of treated landfill leachate and storm water to the Frank and Poet Drain. Detroit Cold Rolling Co (MI0056243) is authorized to discharge a maximum of 10.21 mgd of noncontact cooling water, cooling tower blowdown, filter backwash, sump water, hydrant flushing water, excavation groundwater, fugitive road dust spray water, equipment wash down, cleanup wastewater, and storm water to the Frank and Poet Drain. Countywide LF-Gibraltar (MI0056383) is authorized to discharge a maximum of 1.44 mgd of treated storm water to the Frank and Poet Drain. Detroit Metro Wayne Co. Airport (MI0036846) is authorized to discharge an unspecified amount of treated deicing operations runoff and treated storm water runoff from outfalls 004 and 006 to the Frank and Poet Drain.

The estimated total current TSS load from both point and nonpoint sources in the Frank and Poet Drain watershed is 24,778 pounds per day (lbs/day) (Table 3). Development of this load is described further in the Loading Capacity (LC) Development section of this TMDL.

LINKAGE ANALYSIS

Excessive sedimentation has repeatedly been identified as the leading cause of impairment of the Nation's waters, which include rivers, streams, lakes, reservoirs, ponds, and estuaries. In 1998, approximately 40 percent of assessed river miles in the United States were impaired or threatened from an imbalanced sediment supply (USEPA, 2000). In appropriate amounts, sediments (both suspended and bedded) are essential to aquatic ecosystems. Natural levels transport nutrients, detritus, and other essential organic matter throughout aquatic environments and replenish intermittently mobile bottom sediments and create valuable micro-habitats, such as pools and sand bars (USEPA, 2006). The effects of excessive sediments on aquatic biota can range in severity from no effects to behavioral effects (e.g., invertebrate drift, fish relocation, and impaired ingestion rates in mussels) to lethal effects (USEPA, 2006). Further, sedimentation of benthic substrates has been shown to decrease substrate heterogeneity, increase embeddedness, and alter benthic community structure and species diversity (Waters, 1995). Sediments may also have associated stressors such as nutrients, pesticides, and other bound toxins that further stress aquatic organisms.

Human activities that increase soil erosion or alter rates of sediment transport in waterways (e.g., forestry, mining, urban development, industrial activities, agriculture, dredging, channel alteration, and dam construction) are among the most pervasive causes of sediment imbalance in aquatic systems (Waters, 1995; Nietch et al., 2005; and USEPA, 2006). Altered hydrology, or more specifically increased flashiness due to increased runoff rates and volume, in the Frank and Poet Drain watershed has been identified as the cause for the lack of stable in-stream habitat, increased instream erosion, channel aggradation, and heavy siltation of stable in-stream habitats (Goodwin, 2007 [*in draft*]; Edly and Wuycheck, 2006; and Goodwin, 2002).

Therefore, reducing TSS loads in the Frank and Poet Drain watershed, along with the commensurate decrease in flow volume and rate, should increase macroinvertebrate community diversity and abundance, thus providing a tangible target towards meeting WQS.

LOADING CAPACITY (LC) DEVELOPMENT

Concurrent with the selection of numeric targets, development of the LC requires identification of the critical conditions. The "critical condition" is the set of environmental conditions (e.g., flow) used in developing the TMDL that result in attaining WQS and with an acceptably low frequency of occurrence that, if protected for, should also be protective of other more frequent occurrences. The critical conditions for the applicability of WQS in Michigan are given in Rule 90 (R 323.1090), Applicability of WQS. R 323.1090 requires that the WQS apply at all flows equal to or exceeding the water body design flow, generally the lowest of the 12 monthly 95 percent exceedance flows (the stream flow equal to or exceeded 95 percent of the time). However, the habitat degradation and poor biological communities in the Frank and Poet Drain watershed are linked to the excessive flows attributable to wet weather driven discharges. Because the numeric target of 80 mg/L TSS is aimed at wet weather discharge conditions, and because elevated TSS concentrations are most typically associated with wet weather flows in the Frank and Poet Drain watershed, it is expected that this target concentration will be met under lower flow conditions as well.

LC

The LC is the sum of individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the LC must

include a margin of safety (MOS), either implicitly within the WLA or LA, or explicitly, that accounts for uncertainty in the relation between pollutant loads and the quality of the receiving water body. Conceptually, this definition is denoted by the equation:

$$LC = \sum WLA_s + \sum LA_s + MOS$$

The LC represents the maximum loading that can be assimilated by the receiving water while still achieving WQS. The overall LC is subsequently allocated into WLAs for point sources, LAs for nonpoint sources, and the MOS.

