Middle Huron Stormwater Plan for Addressing Total Maximum Daily Loads (TMDLs)

The following plan was developed by the Middle Huron Watershed Stormwater Advisory Group (SAG) – a collaboration between communities and agencies with a general stormwater Phase I or Phase II permit for the Middle Huron River in Washtenaw County. This plan serves as an alternative approach to steps prescribed under the Storm Water Pollution Prevention Plan (SWPPI) requirement of the Watershed General Permit (MIG610000) for addressing limits imposed by Total Maximum Daily Load (TMDL) documents. The SAG developed this alternative because its members have already made significant progress toward addressing the TMDLs in the Middle Huron, a monitoring plan has already been developed and implemented, and implementation plans already exist for two of the five TMDLs.

Participating Permittees

The permitted entities, who comprise the SAG, that are participating in this alternative approach to addressing TMDL requirements include the following:

- Washtenaw County Water Resources Commissioner
- Washtenaw County Road Commission
- City of Ann Arbor
- City of Ypsilanti
- Village of Dexter
- Charter Township of Pittsfield
- Charter Township of Ypsilanti
- Eastern Michigan University

It should be noted that, unlike the other participants, Pittsfield Township holds a jurisdictional permit. The Township is participating in this plan where appropriate, but they may also need to engage in additional activities to comply with jurisdictional permit requirements. Refer to the Pittsfield Township SWPPI for more details. Other entities may hold stormwater permits within the Washtenaw County potion of the Huron River Watershed, but they have not chosen to participate in this plan at this time.

Alternative Approach Coverage

This plan specifies methods and implementation activities that will be employed within TMDL contributing areas within the Middle Huron River Watershed (Middle Huron). In most cases the geographical extent of activities is included; if it is not, it should be assumed that the activity will apply across the entire TMDL area. The TMDLs addressed by this alternative plan include all those in the Middle Huron that are due to stormwater sources. That includes the TMDLs listed in Table 1 below.

Table 1: Waterbodies requiring TMDLs for Stormwater Related Impairments in the Middle Huron Watershed
(Source: MDEQ 2008 303(d) list of nonattaining waterbodies)

Waterbody	Pollutant or Problem	TMDL Status	Location/Area
Ford Lake/ Belleville Lake	Nutrient enrichment (phosphorus)	Approved in 2000; To be updated 2010	Impoundments of the Huron River located between the cities of Ypsilanti and Romulus.
Huron River (Geddes Pond and Allen Creek)	Pathogens (rule 100)	Approved in 2001	Geddes Pond Dam upstream to Argo Dam, Ann Arbor
Malletts Creek	Poor fish and macroinvertebrate communities	Approved in 2004	Huron River confluence u/s to Packard Rd.
Swift Run	Poor macroinvertebrate community	Approved in 2004	SE Ann Arbor: Huron River confluence upstream to Ellsworth Rd
Honey Creek	Pathogens (rule 100)	Approved in 2009*	Confluence of Huron River upstream to Wagner Rd..

* The Honey Creek TMDL is not included in watershed partner COCs and is not covered by the TMDL Implementation grant.

General Approach

The SAG is taking the general approach that, in order to reduce the sources of TMDL pollutants, individual sources should be identified as specifically as possible through monitoring, then a set of well-targeted implementation activities should be developed to eliminate or reduce the pollutant contribution from each source. Thus, this plan is divided into two sections: a monitoring and source identification section and a pollutant reduction implementation plan section. The monitoring and source identification section describes the data collection and analysis strategy and methods that will be employed in detail. The implementation section describes the steps that will be taken to establish and prioritize implementation activities for each TMDL. For each, an existing plan will be updated or refined, or a new plan will be developed. In addition to these TMDL-specific plans, several watershed management plans have been developed for the middle Huron. The most recent of these, *The Watershed Management Plan for the Huron River in the Ann Arbor-Ypsilanti Metropolitan Area (Middle Huron)*, serves as an umbrella for all of these plans. That plan may be downloaded at http://www.hrwc.org/publications/watershed-management-plans/.

The Washtenaw County Water Resources Commissioner has been awarded a grant from DEQ to develop many of these elements for the SAG. The grant project work plan and schedule is included in Appendix E. The project will begin in February of 2010 and be completed by the end of September 2011.

