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Introduction to the Combined Downriver Watershed

The Combined Downriver Watershed is a relatively urban watershed within Wayne County in southeast Michigan. Originally, combined sewers serviced a portion of the area leading to water quality impairments of the creeks. The Michigan Department of Environmental Quality (MDEQ) required the separation of combined sewers in the 1980's and improvements to the Downriver Sewage System in the 1990's. Even after implementation of the required improvements, the water quality of the watershed is still threatened and in some cases impaired by urban storm water runoff.

Many of the drains within the watershed were originally designed to accept agricultural flows. As the watershed urbanized, the ability of these small drains was insufficient to handle the new, higher peak flows resulting in flooding and erosion. Conversely, the urbanization of the watershed led to an increase in impervious surface area that results in less rainwater being infiltrated into the ground which results in lower creek base flows. The combination of these two effects, higher peak flows during storm events and lower creek base flows, is devastating to the aquatic life in the streams. It is anticipated that the Michigan Department of Environmental Quality (MDEQ) will develop a Total Maximum Daily Load (TMDL) for biota or aquatic life for the Frank & Poet Drain, Blakely Drain, and the Brownstown Creek. Previous studies, sampling and the results of this Watershed Management Plan work point to the impairment as being caused by unstable flows and excessive sedimentation, which are resulting in the loss of stable habitat for aquatic life. It is apparent that implementing methods to reduce the effects of urban storm water runoff are essential to further improving the water quality of the Watershed.

The Combined Downriver Watershed is located within Wayne County, in southeast Michigan. The watershed drains an area of approximately 85.9 square miles in a relatively urbanized region (especially in the northeast and eastern half of the watershed) and has a watershed population of roughly 157,000 people. The Combined Downriver Watershed includes 14 entities. These entities are listed below:

- | | |
|---------------------|--------------------------------------|
| Brownstown Township | Taylor |
| Gibraltar | Trenton |
| Grosse Ile Township | Woodhaven |
| Huron Township | Wyandotte |
| Riverview | Wayne County Airport Authority |
| Romulus | Woodhaven-Brownstown School District |
| Southgate | Wayne County |

The Combined Downriver Watershed can be subdivided into 3 main subwatersheds. These include the Blakely Drain, the Frank & Poet Drain and the Detroit River South. Portions of Southgate and Wyandotte in the Detroit River South Subwatershed have a combined sewer system, which directs storm water to the Wayne County Wyandotte Wastewater Treatment Plant. Each of the subwatersheds contains many



small tributaries and some larger drains such as the Brownstown Creek in the Blakely Drain Subwatershed and the Sutliff & Kenope Drain in the Frank & Poet Subwatershed

According to the Southeast Michigan Council of Governments (SEMCOG), approximately 62% of the land is considered developed with only 38% remaining as open space. The urbanization of the watershed is expected to continue with 92% of the land being developed and only 8% remaining as open space by the year 2030.

Purpose of the Combined Downriver Watershed Management Plan

On March 10, 2003 the entities within the Combined Downriver Watershed applied for a National Pollutant Discharge Elimination System (NPDES) permit under Michigan’s Phase II Storm Water regulations. These regulations require certain “small” municipal separate storm sewer system entities that are located in urbanized areas to obtain a storm water permit. An initial requirement of the permit is the development of a comprehensive Watershed Management Plan that addresses the following elements:

- Watershed Condition
- Challenges and Goals
- Identify Management Alternatives
- Watershed Action Plan
- Methods and Milestones to Measure Progress.
- Future Organizational Structure
- Public Involvement

The goal of the Watershed Management Plan is to create a tool that the entities within the watershed can use to guide implementation of action items that will help achieve long-term goals of the watershed.

Formation of the Combined Downriver Watershed Inter-Municipality Committee (CDWIC)

The entities within the Combined Downriver Watershed needed to legally establish a mechanism in order to fund the development of the Watershed Management Plan. The entities worked to develop a Memorandum of Agreement (MOA) to formalize the group and establish financial responsibilities and by-laws. Each entity adopted the MOA and the Combined Downriver Watershed Inter-Municipality Committee (CDWIC) was formed on March 30, 2004 through the Inter-Municipality Committee Act (PA 200, 1957; MCL 123.631, et seq.)