WLAs

The TSS load for the individual NPDES permitted facilities discharging to the Frank and Poet Drain watershed included in the WLA is 12,553 lbs/day (Tables 3 and 5). Two of the five facilities have limits or monitoring requirements for TSS in their permits (Detroit Cold Rolling Co. and DSC Ltd-Gibraltar) (Table 4). Detroit Cold Rolling Co. was recently purchased by Steel Rolling Holdings. Detroit Cold Rolling Co. has a monthly maximum loading limit of 1,700 lbs/day, which was used as the waste load allocation for this facility. DSC Ltd-Gibraltar has seasonal limits for TSS; therefore, the TSS load was calculated by determining the TSS load per season (from the limit and number of days pertaining to the limit), summing the loads, and dividing by 365 days. Countywide LF-Gibraltar and Detroit Metro Wayne Co. Airport do not have limits or monitoring requirements for TSS in their permits. Therefore, a concentration of 30 mg/L was assumed to be worst-case-scenario based on the limits imposed on other facilities in the watershed. Countywide LF-Gibraltar discharges seasonally; therefore, a TSS load was estimated from the facility's design flow and the assumed 30 mg/L TSS concentration, multiplying the number of days the facility discharges, and then dividing by 365 days. A TSS load for Detroit Metro Wayne Co. Airport was estimated from the average flow of the facility (obtained from discharge monitoring reports) and the assumed discharge concentration of 30 mg/L TSS. Note that the facilities may, in fact, be discharging significantly lower TSS loads than they are permitted or assumed to discharge.

All commercial, industrial, residential, and urban open land use categories are covered under NPDES general, industrial, and municipal storm water permits or Permits by Rule. Therefore, based on the acres of land use categories and TSS loading factors derived from the RRNWWDP (Cave et al., 1994), a current total load estimate of approximately 11,878 lbs/day is attributable to these sources.

No reductions are specified for the commercial, medium density residential, and urban open land uses because the modeled runoff concentrations of TSS are typically less than the 80 mg/L numeric target (Cave et al., 1994). The targeted source load reductions are from the industrial and high density residential land uses and the Michigan Department of Transportation (MDOT) individual permit (Table 3), which have estimated average runoff TSS concentrations of 149, 97, and 141 mg/L, respectively (Cave et al., 1994). To achieve the goal of 80 mg/L as an annual average during wet weather runoff events from all point sources, a reduction of 46 percent (from 7,892 to 4,237 lbs/day) from industry, 18 percent (from 395 to 325 lbs/day) from high density residential, and 43 percent (539 to 306 lbs/day) from MDOT will result in a projected WLA target load of 20,473 lbs/day of TSS, an overall 16 percent reduction in loads from regulated point sources (Table 3).

LAs

The LA component of the TMDL defines the fraction of the LC for TSS from nonpoint sources including the following land use categories: agricultural, forest/rural open, and water/wetland (Table 3). An estimated annual TSS load of 347 lbs/day is attributed to these categories in the Frank and Poet Drain watershed. No reductions are specified for the forest/rural open and

water/wetland land uses because the modeled runoff concentrations of TSS are typically less than the 80 mg/L numeric target (Cave et al., 1994). The only targeted source load reduction is from the agricultural land use, which has an estimated average runoff TSS concentration of 145 mg/L (Cave et al., 1994). A 45 percent reduction (from 75 to 41 lbs/day) from agricultural areas in the watershed is recommended resulting in a LA TSS target of 313 lbs/day, based on achieving a mean annual runoff concentration of 80 mg/L TSS during wet weather events.

MOS

The MOS in a TMDL is used, in part, to account for variability in source inputs to the system and is either implicit or explicit. A MOS is implicit in this TMDL because the quality of the biological community, its integrity, and overall composition represent an integration of the effects of spatial and temporal variability in sediment loads to the aquatic environment. Ultimately it is the reflection by the biological community, signified by an acceptable or higher rating using Procedure 51, which is the goal of this TMDL, thereby providing an MOS for the numeric TSS goal. Follow-up biological and habitat quality assessments will be conducted to determine the progress in attaining the TMDL goals and will reflect this integration. Additionally, the goal of 80 mg/L TSS for a mean annual runoff concentration integrates a MOS because it is based on literature values from longer-term exposure concentrations versus the wet weather event-driven target used herein.

Summary

In summary, the proposed target TSS load estimate in the Frank and Poet Drain watershed (WLA + LA) is 20,786 lbs/day, an overall 16 percent reduction from existing estimated loads. The TSS load to the Frank and Poet Drain watershed is allocated to individually permitted NPDES facilities (59 percent or 12,320 lbs/day), NPDES general, industrial, and municipal storm water permits or Permit by Rule (39 percent or 8,153 lbs/day), and nonpoint sources (2 percent or 313 lbs/day).

To achieve the secondary numeric TMDL target of 80 mg/L mean annual TSS concentration during wet weather events, and thereby address the primary target of biological communities increasing in quality, a reduction in the wet weather runoff of TSS is necessary. It is likely that steps will need to be taken to control runoff rates and volumes during precipitation events. It may be necessary to employ BMPs to attenuate the runoff delivery rates and volume to reduce flashiness, TSS resuspension, and excessive siltation/sedimentation that impacts habitat quality, and therefore biological integrity, throughout the Frank and Poet Drain watershed.

