COLLABORATIVE TMDL for *Escherichia coli* (*E.coli*)

For St Clair County Health Department & Nested Jurisdictions

St. Clair County, MI

I. Introduction

The *Escherichia coli* (*E.coli*) Total Maximum Daily Load (TMDL) has been established for the following surface water bodies in St. Clair County:

- St. Clair River – Entire river from Lake Huron to Lake St. Clair
- St. Clair River Chrysler Beach – 0.1 mile beach in Marysville, MI
- Black River – 2.5 mile
- Lake St. Clair Metropolitan and Memorial Beaches of Macomb County

This TMDL plan is NOT to be construed as a plan to address the *E. coli* issues of Metropolitan Beach or Memorial Beach on Lake St. Clair, in Macomb County, south of the Clinton River's discharge point. The plan is to be applied only to those designated impaired surface waters in St. Clair County's UA.

The affected use is for "Partial and total body contact recreation" at these locations the impaired designated uses addressed by this TMDL are total and partial body contact recreation. 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) states that this water body is to be protected for total body contact recreation from May 1 to October 31 and year-round for partial body contact recreation.

The target levels for these designated uses are the ambient *E. coli* standards established in Rule 62 of the WQS as follows:

R 323.1062 Microorganisms.
Rule 62. (1) All waters of the state protected for total body contact recreation shall not contain more than 130 E. coli per 100 milliliters, as a 30-day geometric mean. Compliance shall be based on the geometric mean of all individual samples taken during 5 or more sampling events representatively spread over a 30-day period. Each sampling event shall consist of 3 or more samples taken at 2 representative locations within a defined sampling area. At no time shall the waters of the state protected for total body contact recreation contain more than a maximum of 300 E. coli per 100 milliliters. Compliance shall be based on the geometric mean of 3 or more samples taken during the same sampling event at representative locations within a defined sampling area.

Rule 62. (2) All surface waters of the state protected for partial body contact recreation shall not contain more than a maximum of 1,000 E. coli per 100 milliliters.

Compliance shall be based on the geometric mean of 3 or more samples, taken during the same sampling event, at representative locations within a defined sampling area.

The target for sanitary wastewater discharges is:
Rule 62. (3) Discharges containing treated or untreated human sewage shall not contain more than 200 fecal coliform bacteria per 100 milliliters, based on the geometric mean of all of 5 or more samples taken over a 30-day period, nor more than 400 fecal coliform bacteria per 100 milliliters, based on the geometric mean of all of 3 or more samples taken during any period of discharge not to exceed 7 days. Other indicators of adequate disinfection may be utilized where approved by the department.

The targets for this TMDL are 300 *E. coli* per 100 milliliters (mL) expressed as a daily maximum load and concentration from May 1 to October 31 (i.e., daily target) and 130 *E. coli* per 100 mL as a 30-day geometric mean, expressed as a concentration (i.e., monthly target). An additional target is the partial body contact standard of 1,000 *E. coli* per 100 mL as a daily maximum concentration year-round. Achievement of the total body contact daily maximum target is expected to result in attainment of the partial body contact standard.

II. Procedure for Identifying and prioritizing BMPs currently being implemented for the TMDL in the Urbanized Area within the jurisdictional boundary of St. Clair County. (Q.86)

The level of detail in identifying and prioritizing BMPs to address the *E.coli* TMDL in St. Clair County varies with the extent of local involvement, stakeholders, and the level of involvement of local governing institutions. Implementation of a procedure to identify and prioritize BMPs will be as follows:

1. St. Clair County will continue its involvement with the St. Clair County NPDES MS4 Advisory Group for Stormwater Management and cooperate with those developing a collaborative plan to address the regional issue of the *E.coli* TMDL.
2. St. Clair County will also work with local stakeholder groups which are involved in the ongoing work with the Belle, Black, Northeastern and Pine River Watershed Advisory Groups to identify BMPs to implement within economically feasible implementation parameters.
3. St. Clair County will review existing Watershed Management Plans (WMPs) to determine which BMPs these plans have identified to address the E.coli TMDL which is evaluated in the WMPs.
4. St. Clair County will review the existing *E.coli* TMDL adopted by the MDEQ in August 2012 for recommended BMPs.
5. The above mentioned TMDL document will also be used to assist in prioritizing BMPs to address the *E.coli* TMDL on the identified sub-watersheds or sections of the Black River which are in the Urbanized Area of St. Clair County.

6. St. Clair County will cooperate with the St. Clair County NDPES MS4 Group and other stakeholders to revise this TMDL procedure to assure it can be realistically implemented. This will be done at least once per permit cycle.
7. Once a BMP is implemented it will be reviewed at least once a permit cycle to determine effectiveness. Or, if it is an administrative BMP if updates or revisions will be necessary.
8. Criteria for review, updates or revisions of a BMP will be completed by year three of a permit cycle.
9. Any changes in identification of BMPs or prioritization of BMPs will be reported in a scheduled progress report during a permit cycle.