Combined Downriver Watershed Condition

The current condition of the Combined Downriver Watershed was determined through a review of existing reports, water quality sampling data and field investigations. The information reviewed came from the Michigan Department of Natural Resources, the Michigan Department of Environmental Quality, the U.S. Army Corps of Engineers, the U.S. Geological Survey, Wayne County Department of Environment and other sources. Field surveys utilizing the MDEQ’s Stream Crossing Watershed Survey Procedure were also conducted at 78 locations



throughout the Combined Downriver Watershed to provide habitat, water quality data and culvert/bridge structure information.

Total Maximum Daily Load (TMDL) allocations are anticipated for the Frank & Poet Drain, the Blakey Drain and the Brownstown Creek by 2007. Currently, these creeks are identified on Michigan’s list of water-quality limited or threatened waters as failing to meet Michigan water quality standards for the protection of warm water aquatic life. It is anticipated that the future TMDL for these creeks will be very similar to the TMDL set for aquatic life in the adjacent Ecorse Creek Watershed. The Detroit River is also on the state’s list for failing to meet water quality standards for mercury and pathogens and for fish contaminant advisories for dioxin, mercury and polychlorinated biphenyls. Because of this contamination, the Detroit River has been designated by the United States and Canada as an Area of Concern.

In light of future TMDL development for the Frank & Poet Drain, Blakely Drain, and the Brownstown Creek, assessments of the biological communities, total suspended solids concentrations and other key parameters with the potential to impact the aquatic life and sedimentation were evaluated. The specific water quality indicators and a summary of the rating/observation for each are listed below:

Water Quality Indicator	Rating/Observation
Biological communities	Fair to Poor
Sedimentation/total suspended solids	Significant sedimentation generally in a range that would reduce fish populations
Hydrology	Flashy flows/extremely unstable hydrology
Imperviousness	Frank & Poet Drain: ex 30.2%, future 49.6% Blakely Drain: ex 21.4%, future 46.6% Detroit River South: ex 26.9%, future 45.1%
Phosphorus	2 to 4 times the recommended value of 0.05 mg/L TP
Dissolved oxygen	3 mg/L to 12 mg/L, recommended min value is 5 mg/L
Conductivity	200 µS/cm to 3,500 µS/cm, recommended value <800 µS/cm
Pathogens (e.coli)	1.5 to 6 times the recommended max. of 130 cts/100 mL

Field surveys were performed in October and November of 2004 to gain a hands-on assessment of the watershed. The field surveys focused on “areas of concern” identified by the CDWIC, 78 stream crossings and additional areas along the drains to obtain a general understanding of the creeks’ conditions. In total, 28 different drains were evaluated at various locations. General findings revealed minimal riparian buffers, significant sedimentation and turbid water, evidence of flashy flows, eroded banks and debris piles.





Designated and Desired Uses and Pollutants

All surface waters in Michigan are designated for and protected for a variety of uses. The designated uses that are applicable to the Combined Downriver Watershed are shown in the following table. In addition to the designated uses, the CDWIC identified certain desired uses for the watershed. The desired uses are also shown in the table below.

Some of the uses are considered impaired, meaning the use is not being met. Threatened indicates that the use is being met, however, there is a good likelihood that the use could become impaired in the future. For those uses recognized as impaired, the CDWIC identified known (k) and suspected (s) pollutants. Sources and causes for the pollutants were also identified by the CDWIC.

Uses	Impaired	Threatened	Unknown	Known or Suspected Pollutant
Designated Use				
Partial Body Contact Recreation		X		
Warmwater Fishery		X		
Other Indigenous Aquatic Life and Wildlife	X			Lack of stable flow (k) Sedimentation (k) Low dissolved oxygen (k) Nutrients (k) Lack of habitat (k)
Total Body Contact Recreation (between May and Oct)		X		
Agriculture			X	
Industrial Water Supply			X	
Navigation			X	
Desired Use				
Flood Control	X	X		Lack of stable flow/excessive surface runoff (k) Lack of hydraulic capacity (k) Inadequate protective measures (k)
Natural Features		X		
Native Vegetation/Unique Habitat/Natural Buffers		X		
Recreational Areas		X*		
Open Space		X		
Greenways		X		
Wetlands		X		
Agricultural Land		X		
Well Water Supply			X	

*designated as threatened because more recreational areas are desired

Goals and Objectives

Once the CDWIC identified the designated and desired uses, determined pollutants and their sources and causes, and considered plan maintenance and sustainability issues, goals and objectives for the watershed were developed. A goal is a long-term qualitative description of a desired future condition stated in general terms without criteria of achievement while an objective is an action that can be either short-term or long-term that will reduce pollution from a source to protect or restore a designated or desired use. The CDWIC's 10 goals and the associated objectives are shown in the following table.