SEASONALITY

Seasonality is addressed in this TMDL through specified sampling periods for the macroinvertebrate community. To minimize temporal variability in the biological community, sampling will be conducted between June and September during stable, low flow conditions, following Procedure 51. Support of the designated uses using these biological indicators further addresses seasonality by their presence in the aquatic environment over their entire (or large portions of) life cycles, thereby being reflective of seasonal shifts in the condition of the water body.

For assessing progress in reducing TSS loading to the Frank and Poet Drain watershed, seasonal event monitoring will be conducted, if necessary, once source control measures are in place to better define and characterize TSS loading and the associated hydrologic pattern that influences the biota in the TMDL reaches.

MONITORING

Monitoring will be conducted by the MDEQ to assess progress toward meeting this TMDL target following implementation of applicable BMPs and control measures. Follow-up biological assessments will be conducted from June through September and under stable, low flow conditions, following Procedure 51. Additionally, the Frank and Poet Drain watershed will continue to be monitored on a five-year rotating basis, regardless of TMDL activity, and the information from those surveys will be available to assess the condition of the biological communities as well.

In-stream monitoring of TSS concentrations may also be conducted to determine whether the secondary TSS target is met.

REASONABLE ASSURANCE ACTIVITIES

There are currently 46 active or pending NOCs under Permit by Rule for construction activities of 5 acres or more, issued by the MDEQ, in the Frank and Poet Drain watershed. Applicants are required to submit an NOC to obtain coverage under Permit by Rule. Prior to submitting the NOC, a Soil Erosion and Sedimentation Control (SESC) permit must be obtained.

Regulated construction activities that disturb one to five acres are not required to submit an NOC. These sites have automatic coverage under Permit by Rule if they have obtained coverage under the SESC program, in accordance with Part 91, SESC, of the NREPA. The land owner or easement holder must comply with the requirements of the Permit by Rule. Therefore, the owner or easement holder is required to provide for weekly inspections of the SESC practices identified in their SESC permit. In addition, the site should be inspected after major rain events that may cause a discharge from the site. These inspections are conducted by, and recorded in, inspection logs by a storm water operator who is trained and certified by the MDEQ (MDEQ, 2007).

With regard to the MDOT statewide MS4 permit (MI0057364), the permit requires that the MDOT shall develop, implement, and enforce storm water management programs designed to reduce the discharge of pollutants from the MDOT drainage systems in the state of Michigan to the Maximum Extent Practicable, to protect the designated uses of the waters of the state, to protect water quality, and to satisfy the appropriate state and federal water quality requirements. If a water body has a TMDL established by the MDEQ for a particular pollutant, the Maximum Extent Practicable includes the development, implementation, and enforcement of storm water controls designed to meet the responsibilities established by the TMDL. Storm water management programs require implementation of BMPs to comply with the minimum measures identified in the permit and any TMDLs if applicable (MDEQ, 2007).

Federal regulations require certain industries to apply for an NPDES permit if storm water associated with industrial activity at the facility discharges into a separate storm sewer system or directly into surface water. There are 22 facilities with storm water discharge authorization within the Frank and Poet Drain watershed. Prior to obtaining permit coverage, applicants must certify that they do not have any unauthorized discharges. MDEQ staff conduct inspections on a percentage of the permitted/regulated industrial facilities annually. Inspections ensure that facilities comply with the regulations and result in a further reduction in unauthorized discharges and illicit connections. More illicit discharges will be eliminated as additional facilities obtain industrial storm water permits. In addition, Michigan's storm water permit authorization requires facilities to obtain a certified operator to have supervision and control over the control structures at the facility, eliminate any unauthorized non-storm water discharges, and develop and implement a storm water pollution prevention plan for their facility, including structural and nonstructural control measures (MDEQ, 2007).

In order to comply with their MS4 permits (MIG619000), the municipalities in the Frank and Poet Drain watershed (as listed in Appendix A), in conjunction with other permittees in the Combined Downriver watershed, are required to submit a joint Public Participation Process and a joint Watershed Management Plan. The permittees are also required to submit a Storm Water Pollution Prevention Initiative and implementation schedule.

In 2003, the Combined Downriver Inter-Municipality Committee (CDWIC) was formed to facilitate the implementation of the requirements of the state of Michigan general permit (MIG619000) for Phase II MS4s subject to watershed plan requirements. Some of these requirements include: public education and outreach, illicit discharge detection and elimination, construction site runoff control, and pollution prevention and good housekeeping. Thirteen communities and entities developed the watershed management plan (Combined Downriver Watershed Management Plan) as required by the general permit. The final revised watershed management plan was submitted to the MDEQ on May 12, 2006 (CDWIC, 2004). The Frank and Poet Drain watershed is part of the Combined Downriver Watershed Management Plan.