III. List of Prioritized BMPs currently being Implemented during the permit cycle to make progress towards achieving a load reduction. (Q.87)

There are several best management practices (BMPs) available to reduce *E. coli* in waterways and surface waters of the state. They can generally be divided into two groups: source control and pre-storm pipe drainage reduction.

As its name implies, **source control strategies** have the goal of reducing pollution at the source. They can involve both structural and non-structural BMPs and many times, they can be more cost-effective than pre-storm drainage reduction strategies. Examples of source control strategies for *E. coli* reduction currently being implemented by St. Clair County and which they have some control over are:

Table 1. Source Control Strategies

BMPs or Strategies currently in place	Tasks	Targeted TMDL
Illicit Discharge Elimination Program (IDEP)	Outfall sampling, source tracking, dry weather screening, video/TV of drains, smoke / dye testing	*E. coli*
Runoff reduction	Use of green infrastructure to transport stormwater, e.g., bioswales, porous paving, rain gardens, infiltration basins.	*E. coli*
On Site Sewage Systems (OSSS) Program	Educational programs, inspections, information for repair and replacements as administered by the County Health Department	*E. coli*
Pet waste management	Educational programs, pet waste disposal products at county parks	*E. coli*
Storm sewer maintenance/cleaning	Catchbasin cleaning, street sweeping, road kill pickup	*E. coli*

Low Impact Development (LID)	LID Ordinances, practices for new developments	*E. coli*
Wildlife / waterfowl management	Population control, especially geese, ducks at county/city parks with lake or river frontage.	*E. coli*

The above table is also prioritized with the order they are listed. If this priority changes when the table is reviewed during the permit cycle or before the first progress report of this permit period, then the table will be revised and an updated table with the new priority ranking will be submitted with the progress report.

The **Pre-Storm Pipe drainage reduction BMPs or Strategies** are those activities which involve the use of more structural controls to reduce bacterial loadings. This can be achieved by many methods such as intercepting a site's stormwater runoff and using physical or biological BMPs to effect pollutant removal rates. These removal rates can vary greatly depending on the literature researched but can range from 20% up to 100%, again dependent on many natural setting variables.

Examples of current practices for pre-storm pipe drainage are:

Table 2. Pre-Storm Pipe Drainage

BMPs or Strategies currently in place	Tasks	Targeted TMDL
Dry Detention Basins	UV Light exposure, settling, infiltration	*E. coli*
Wet Detention Basins	UV Light exposure, settling, biotic predation	*E. coli*
Bioswales/bioretention	UV Light exposure, settling, infiltration, drying	*E. coli*
Vegetated Filter strips	Filtration, infiltration	*E. coli*
Riparian buffers	Exclusion from stream, drains or rivers, filtration, infiltration	*E. coli*
Constructed wetlands	UV Light exposure, settling, infiltration, biotic predation	*E. coli*
Infiltration trenches/swales	Infiltration	*E. coli*

As other BMPs or strategies are identified and implemented; or are already being implemented, they will be added to this list and reported during a scheduled progress report submitted for the NPDES MS4 permit during the permit cycle.

IV. Monitoring Plan for assessing BMP effectiveness currently implemented or to be implemented in making progress towards achieving TMDL pollutant load reduction. (Q88)

It is well established by many sources that monitoring a riverine system is not an effective means to determine if best management practices are effective. There are too many variables to consider, such as weather conditions, temperature, time of year the sampling occurs, upstream conditions and the simple fact that a temporal based sampling method is just not accurate. Another factor is that sampling for E. coli does not truly provide a basis for a problem, this is just an indicator species. To be truly effective there must be a cost-effective method to determine host source. Basically, is it human or animal, if animal what animal, domestic or wild?

Proposed Monitoring Activity during the permit cycle:
St. Clair County has 6 monitoring sites established on the Black River within the Urbanized Area, which were utilized during the study establishing the TMDL Load for *E.coli* for the Black River. There will also be three sites at the following locations in St. Clair County (See Figure 2): County Law Enforcement Complex, Bunce Creek, and King Rd (Owned by the St. Clair County Road Commission). These sites can be characterized as surface waters or a variant of an MS4, and there are no direct wastewater discharges at these sites. In review of the nine sites it is felt that they are representative of the contributing watershed for the TMDL for the St. Clair River. Also, four of the sites on the Black River provide indications of what is flowing into that TMDL reach from other sources, such as the Howe-Brandymore Drain, Stocks Creek, Lake Huron, or the upper reaches of the Black River. The monitoring sites are shown on Figure 1 and Figure 2 on the next pages. In conclusion, the monitoring during a permit cycle will consist of 1 sample taken at each of the nine (9) monitoring sites for one sampling event (9 total samples). This will be done twice during the permit cycle during year 2 and year 4. A total of 18 samples will be taken during the permit cycle A geometric mean will be completed for each of the monitoring sites collective sample and reported on a copy of the table shown below in one progress report during a permit cycle.