Goals	Objectives
<p>Reduce Stream Flow Variability</p>	<p>Both Short- and Long-Term Objectives:</p> <ul style="list-style-type: none"> ▪ Reduce runoff volume/rate ▪ Preserve & enhance native vegetation/naturalization <p>Long-Term Objective</p> <ul style="list-style-type: none"> ▪ Preserve & restore wetlands & open space
<p>Reduce Flooding</p>	<p>Long-Term Objectives:</p> <ul style="list-style-type: none"> ▪ Improve drain capacity in streams ▪ Preserve and restore wetlands & open space ▪ Reduce runoff volume/rate ▪ Improve understanding of streamflow volumes & distribution
<p>Increase Public Education, Understanding, and Participation Regarding Watershed Issues</p>	<p>Short-Term Objective:</p> <ul style="list-style-type: none"> ▪ Improve media coverage ▪ Create partnerships with institutions, schools, and the private sector ▪ Foster relationships with the County and neighboring communities <p>Both Short- and Long-Term Objective:</p> <ul style="list-style-type: none"> ▪ Improve education and awareness of watershed successes and failures



<p>Improve Water Quality</p>	<p>Short-Term Objective:</p> <ul style="list-style-type: none"> ▪ Eliminate/reduce illicit discharges <p>Both Short- and Long-Term Objective:</p> <ul style="list-style-type: none"> ▪ Protect, expand, and restore the riparian corridor ▪ Improve erosion and sedimentation controls ▪ Preserve and restore wetlands and open space <p>Long-Term Objective:</p> <ul style="list-style-type: none"> ▪ Reduce directly connected storm water discharges to sanitary systems
<p>Protect Public Health</p>	<p>Both Short- and Long-Term Objective:</p> <ul style="list-style-type: none"> ▪ Reduce secondary health concerns related to flooding <p>Long-Term Objective:</p> <ul style="list-style-type: none"> ▪ Meet partial body contact requirements ▪ Meet total body contact requirements
<p>Preserve, Increase, and Enhance Recreational Opportunities</p>	<p>Both Short- and Long-Term Objective:</p> <ul style="list-style-type: none"> ▪ Protect and improve riparian corridor aesthetics <p>Long-Term Objective:</p> <ul style="list-style-type: none"> ▪ Obtain land for wetlands and passive parks ▪ Meet partial body contact requirements ▪ Increase public access to stream corridors ▪ Encourage recreation and open space planning in site plan/land use approval process
<p>Protect, Enhance, and Restore Riparian and Instream Habitat</p>	<p>Short-Term Objective:</p> <ul style="list-style-type: none"> ▪ Integrate storm water management in planning and land use approval process <p>Long-Term Objective:</p> <ul style="list-style-type: none"> ▪ Restore warmwater fishery ▪ Restore diverse aquatic community
<p>Watershed Management Sustainability</p>	<p>Short-Term Objective:</p> <ul style="list-style-type: none"> ▪ Establish institutional relationships to ensure plan implementation <p>Long-Term Objective:</p> <ul style="list-style-type: none"> ▪ Determine long-term funding methodologies
<p>Preserve & Protect Critical Areas</p>	<p>Long-Term Objective:</p> <ul style="list-style-type: none"> ▪ Integrate agricultural preservation goals into land-use policy
	<ul style="list-style-type: none"> ▪



Management Alternatives

Management Alternatives are specific actions that a community or entity can take towards achieving the goals and objectives of the Watershed Management Plan, and towards improving the water quality of the Combined Downriver Watershed. Looking at the specific problems in the Watershed, it is apparent that implementing urban storm water source controls would bring the biggest benefit. Typical management alternatives for reducing urban storm water peak runoff flow rates would point to the construction of regional storm water detention basins. These basins are a very effective means for reducing urban storm water runoff rates; however, with the many other mandated NPDES Phase II permit requirements such as Public Education Plans (PEPs) and Illicit Discharge Elimination Plans (IDEPs), there is very little money available for significant source control construction projects. Therefore, to achieve the goals of the watershed, the CDWIC focused on a myriad of potential management alternatives taking into consideration actions they were already performing, committed to doing through their individual PEPs and IDEPs in the short term (less than 3 years), desired actions in the intermediate-term (less than 5 years) and long-term actions (greater than 5 years). Phase II Actions are “commitments” for the watershed and are individual community commitments if listed as currently doing or short-term. Other Non-Phase II Actions are considered “wish list” actions.