Monitoring and Source Identification

The Middle Huron has a monitoring program that was established in 2002, primarily to gain an understanding of nutrient dynamics from tributaries to the Huron River and Ford and Belleville Lakes

downstream. A monitoring plan was developed to establish baseline measures and track progress toward achieving the TMDL for phosphorus. The monitoring plan detailed in Table 2 was established for the Watershed Management Plan that includes monitoring for the TMDLs and other identified impairments. Monitoring sites included in this plan are shown in Figure 1.

The monitoring plan is based around four programs administered by three organizations. First, the Huron River Watershed Council's Adopt-A-Stream Program collects data on benthic macroinvertebrates three times a year, including a special collection of winter stoneflies. Adopt also does a complete stream habitat assessment of each site every 4-5 years, which includes a number of geomorphic characteristics along with general habitat characteristics, which is consistent with the MDEQ protocol. Adopt collectors also sample for water conductivity at each macroinvertebrate event. In addition, summer temperatures are documented every 5 years. The Adopt program uses volunteers to collect the vast majority of the data.

Secondly, MDEQ collects data through its rotational watershed assessments. MDEQ returns to the watershed every five years to collect benthic macroinvertebrates, habitat assessment data and, in some cases, a suite of water chemistry parameters. Site selection varies each year.

The Huron River Watershed Council (HRWC) also administers the Middle Huron Tributary Monitoring Program on behalf of the Middle Huron Partnership, a group formed in 1996 to address the nutrient TMDL for Ford and Belleville Lakes . HRWC uses volunteers and staff to collect water samples and deliver to the Ann Arbor Water Treatment Plant for analysis. Analytes include total phosphorus, nitrates, nitrites, total suspended solids and *E. coli*. Staff and volunteers also collect stream discharge data from all ten sites to allow for the calculation of pollutant loads. Currently, data is collected twice per month with additional storm event samples collected opportunistically during the April to September growing season.

Finally, MDEQ conducted water quality monitoring of six lake sites in Ford and Belleville Lakes and two sites on the Huron River. Nutrients and other parameters were collected once per month from April to September. This program was in effect through 2006 when it was halted due to funding cuts. These sites were also sampled in 2009, but it is unlikely that this monitoring will continue.

While this data collection is a good start, the monitoring plan must be updated with specifics that relate directly to stormwater related impairments – namely phosphorus and *E. coli*. Beginning in 2010, the Middle Huron SAG will analyze all of the existing data from these programs and, in addition, data from Illicit Discharge Elimination Programs (IDEP) to identify "hot spots" for TMDL pollutants. A plan will help the SAG gain a better understanding of watershed conditions, pollutants, sources, and causes – especially those related to 303(d) listed impairments. A desktop analysis will be performed to evaluate the frequency and type of monitoring needed to characterize critical drainages. Initial monitoring of potential "hot spots" may lead the investigators to conclude that some areas are not impairing the system as originally thought. For example, some tributaries to the Huron have recently been found to be meeting TMDL phosphorus concentration limits. Further monitoring is needed to determine overall loading from critical areas at various flow levels during dry weather and across storm events.

This information will help to better characterize the sources and dynamics of phosphorus loading into the system. For example, does the majority of phosphorus loading come from channel cutting and other erosive processes, or from stormwater runoff? If from stormwater runoff, then is most of the loading from near sources or is it accumulated across the drainage? Is *E. coli* coming directly from storm pipes

or from the upstream watershed during storms? Answers to these and other questions will help to refine management targets. The monitoring plan will be updated with these questions in mind (and in consultation with SAG and MDEQ), and will comprehensively examine the system of discharge points to determine the critical pollutant loading areas.

Sampling will consist of grab samples collected in conjunction with discharge measurements or estimates (from gage rating curves) taken twice per month, May through September at the ten sites listed as "HRWC" in Figure 1. In addition, investigative sampling will be conducted upstream of sites that exhibit the highest concentrations or loads. Upstream sites will be selected strategically to segment drainages and isolate areas with different potential sources. Storm samples will be collected opportunistically from hot spot sites where water level sensors are installed. A minimum of 4 samples will be collected from each storm event. Resulting concentrations will be compiled into event mean concentrations (EMC). EMCs will be compared with predicted concentrations from long-term monitoring to determine if storm event loading is significant. Further methodological details can be reviewed in the program's DEQ-approved Quality Assurance Project Plan (QAPP) (Appendix A).

