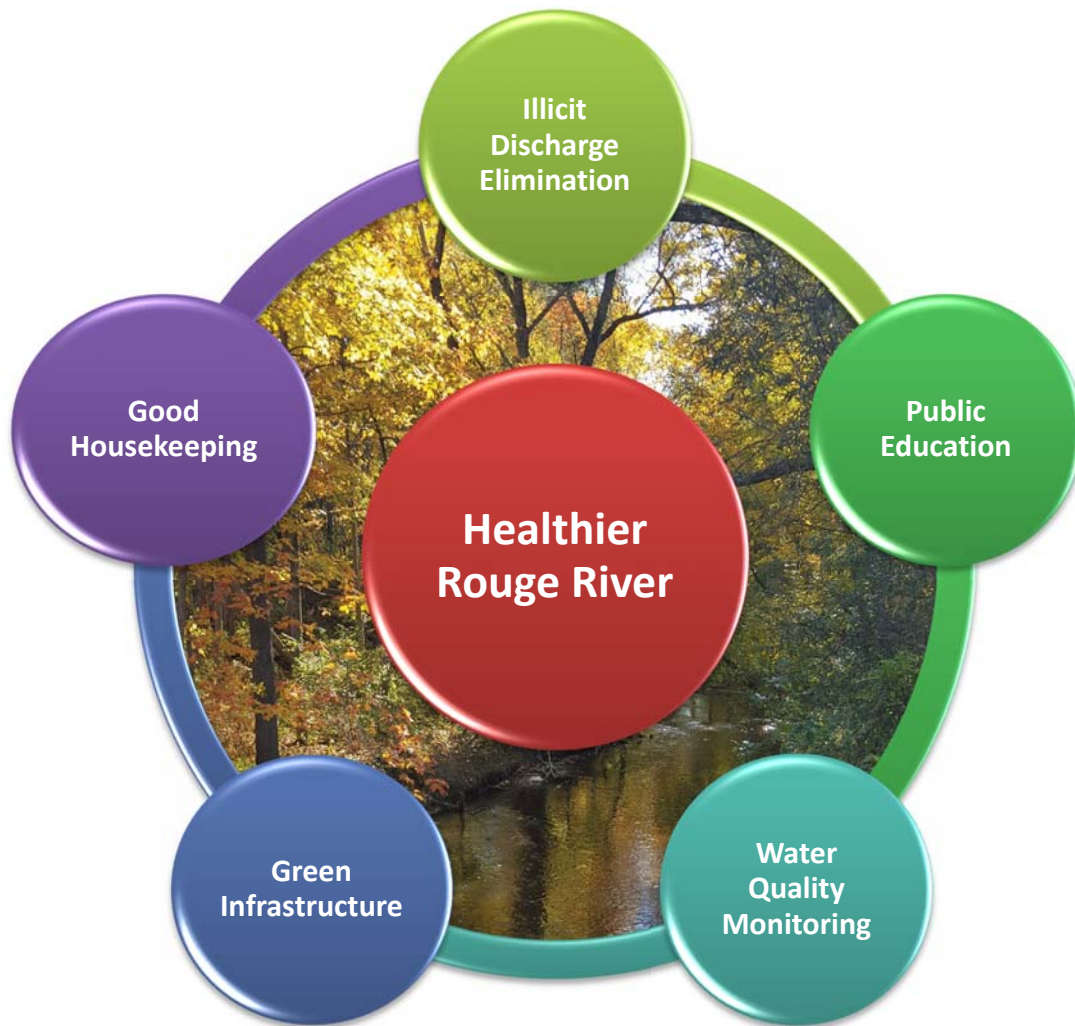


# ROUGE RIVER COLLABORATIVE TOTAL MAXIMUM DAILY LOAD (TMDL) IMPLEMENTATION PLAN FOR MUNICIPAL STORMWATER PERMITEES



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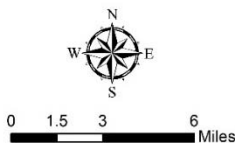
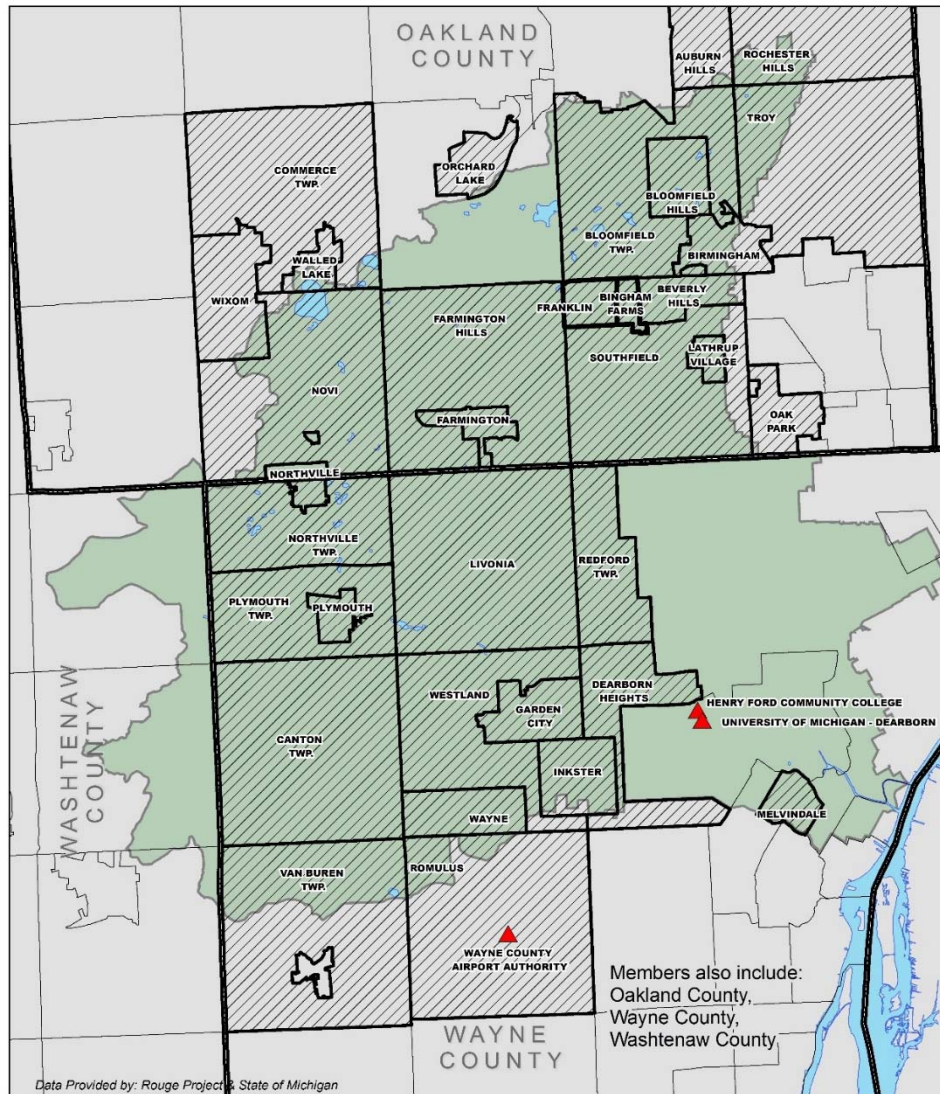
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## A. Introduction

The Alliance of Rouge Communities (ARC), a 501(c)(3) organization, is a voluntary public watershed entity currently comprised of municipal governments, counties, schools, and cooperating partners as authorized by Part 312 (Watershed Alliances) of the Michigan Natural Resources and Environmental Protection Act (MCL 324.101 to 324.90106) as amended by Act No. 517, Public Acts of 2004. The purpose of the ARC is to provide an institutional mechanism to encourage watershed-wide cooperation and mutual support to meet water quality permit requirements and to restore beneficial uses of the Rouge River to the area residents.



**Alliance of Rouge Communities**

ARC Member Communities

February 2016

This Collaborative Plan (Plan) presents the watershed-wide approach to effectively and efficiently address the pollutants contained within approved Total Maximum Daily Load (TMDL) Assessments for the Rouge River watershed. This Plan was developed by the Technical Committee of the Alliance of Rouge Communities (ARC) in response to the requirements under the State of Michigan’s Permit Application for Discharges of Storm Water to Surface Waters of the State from a Municipal Separate Storm Sewer System (MS4), revised October 2015.

This Plan is intended to meet the TMDL elements of the permit application: questions 85 – 88. These requirements are as follows:

- Provide a procedure for identifying and prioritizing BMPs to reduce the TMDL pollutants,
- Provide a list of BMPs that will be implemented to reduce the TMDL pollutants, and
- Provide a monitoring plan to assess the effectiveness of the BMPs.