As part of the Combined Downriver Watershed Management Plan, 22 road-stream crossing sites in the Frank and Poet Drain watershed were assessed using the MDEQ's Stream Crossing Watershed Survey Procedure. Where possible, the data collected included background information, river substrate, river morphology, physical appearance, instream cover, stream corridor, and potential pollutant sources.

In addition, the Combined Downriver Watershed Management Plan identified 22 potential, desired BMPs in the Frank and Poet Drain watershed. The BMPs include eight bank stabilization/restoration sites, three storm water retention/detention sites, seven hydraulic capacity improvement sites, three culvert/bridge replacement sites, and one floodplain enhancement site (CDWIC, 2004).

The Wayne County Department of Management, Watershed Management Division, received a \$163,196 Clean Michigan Initiative-Clean Water Fund grant in 2006 to implement BMPs in the Combined Downriver Watershed, including the Frank and Poet Drain. These funds were matched with local funds for an overall \$326,000 project to develop low-impact grow zones such as bioretention swales and/or woody debris log revetments. The grow zones will help improve water quality by expanding greenspace and natural habitat in the watershed. The project will also focus on public education about grow zones.

The Downriver Citizens for a Safe Environment (DCSE) was founded in 1989 by residents in five downriver communities to address chemical exposure to area residents (Wayne County Department of Environment, 2004). The DCSE conducts a variety of programs and events in the Frank and Poet Drain watershed such as Stream Team Adopt-A-Waterway, stream cleanups and restorations, and water testing.

The Stream Team and Wayne County Department of Management, Watershed Management Division, conduct benthic macroinvertebrate monitoring at several locations in the Frank and Poet Drain watershed. Stream Team volunteers receive training in how to use benthic macroinvertebrates to monitor the health of the watershed. The types and numbers of benthic macroinvertebrates found are used to assess water quality over time. The eventual goal is to expand the program to all of the schools and communities in the Ecorse Creek and Downriver Combined Watersheds. Data collected by the Lake Erie Watersheds Volunteer Stream Monitoring Program, a Stream Team participant, in fall 2004 indicated that one of four stations sampled in the Frank and Poet Drain watershed rated poor and four of five stations sampled in spring 2005 rated poor.

The Alliance of Downriver Watersheds, a new organization proposed under the Watershed Alliance legislation (Public Act 517 of the Public Laws of 2004), is composed of the public

agencies in the Combined Downriver watershed and the Ecorse Creek and Lower Huron River watersheds. The purpose of this organization is to facilitate the implementation of the management plans recently developed for each watershed (CDWIC, 2004).

The Friends of the Detroit River envisions an ever-improving quality of life for people, plants, and animals in southeast Michigan and southwest Ontario through development of a balance of grass roots advocacy and staffed programs forming an environmental group that watches and protects the Detroit River, including creation of a highly visible resource center focusing on Detroit River issues, programs, research, policies and partnerships. The mission of the Friends of the Detroit River is to enhance the environmental, educational, economic, cultural, and recreational opportunities associated with the Detroit River watershed, through citizen involvement and community action. One recent example is achievement of the designation of the Detroit River as an American Heritage River through collaborative efforts of many agencies and organizations. Another example is their collaboration with many agencies and organizations to preserve the Humbug Marsh, Humbug Island, and Humbug Bay. Many of the entities in the watershed have been working with the Detroit Riverkeeper group on their "Storm Drain Labeling and Educational Program." The Detroit Riverkeeper program has been working closely with the Combined Downriver and Ecorse Creek watershed groups to put together a program that involves storm drain labeling and a region-wide storm water educational program. Over 12,000 labels were produced and distributed to the participating communities in these watersheds. Installation of the curbside storm drain labels started in the spring of 2004, helping to bring attention to storm drain-born water quality issues (CDWIC, 2004).