Table 2. Middle Huron River Watershed Monitoring and Evaluation

Monitoring Site[1]	Parameter Target	Type of Analysis	Protocol	Frequency	Responsible Party
Huron River Adopt (24,26,61,62) Middle Huron (MH01) MDEQ (HR1, HR2, F1, F2 F3, F4, B1, B2, B3, B4)	S,N,DO,T,I, B, Bio[2]	Stream Habitat Assessment	HRWC Protocol	3- 5 yr interval	HRWC, MDEQ[3]
		Total Suspended Solids	SM20 2540 D[5]	1x/Mo Apr-Sept	HRWC to AA WTP[4]
		Total Phosphorus, Nitrates, Nitrites	SM20 4500	1x/Mo Apr-Sept	HRWC to AA WTP; MDEQ
		Temp, DO, pH, Conductivity	Horiba U10 Meter	1x/Mo Apr-Sept	HRWC
		E. coli	SM20 9213 D	1x/Mo Apr-Sept	HRWC to AA WTP
		Benthic Macroinvertebrates	HRWC Protocol	2-3x/year	HRWC, MDEQ
		Lake Chemistry	MDEQ protocols	1x/Mo Apr-Sept	MDEQ[3]
Mill Creek Adopt (31,32,33,34,55, 57,79,80) Middle Huron (MH02A, MH02B)	S, N, DO, T, I, B, Bio	Stream Habitat Assessment	HRWC Protocol	3- 5 yr interval	HRWC, MDEQ
		Total Suspended Solids	SM20 2540 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Total Phosphorus, Nitrates, Nitrites	SM20 4500	1-2x/Mo + Rain event	HRWC to AA WTP; MDEQ
		Temp, DO, pH, Conductivity	Horiba U10 Meter	1-2x/Mo Apr-Sept	HRWC
		E. coli	SM20 9213 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Benthic Macroinvertebrates	HRWC Protocol	2-3x/year	HRWC, MDEQ
Boyden Creek Adopt (2,3,4)	Bio, T, I	Stream Habitat Assessment	HRWC Protocol	3- 5 yr interval	HRWC
		Benthic Macroinvertebrates	HRWC Protocol	2-3x/year	HRWC
		Conductivity	HRWC Protocol	2-3x/year	HRWC
		Avg Max Daily Summer Temp	HRWC Protocol	3 yr interval:Summer	HRWC
Honey Creek Adopt (18,19,20,22) Middle Huron (MH03)	S, N, DO, T, I, B, Bio	Stream Habitat Assessment	HRWC Protocol	3- 5 yr interval	HRWC, MDEQ
		Total Suspended Solids	SM20 2540 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Total Phosphorus, Nitrates, Nitrites	SM20 4500	1-2x/Mo + Rain event	HRWC to AA WTP; MDEQ
		Temp, DO, pH, Conductivity	Horiba U10 Meter	1-2x/Mo Apr-Sept	HRWC
		E. coli	SM20 9213 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Benthic Macroinvertebrates	HRWC Protocol	2-3x/year	HRWC, MDEQ

Monitoring Site	Parameter Target	Type of Analysis	Protocol	Frequency	Responsible Party
Allens Creek Middle Huron (MH04)	S, N, DO, T, I, B	Total Suspended Solids	SM20 2540 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Total Phosphorus, Nitrates, Nitrites	SM20 4500	1-2x/Mo + Rain event	HRWC to AA WTP; MDEQ
		Temp, DO, pH, Conductivity	Horiba U10 Meter	1-2x/Mo Apr-Sept	HRWC
		E. coli	SM20 9213 D	1-2x/Mo + Rain event	HRWC to AA WTP
Traver Creek Adopt (42,43) Middle Huron (MH05A, MH05B)	S, N, DO, T, I, B, Bio	Stream Habitat Assessment	HRWC Protocol	3- 5 yr interval	HRWC, MDEQ
		Total Suspended Solids	SM20 2540 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Total Phosphorus, Nitrates, Nitrites	SM20 4500	1-2x/Mo + Rain event	HRWC to AA WTP; MDEQ
		Temp, DO, pH, Conductivity	Horiba U10 Meter	1-2x/Mo Apr-Sept	HRWC
		E. coli	SM20 9213 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Benthic Macroinvertebrates	HRWC Protocol	2-3x/year	HRWC, MDEQ
Millers Creek Adopt (35,72,73,74,75, 76,77,78,86) Middle Huron (MH08)	S, N, DO, T, I, B, Bio	Stream Habitat Assessment	HRWC Protocol	3- 5 yr interval	HRWC, MDEQ
		Total Suspended Solids	SM20 2540 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Total Phosphorus, Nitrates, Nitrites	SM20 4500	1-2x/Mo + Rain event	HRWC to AA WTP; MDEQ
		Temp, DO, pH, Conductivity	Horiba U10 Meter	1-2x/Mo Apr-Sept	HRWC
		E. coli	SM20 9213 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Benthic Macroinvertebrates	HRWC Protocol	2-3x/year	HRWC, MDEQ
Malletts Creek Adopt (27,28,29,56) Middle Huron (MH07)	S, N, DO, T, I, B, Bio	Stream Habitat Assessment	HRWC Protocol	3- 5 yr interval	HRWC, MDEQ
		Total Suspended Solids	SM20 2540 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Total Phosphorus, Nitrates, Nitrites	SM20 4500	1-2x/Mo + Rain event	HRWC to AA WTP; MDEQ
		Temp, DO, pH, Conductivity	Horiba U10 Meter	1-2x/Mo Apr-Sept	HRWC
		E. coli	SM20 9213 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Benthic Macroinvertebrates	HRWC Protocol	2-3x/year	HRWC, MDEQ