Table 3. Sample Reporting Form

DATE of sampling:		**Weather Conditions:**	
Temperature (°F)			
Sample Site	**Year 2 cfu/100mL**	**Year 4 cfu/100mL**	**Geometric Mean cfu/100mL**
M-29 Outlet of Black River			
M-17 At Fort Gratiot Twp. Park			
M-09 At Old North River Road			
M-11 Howe - Brandymore Drain			
M-10 Black River Canal			
M-47 Stocks Creek			
County Law Enforcement			
Bunce Creek			
King Rd. (SCCRC)			
FLOW CONDITIONS			

Sampling criteria shall be to the same standards as performed in the 2009 TMDL study on the Black River, EPA method 1103.1 will be used for enumeration of *E.coli.* The SCCHD lab will be used for the processing of the samples taken.

If funding is available and provided for monitoring (e.g. a water quality monitoring grant) then the SCCHD may consider doing additional surface water monitoring for the public health of residents. However, reporting for the NPDES MS4 permit will be limited to once per permit cycle if funding is not available.

In addition, based on available funding the St. Clair County Health Department will monitor two beaches on the St. Clair River (Marysville and Marine City) weekly from May until September for *E. coli*.

Figure 1. Locations of the monitoring sites to be used for MS-4 Permit Compliance Monitoring once per permit cycle.

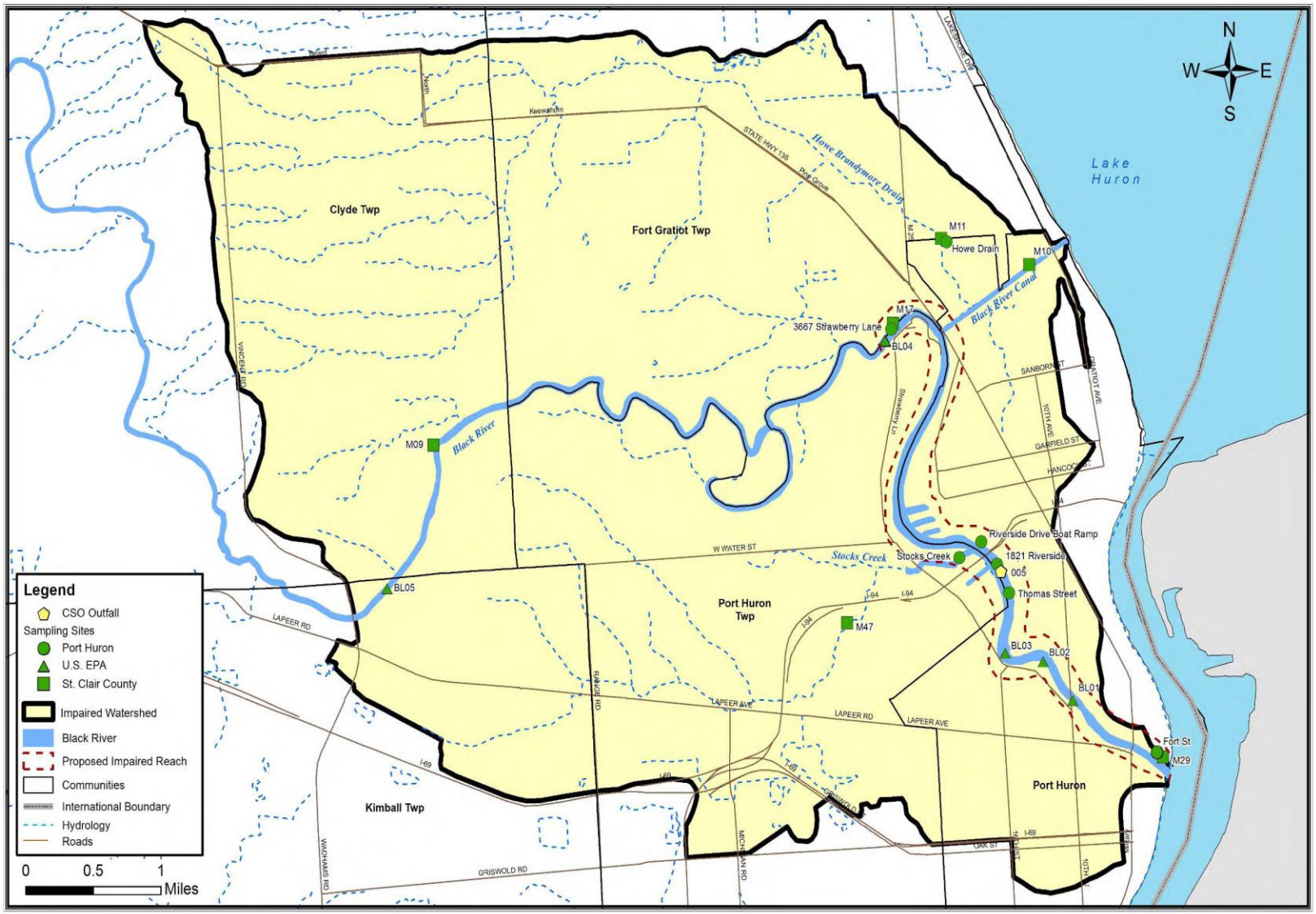

Figure 2: Three additional sites in St. Clair County. Sites shown at yellow pin.