Prepared by: Kay Edly, Aquatic Biologist
Surface Water Assessment Section
Water Bureau
Michigan Department of Environmental Quality
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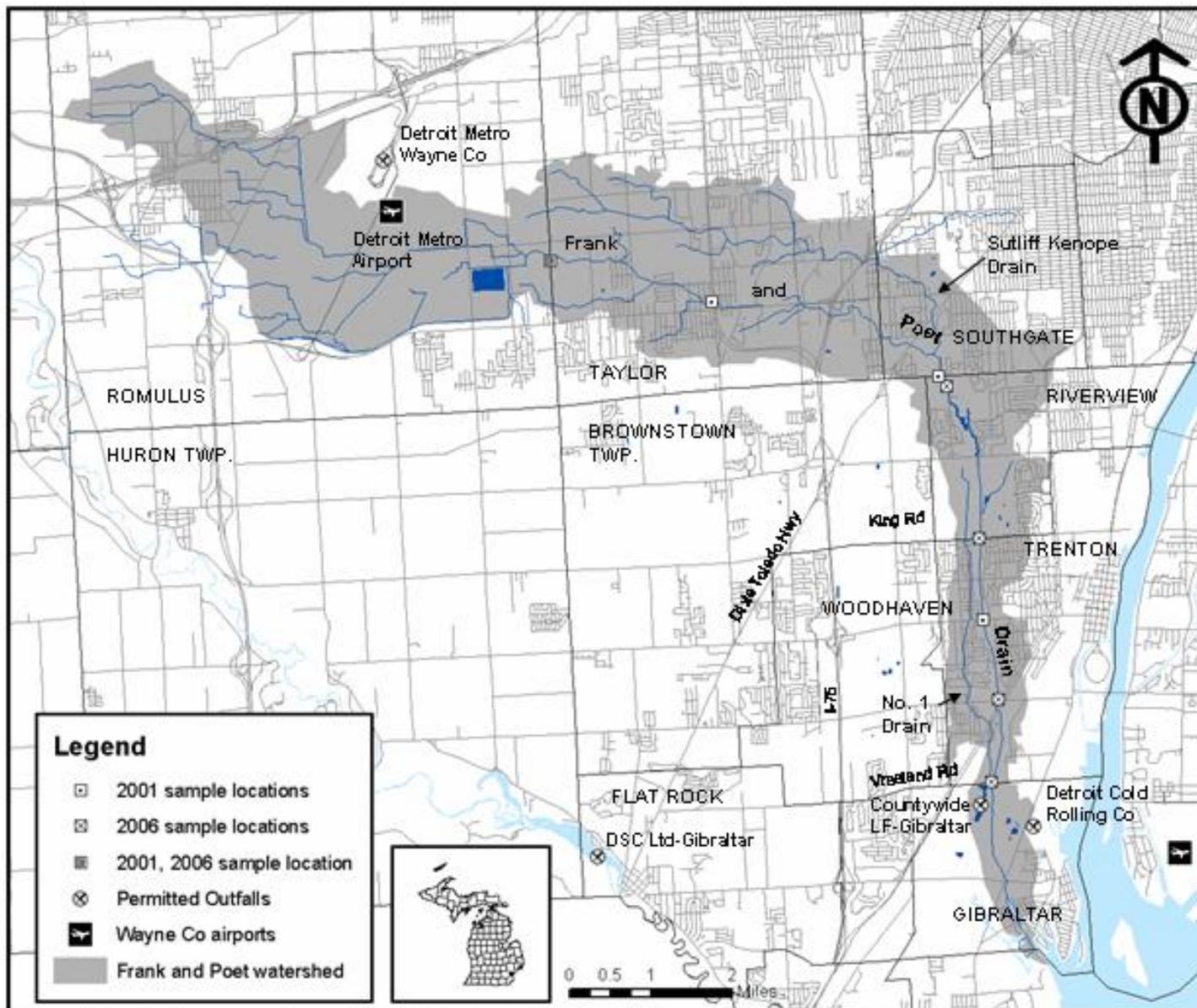


Figure 1: Sample locations and permitted outfalls in the Frank and Poet Drain watershed, Wayne County.