Monitoring Site	Parameter Target	Type of Analysis	Protocol	Frequency	Responsible Party
Swift Run	S, N, DO, T, I, B, Bio	Stream Habitat Assessment	HRWC Protocol	3- 5 yr interval	HRWC, MDEQ
Adopt (41)		Total Suspended Solids	SM20 2540 D	1-2x/Mo + Rain event	HRWC to AA WTP
Middle Huron (MH09)		Total Phosphorus, Nitrates, Nitrites	SM20 4500	1-2x/Mo + Rain event	HRWC to AA WTP; MDEQ
		Temp, DO, pH, Conductivity	Horiba U10 Meter	1-2x/Mo Apr-Sept	HRWC
		E. coli	SM20 9213 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Benthic Macroinvertebrates	HRWC Protocol	2-3x/year	HRWC, MDEQ
Fleming Creek	S, N, DO, T, I, B, Bio	Stream Habitat Assessment	HRWC Protocol	3- 5 yr interval	HRWC, MDEQ
Adopt (9,11,12,13,84)		Total Suspended Solids	SM20 2540 D	1-2x/Mo + Rain event	HRWC to AA WTP
Middle Huron (MH06)		Total Phosphorus, Nitrates, Nitrites	SM20 4500	1-2x/Mo + Rain event	HRWC to AA WTP; MDEQ
		Temp, DO, pH, Conductivity	Horiba U10 Meter	1-2x/Mo Apr-Sept	HRWC
		E. coli	SM20 9213 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Benthic Macroinvertebrates	HRWC Protocol	2-3x/year	HRWC, MDEQ
Superior Drain #1	S, N, DO, T, I, B	Total Suspended Solids	SM20 2540 D	1-2x/Mo + Rain event	HRWC to AA WTP
		Total Phosphorus, Nitrates, Nitrites	SM20 4500	1-2x/Mo + Rain event	HRWC to AA WTP; MDEQ
Middle Huron (MH10)		Temp, DO, pH, Conductivity	Horiba U10 Meter	1-2x/Mo Apr-Sept	HRWC
		E. coli	SM20 9213 D	1-2x/Mo + Rain event	HRWC to AA WTP

1) Adopt = HRWC Adopt-a-Stream; Middle Huron = Middle Huron Partners tributary nutrient monitoring; MDEQ = DEQ lake monitoring

2) S= Sediment; N= Nutrients; DO= Dissolved Oxygen; T= Temperature; I= Ions; B= Bacteria; Bio= Biota

3) Specific sites will be included as part of MDEQ Water Bureau's rotational water quality monitoring program; Lakes program monitors water quality monthly

4) HRWC staff and volunteers to collect samples and deliver to Ann Arbor Water Treatment Plant for analysis under their direction.

5) Analytical protocols follow “Standard Methods for the Examination of Water and Wastewater”, 20th edition, by the American Waterworks Association

Insert Figure 1 (monitoring.pdf)

Priority Project Implementation

Targeted monitoring of potential hot spots will help confirm and better define critical areas. The associated loadings of phosphorus will be quantified with initial monitoring. The data also will help to obtain better projections for the likely impact (i.e. loading reductions) of potential projects. The monitoring plan and the monitoring itself also will address the need to establish a better baseline for evaluating the success of future implementation projects, as well as progress toward load reduction targets. Once we have obtained measures of phosphorus concentrations and loading, both during various dry weather flow and during storm events, a baseline will be established that can be used to determine the nature and degree of reductions (or increases) from future projects. This approach has been utilized with great success broadly in the Middle Huron, where geographically specific phosphorus reductions were measured following the implementation of a phosphorus fertilizer ordinance.