The management alternatives or storm water best management practices (BMPs) selected were gathered through the following means:

- CDWIC Meetings and Workshops (15 CDWIC meetings, 2 workshops)
- Public Meetings (3 total)
- Individual Community/Entity Interviews
- Management Alternative Selection Sheet
- Code & Ordinance Worksheet (COW)

One-hundred, forty-six BMPs were identified by the CDWIC, 41 of which are currently being performed or will be preformed by a number of entities as part of their individual Phase II storm water permits. The remaining BMPs are in addition to the requirements of the Phase II storm water regulations and thus may qualify for future Clean Michigan Initiative funding and EPA Section 319 funding.

The BMPs are categorized as structural, vegetative, or managerial. Managerial BMPs were further categorized as ordinances and policies, managerial practices, studies and inventories, public education and coordination and funding. Some of these BMPs include specific desired projects for replacing undersized bridges and culverts, bank stabilization and restoration, improving hydraulic capacity, increasing the floodplain and constructing storm water detention/retention basins. Chapter 6 includes a detailed summary of the BMPs, their anticipated cost, level of effort and schedule. In addition, individual summary sheets listing all the BMPs each entity has selected are included to facilitate implementation.

While the results of this study found that implementing a variety of BMPs will be necessary for the CDWIC to reach their identified goals, several BMPs appear to be cost-effective and also appear to have the biggest impact in reducing the top 3





pollutants; sediment loads, urban storm water runoff and E.coli and other pathogens. These BMPs include the following:

- Improving street sweeping coverage and efficiencies
- Implementing storm water detention standards to control both water quality and quantity (Wayne County Storm Water Ordinance)
- Reducing impervious surfaces in future development and re-development
- Stabilizing stream banks to reduce erosion
- Treating storm water through floodplain enhancements and regional detention
- Revising zoning ordinances and master plans to protect open space
- Identifying and eliminating illicit discharges
- Public Education and Awareness efforts

Applying these BMPs as well as others will help the Combined Downriver Watershed work toward reaching their goals. It is important to note that these BMPs need to be utilized throughout the watershed and especially in the critical areas identified by CDWIC members, riparian areas denoted for preservation and conservation and critical areas based on existing pollutant loads.

Partnering with the general public, Wayne County Department of Environment, The Stream Team, the Woodhaven-Brownstown School District and other entities active within the region will help stretch available funding and maximize the benefit to the Watershed. Activities that these organizations can accomplish at relatively low cost to the communities include volunteer monitoring, bank stabilization, wetland plantings, IDEP activities and the promotion of watershed education and awareness.

Measuring Progress

The Watershed Management Plan includes ideas on how to measure the effectiveness of the various BMPs. Measuring progress will be done by both qualitative and quantitative techniques. Qualitative measures include: public surveys, ordinances passed, stream surveys, written evaluations following watershed activities, visual documentation, complaint records and citizen participation. Quantitative techniques include: aquatic life, suspended solids, pathogens/bacteria, dissolved oxygen, flow stability and method and frequency of monitoring activities.

Future Organizational Structure

Sustainability is a required element of the Watershed Management Plan. It is important that implementation of the action items or BMPs occurs throughout the watershed and that the effectiveness is measured, so that revisions to the plan can be accomplished in a timely manner.

Working together as a team for the development of this Watershed Management Plan, the communities, Wayne County, the Wayne County Airport Authority and the Woodhaven-Brownstown School District have realized many benefits. Resources both technical and financial are easily shared resulting in an affordable, comprehensive plan addressing the goals of all involved. Similarly, in implementing the plan, it is anticipated that the entities will continue to realize the many positive benefits. Several options exist for the CDWIC members to consider for continuing

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their efforts in working together for the benefit of the watershed and compliance with their permits. Formation of a Watershed Alliance appears to be an effective way to facilitate the implementation of the plan.