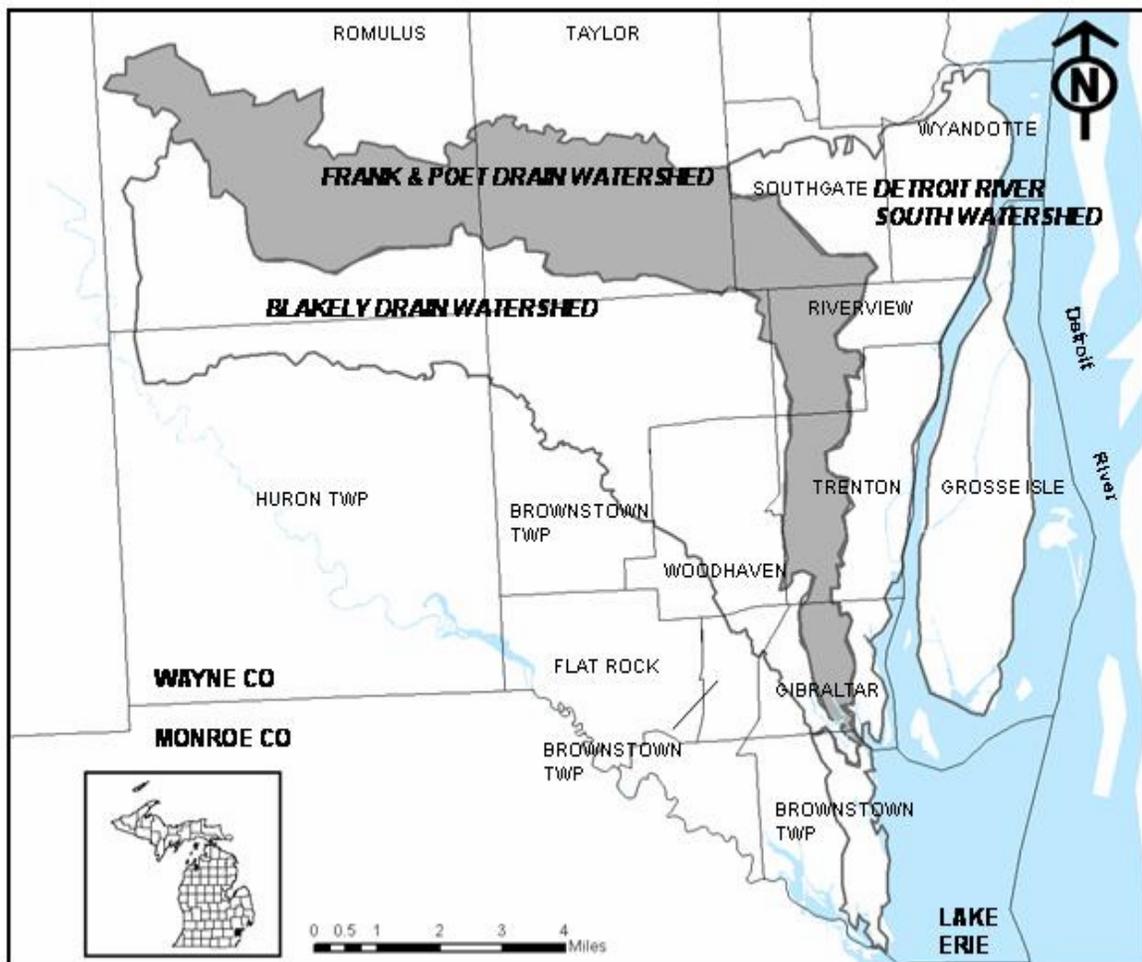


Figure 2. Combined Downriver watershed with subwatersheds delineated.

Table 1. Dry weather event TSS loading data in the Frank and Poet Drain watershed (RTI International and Environmental Consulting & Technology, Inc., 2006).

Site Description	Avg. Concentration (mg/L)	Avg. Loadings (lb/day)*	Avg. Hourly Loading (lbs/hr)
Frank and Poet Drain @ Vreeland Road	17	147	6
Frank and Poet Drain @ King Road	17	183	8

* lb/day = discharge rate (in MGD) x conversion factor (8.34) x TSS (mg/L)

Table 2. Wet weather event TSS loading data in the Frank and Poet Drain watershed (RTI International and Environmental Consulting & Technology, Inc., 2006).

Rainfall	Event 1 - 0.46 in			Event 2 - 0.63 in			Event 3 - 0.63 in			Event 4 - 0.34 in			Event 5 - 1.89	
Site Description	Event Loading (lb)	Avg. Hourly Loading (lb/hour)	Avg. TSS conc. (mg/L)	Event Loading (lb)	Avg. Hourly Loading (lb/hour)	Avg. TSS conc. (mg/L)	Event Loading (lb)	Avg. Hourly Loading (lb/hour)	Avg. TSS conc. (mg/L)	Event Loading (lb)	Avg. Hourly Loading (lb/hour)	Avg. TSS conc. (mg/L)	Event Loading (lb)	Avg. Hourly Loading (lb/hour)
Frank and Poet Drain @ Vreeland Road	6,687	618	66	346	25	56	1,409	56	39	160	21	47	71,139	2,678
Frank and Poet Drain @ King Road	6,876	724	55	50	4	15	1,795	72	32	523	84	28	123,347	4,652

Table 3. Land use categories, estimated current TSS loads (lbs/day), and target TSS loads in the Frank and Poet Drain Watershed, Wayne County, Michigan.

	Land Use/Source	Acres	% Land Use	Expected TSS Concentration (mg/L)*	Expected TSS Load (lbs/day)	% Total Load	Target TSS Concentration (mg/L)	Target TSS Load (lbs/day)	% Reduction Needed
WLA	Commercial**	1,850	11	77	1,451	6	80	1,451	0
	Industrial**	3,924	24	149	7,892	32	80	4,237	46
	Residential Hi**	435	3	97	395	2	80	325	18
	Residential Med**	3,933	24	70	1,985	8	80	1,985	0
	Urban Open**	1,112	7	51	155	1	80	155	0
	NPDES Individual***								
	MDOT	395	2	141	539	2	80	306	43
	All Others	-	-	-	12,014	48	-	12,014	0
	WLA Total	11,254	68	-	24,431	99	-	20,473	16
LA	Agricultural	415	3	145	75	0	80	41	45
	Forest/Rural Open	2,322	14	51	148	1	80	148	0
	Water/Wetland	2,213	13	6	124	1	80	124	0
	LA Total	4,950	30	-	347	2	-	313	10
	Overall Total	16,599	100	-	24,778	101	-	20,786	16

*Rouge River National Wet Weather Demonstration Project 2006

**These land use categories are addressed under NPDES general, industrial, and municipal stormwater permits or Permit by Rule.