The U.S. Environmental Protection Agency has approved three TMDL Assessments within the Rouge River watershed as listed below. The *E. coli* and biota assessments apply to the entire watershed, while the dissolved oxygen (DO) assessment only applies to the City of Northville, Northville Township and the City of Novi.

- *Escherichia coli* (*E. coli*) (MDEQ, 2007a)
- Biota (MDEQ, 2007b)
- Dissolved Oxygen for Johnson Creek (up to 6 Mile Road) (MDEQ, 2007c)

This Plan will address each of these parameters within the limits of the MS4 permit. **As such, this should not be considered an implementation plan to address all sources, only those under the authority of the MS4 permit.**

This Plan will be implemented by the participating communities through September 30, 2022, which is the end of the permit cycle for the Rouge River watershed. The list of permittees participating in this Plan can be found in **Attachment A**.

## B. BACKGROUND

Within the TMDL Assessments, the MDEQ established primary and secondary targets for municipal stormwater permittees as shown in **Table 1**<sup>1</sup>. The secondary target parameters can be thought of as surrogates that will be useful in determining the success of the selected best management practices that are needed to reduce pollutant loads. In all three assessments, the MDEQ opted to assign collective targets to the MS4 permittees rather than individual targets. This would seem to indicate that the MDEQ recognizes that the impairments need to be addressed on a watershed-basis rather than within jurisdictional boundaries. It should be noted that the *E. coli* target is equivalent to the state’s full body contact standards for recreational waters which will be very difficult to achieve in urban stormwater runoff.

<sup>1</sup> For ease of understanding, this document refers to concentration-based, rather than load-based targets. The pollutant load targets listed in the TMDLs are based on these concentrations.

**Table 1 – TMDL Targets for Municipal Stormwater Permittees**

Parameter	TMDL Targets for MS4 Permittees Primary (1°) and Secondary (2°)	Notes
<i>E. coli</i>	1°: 300 cfu/100 ml and 130 cfu/100 ml	Daily geometric mean value 30 day geometric mean value
Biota	1°: Procedure 51 scores ≥ Acceptable 2°: Suspended solids ≤ 80 mg/l	For 2 successive years Annual average during wet weather
Dissolved Oxygen	1°: 7 mg/L 2°: Suspended solids ≤ 80 mg/l*	

\*This concentration is presumed for the purposes of this document, but it was not explicitly listed in the DO TMDL.

### B.1. *E. coli* Conditions

Between May and October 2005, the MDEQ evaluated *E. coli* conditions on a routine basis during a range of weather conditions at approximately 70 locations across the watershed. Issues were found during both dry and wet weather conditions at most sites as indicated in **Table 2**. MDEQ also determined that human sources of *E. coli* were likely present at a few sites based on DNA analyses. However, only a few samples with elevated *E. coli* levels were evaluated for the presence of human DNA (MDEQ, 2007a).

**Table 2 – Summary of *E. coli* Data from the *E. coli* TMDL**

River Branch	Range of Exceedances by Site (% of samples above the standard)		
	Above the Monthly Standard of 130 cfu/100 ml	Above the Daily Standard of 300 cfu/100 ml	Above the Partial Body Contact Standard of 1,000 cfu/100 ml
Lower	89 – 100%*	41 – 100%	9 – 83%
Main	59 – 100%	40 – 100%	0 – 71%
Middle	89 – 100%	39 – 100%	9 – 91%
Upper	100%	90 – 100%	48 – 86%

\*Table interpretation note: at least one site had 89% of samples exceed the monthly standard and at least one site had all (100%) samples exceed the monthly standard. The remaining sites fell within this range.

### B.2. Suspended Solids Conditions

For the Biota TMDL, the MDEQ calculated the mean suspended solids concentration of each major river branch using data collected by the Rouge Project between 1994 and 2001 (See **Table 3**). In addition, an annual sediment load of 33,800 tons/year was calculated using the Simple Method model. Based on the 80 mg/l value, a suspended solids loading target of approximately 29,000 tons/year was established. This would require a 15% reduction in sediment loads from stormwater permittees (MDEQ, 2007b).

**Table 3. Suspended Solids Concentrations by River Branch**

River Branch	Mean Suspended Solids Concentration (mg/l)	
	Wet Weather*	Dry Weather
Lower	191	37
Main	114	27
Middle	95	19
Upper	152	30
Watershed-wide	138	28

\*The TMDL target is 80 mg/l.