Once sources or hot spots are identified, TMDL Implementation Plans can be developed or updated. Implementation plans have already been developed and partially implemented for three of the five approved TMDLs in the Middle Huron. Existing plans are included with this plan as follows:

- Ford and Belleville Lakes TMDL for Phosphorus (Draft) – Appendix B,
- Middle Huron River TMDL for Bacteria – Appendix C, and
- Malletts Creek TMDL for Biota – Appendix D.

The current plans contain a number of recommended activities as part of an "Action Plan." However, many of these activities are broadly defined and lack specificity in location, responsible agency, timeline and cost. The proposed project will address some of these deficiencies by providing monitoring information that will narrow critical area definitions and target areas for employing BMPs. Among other items, these plans will be updated with information on the following:

- completed and ongoing activities to date to reduce TMDL pollutants from point and nonpoint sources;
- measurement data and information to evaluate the success of completed projects;
- assessment of new priority targets for project implementation, including source identification;
- an updated list of prioritized projects and activities complete with information on the party responsible, milestones, timelines, costs and estimated TMDL pollutant load reductions; and
- a map (and associated GIS with attribute information) of location-specific completed, ongoing, and planned activities.

All five TMDL Implementation Plans are scheduled to be finalized, in consultation with DEQ staff, by September 2011, well ahead of the schedule prescribed by TMDL guidance documents.

Work Plan and Schedule

A complete work plan and schedule for implementation of this plan, which is based on a project currently being developed with funding from the DEQ is included in Appendix E.

Permittee Responsibilities, Reporting and Progress Evaluation

HRWC will have primary responsibility for developing and implementing the monitoring plan, TMDL Implementation Plans and Progress Evaluation reports for this alternative approach. All permittees listed in "Participating Permittees" will be responsible for the following tasks:

- contribute relevant data and information upon request from HRWC;
- review the monitoring plan and assist in potential site selection;
- approve and support the monitoring plan and its implementation;
- provide past and ongoing project information and evaluation data for projects within their jurisdiction;
- assist with project identification and site selection for activities to address TMDL pollutant sources or hot spots within their jurisdiction;
- provide reasonable and accurate information about potential project commitments, milestones, timelines, costs and pollutant reduction estimates;
- review and approve final TMDL implementation plans;
- review and approve a monitoring report; and
- submit a progress report on TMDL activities according to timelines established in each permittee's COC.

All activities under this plan will be tracked and reported within progress reports as defined in Part I.B.1 of the watershed permit. Watershed monitoring data will be included and evaluated to indicate success or failure of activities under this plan. Activities to develop and implement TMDL Implementation Plans will be reported for both watershed-wide activities and within each permittee's regulated area.

Benefits, Drawbacks and Effectiveness of This Alternative Approach

The approach toward TMDL Implementation outlined in this plan will be more effective than the standard permit requirements specified in Part I.A.4.b.1 of the watershed permit for several reasons. First, this approach will be more cost-effective because it takes advantage of existing TMDL Implementation Plans, thus eliminating a duplication of effort. Second, the monitoring plan goes farther? (to more locations) and deeper (across more parameters) than what is required under the permit. Third, the monitoring plan will result in a more effective targeting of monitoring locations. Rather than focusing on a limited number of discharge points somewhat randomly, this plan's approach targets monitoring based on existing and ongoing data from ambient sites upstream to discharge points. This approach is far more likely to result in a definition of TMDL pollutant sources. Fourth, the alternative approach reduces the need for wet weather monitoring by sampling in free-flowing channels across a variety of flow conditions. This approach is easier to implement and will result in a greater number of useful data points. Finally, the alternative approach will result in the implementation of activities to reduce TMDL pollutants much earlier than the approach prescribed by the permit since it builds upon information gathered through existing monitoring efforts.

The main potential drawback of this alternative approach is that it will likely result in fewer wet weather data points from large discharge points. However, large discharge points would only be left unmonitored if existing data suggests that they are unlikely to be contributing significantly to TMDL pollutant loads.

In the unlikely event that the alternative approach described in this plan is determined, through the assessment of evaluation data, to be ineffective at discovering TMDL pollutant hot spots or sources, the watershed partners will revise the plan or revert to a plan that is

more directly consistent with the permit prescriptions. Such a decision will be made following the completion of the evaluation report in September 2011.