***Refer to Table 5 for NPDES Individual TSS load allocations.

Table 4. TSS NPDES Permit Limits for Facilities Discharging to the Frank and Poet Drain Watershed.

Permittee	Permit Number	Maximum Loading		Maximum Concentration	
		Monthly (lbs/day)	Daily (lbs/day)	Monthly (mg/L)	Daily (mg/L)
Detroit Cold Rolling Co	MI0056243	1,700	2,600	20	30
DSC Ltd-Gibraltar	MI0004227				
May 1 - Nov 30		130	190	20	30
Dec 1 - Apr 30		190	280	30	45

Table 5. TSS Loads for Individually Permitted NPDES Facilities Discharging to the Frank and Poet Drain Watershed Included in the WLA.

Permittee	Permit Number	TSS Load (lbs/day)
Detroit Cold Rolling Co*	MI0056243	1,700
DSC Ltd-Gibraltar	MI0004227	155
Detroit Metro Wayne Co. Airport	MI0036846	
Outfall 004A		4,318
Outfall 006A		5,662
Countywide LF Gibraltar	MI0056383	179
Michigan Department of Transportation (MDOT)	MI0057364	539
Total TSS Load for Individually Permitted NPDES Facilities		12,553

*Facility was purchased by Steel Rolling Holdings.

Appendix A. Permitted outfalls to the Frank and Poet Drain watershed. Source: MDEQ, Water Bureau's NPDES Permit Management System (NMS).

Facility	Number	County	Latitude	Longitude	Receiving Water
Individual Permit					
Detroit Metro Wayne Co. Airport	MI0036846	Wayne	42.225833	-83.345833	Frank and Poet Drain and Sexton and Kilfoil Drain
Countywide LF-Gibraltar	MI0056383	Wayne	42.108333	-83.208333	Frank and Poet Drain
Detroit Cold Rolling Co	MI0056243	Wayne	42.10417	-83.19583	Frank and Poet Drain
DSC Ltd-Gibraltar	MI0004227	Wayne	42.101388	-83.3	Frank and Poet Drain
MDOT MS4	MI0057364	Statewide	---	---	---
MS4 General Permit MIG619000 and MIS040000					
Municipal Separate Storm Sewer System (MS4)					
Gibraltar MS4-Wayne	MIG610346	Wayne			Frank and Poet Drain
Gibraltar PS MS4-Wayne	MIS040055	Wayne			Frank and Poet Drain
Riverview MS4-Wayne	MIG610345	Wayne			Frank and Poet Drain
Romulus MS4-Wayne	MIG610017	Wayne			Frank and Poet Drain, Shook Drain, Post Drain, Packard Drain, Texas-Marsh Drain
Southgate MS4	MIG610347	Wayne			Frank and Poet Drain, Sutliff and Kenope Drain
Taylor MS4-Wayne	MIG610348	Wayne			Frank and Poet Drain, Sutliff and Kenope Drain
Trenton MS4-Wayne	MIS040000	Wayne			Frank and Poet Drain
Wayne Co. MS4	MIG610040	Wayne			
General Permit MIS210000					
Storm Water Discharges From Industrial Activities					
Dolphin Manufacturing	MIS210886	Wayne	42.22072	-83.28086	Sutliff and Kenope
General Permit MIS319000					
Storm Water Discharges From Industrial Activities					
Millcraft SMS Services-Taylor	MIS310315	Wayne	42.195833	-83.2375	Frank and Poet Drain
Saint-Gobain Abrasives Inc	MIS310095	Wayne	42.21	-83.318611	Frank and Poet Drain
Solutia Inc-Trenton-Plant 2	MIS310042	Wayne	42.120833	-83.1875	Frank and Poet Drain
Summit Industries-Taylor	MIS310094	Wayne	42.2125	-83.241666	Frank and Poet Drain

Facility	Number	County	Latitude	Longitude	Receiving Water
CL Rieckhoff Co Inc	MIS310553	Wayne	42.20936	-83.29499	Frank and Poet Drain
Elkins Machine & Tool-Romulus	MIS310284	Wayne	42.213055	-83.308333	Frank and Poet Drain
ArvinMeritor AE & T-Taylor	MIS310238	Wayne	42.21167	-83.27778	Sutliff & Kenope
EFTEC North America LLC-Taylor	MIS310286	Wayne	42.213611	-83.231944	Sutliff & Kenope
Johnson Controls-Taylor	MIS310239	Wayne	42.21096	-83.24125	Sutliff & Kenope
Mich ARNG-Taylor Armory OMS8	MIS310186	Wayne	42.2125	-83.291666	Sutliff & Kenope
UPS-Taylor	MIS310510	Wayne	42.221666	-83.295	Sutliff & Kenope
Apollo Plating Inc-Taylor	MIS310518	Wayne	42.2125	-83.275	Sutliff & Kenope
Control Manufacturing	MIS310040	Wayne	42.175	-83.175	Huntington Drain
Federal Screw Works-Romulus	MIS310470	Wayne	42.225	-83.383333	Shook Drain
Kreher Wire Processing-Romulus	MIS310273	Wayne	42.223055	-83.3825	Shook Drain
Questor-ASC-Southgate	MIS310384	Wayne	42.208333	-83.225	Asmey Drain
Broomes Auto Parts	MIS210643	Wayne	42.273333	-83.399444	McCloughrey Drain
Daikin Clutch Corp-Belleville	MIS210319	Wayne	42.24	-83.445	McCloughrey Drain
General Metal & Abrasive Co	MIS210412	Wayne	42.251388	-83.414166	McCloughrey Drain
GM-CPC-Romulus Engine	MIS210409	Wayne	42.252222	-83.401666	McCloughrey Drain
Weiser Recycling Inc	MIS210308	Wayne	42.275833	-83.393055	McCloughrey Drain
NOCs	Storm Water Discharge From Construction Activities				
600 Trenton-Chilis Restaurant	MIR110095	Wayne	---	---	
Aaa Dev-Westlake Commons Condo	MIR107074	Wayne	---	---	
AMG Inv-Knollwood Estates	MIR108050	Wayne	---	---	
Antlar-Parkway Meadows	MIR106625	Wayne	---	---	
Centex-Highlands of Romulus	MIR107320	Wayne	---	---	
Centex-Timberline Meadows	MIR109081	Wayne	---	---	
Charter Oaks-Charter Oaks Vlge	MIR107035	Wayne	---	---	
Construction Solutions-Trilium	MIR108793	Wayne	---	---	
Diversified-Preserve Romulus	MIR108812	Wayne	---	---	
DiDomenico-19 Acres Inkster Rd	MIR109821	Wayne	---	---	
Elro-Legacy Park Subdivision	MIR108732	Wayne	---	---	
Fairways @ Gateway Ph 4	MIR107203	Wayne	---	---	
First Distribution Center	MIR109053	Wayne	---	---	
Gateway-Clubhouse Pavilion	MIR109762	Wayne	---	---	
Gargaro-Romulus Corp Park	MIR106015	Wayne	---	---	
Holtzman&Silverman-Wdland Ridg	MIR108476	Wayne	---	---	
Liberty Ecorse Industrial Dev	MIR109109	Wayne	---	---	

Facility	Number	County	Latitude	Longitude	Receiving Water
MJC-Carrington Village	MIR109043	Wayne	---	---	
MJC-Cypress Garden Condo	MIR108283	Wayne	---	---	
MJC-Devonshire Cove Condo	MIR109042	Wayne	---	---	
MJC-On-site Wetland Mitigation	MIR109806	Wayne	---	---	
MJC-Proposed Blakely Drain Imp	MIR109807	Wayne	---	---	
Mjc-Terraces @ Autumn Woods	MIR106811	Wayne	---	---	
Orco-Superior Estates	MIR109717	Wayne	---	---	
Northstone Village	MIR108919	Wayne	---	---	
Pinewood Condo	MIR106941	Wayne	---	---	
Pizzo Const-Pizzo Est Subdiv	MIR107780	Wayne	---	---	
Plastech of Romulus	MIR109261	Wayne	---	---	
Princeton Prop-Timberline Mdws	MIR108767	Wayne	---	---	
Real Est Interest Gp-Island Lk	MIR108904	Wayne	---	---	
Romulus Business Center	MIR109982	Wayne	---	---	
Romulus Recreation Center	MIR109824	Wayne	---	---	
Romulus-Wahrman Rd Improvement	MIR107041	Wayne	---	---	
Sole Dev-The Coves Condo	MIR109730	Wayne	---	---	
Southtown Village-Southgate	MIR108016	Wayne	---	---	
Southview Inc-Southview	MIR107033	Wayne	---	---	
Taylor Classic-Timbers Edge	MIR108425	Wayne	---	---	
Taylor Exemplar Charter Acad	MIR109504	Wayne	---	---	
Taylor Meadows Condominiums	MIR108385	Wayne	---	---	
Taylor-Commons at the Villages	MIR108060	Wayne	---	---	
Wal-Mart-Taylor MI 2912-01	MIR110074	Wayne	---	---	
Wayne Comm College-Downriver	MIR110005	Wayne	---	---	
Wayne-Rehab of Runway 3R-21L	MIR109889	Wayne	---	---	
WCCC-Emergency Training Comp	MIR108067	Wayne	---	---	
Westminster-Drake Shire	MIR108038	Wayne	---	---	
Winnick-Echo Park Sub	MIR108998	Wayne	---	---	