### B.3. Dissolved Oxygen Conditions

For dissolved oxygen, the MDEQ determined that 3% of samples collected within the TMDL reach were below the target of 7 mg/l. This result was primarily based on 43,000 hourly DO values collected at 7 Mile Road by the Rouge Project between 1994 and 1996. The instances of low DO occurred primarily during low flow (non-runoff) conditions and high flows often resulted in higher levels of DO. Based on available data of other suspect pollutants, the MDEQ determined sediment oxygen demand was the primary factor affecting the low DO levels in Johnson Creek. Although they did note that low base flow conditions were also contributing to the low DO levels. It is noted that data used in this assessment was at least 10 years old which may not reflect conditions at the time the assessment was written.

Based on modeling, the MDEQ estimated that the existing suspended sediment load from MS4s was 650 tons/year and that an 85% reduction was needed to meet the target of 96 tons/year. This should result in the creek meeting the 7 mg/l DO target during low flow conditions (MDEQ, 2007c). Note that the MDEQ did not explicitly state the concentration of suspended sediment needed to meet the target, only the load.

### B.4. Pollutant Sources

The Alliance of Rouge Communities (ARC) determined the suspected sources and causes associated with each of the TMDL parameters as shown in Tables 4 and 5. Only those sources regulated under the MS4 permit are included in these tables.

**Table 4 – Sources and Causes of *E. coli***

Suspected Sources*	Suspected Causes
Failing Septic Systems (OSDS)	<ul style="list-style-type: none"> <li>Historical lack of septic system maintenance, education, inspection and correction.</li> <li>Undetected or uncorrected illicit discharges.</li> </ul>
Illicit Sanitary Connections to a Storm System	<ul style="list-style-type: none"> <li>Undetected or uncorrected illicit discharges.</li> </ul>
Pet Waste/Urban Animal Waste	<ul style="list-style-type: none"> <li>Little knowledge of the importance of pet waste /urban animal waste management.</li> <li>Loss of pervious areas via urban development.</li> </ul>
Re-suspended Sediment	<ul style="list-style-type: none"> <li>Excessive peak discharges</li> <li>Unsatisfactory infrastructure maintenance.</li> </ul>

\*Additional sources not regulated under the MS4 permit but contributing to the pollutant are uncontrolled combined sewer overflows, sanitary sewer overflows, sanitary sewer maintenance, wastewater treatment plant flows, and runoff impacted by animal waste from agricultural lands.

**Table 5 – Sources and Causes of Sediment**

Suspected Sources*	Suspected Causes
Roads/Highways/Bridges and Related Infrastructure on Municipal Properties	<ul style="list-style-type: none"> <li>Loss of pervious areas via urban development.</li> <li>Insufficient storm water infrastructure maintenance.</li> </ul>

\*Additional pollutant sources not regulated under the MS4 permit but likely contributing to the pollutant are eroding streambanks, and runoff from agricultural lands and communities not regulated to discharge stormwater.

## B.5. Summary

Based on the information discussed above, addressing the indicator pollutants/parameters shown in **Table 6** will make progress toward addressing the impairments identified in the TMDLs.

**Table 6. Indicators to be Addressed in this Plan**

Indicators	Associated TMDLs
<i>E. coli</i>	<i>E. coli</i>
Suspended Solids	Biota Dissolved Oxygen <i>E. coli</i>
Stream flow	Biota Dissolved Oxygen <i>E. coli</i>

## C. BMP Prioritization Procedure

Several criteria were used to prioritize the best management practices (BMPs) that should be implemented to address the impairments. These criteria are as follows:

- A. Ability of the BMP to affect human health impacts caused by direct contact with the river.
  - Low, moderate, high
- B. Ability of the BMP to impact the concentrations of *E. coli* and suspended solids in the river and/or reduce peak stream flows.
  - Low, moderate, high
- C. Ability of the BMP to impact multiple TMDL parameters
  - Low, moderate, high
- D. Anticipated level of impact of the BMP as compared to added cost to implement it.
  - Low, moderate, high
- E. Legal authority to implement the BMP.
  - Yes or no
- F. Are there prerequisite projects that need to be completed before the BMP can be implemented?
  - Yes or no.

This process will be reviewed and updated, if necessary, by the ARC before August 30, 2022. The review will be based on the results of monitoring data and other measurables provided in Section E.

## D. Selected BMPs

Using the criteria listed above, several BMPs were evaluated for implementation as shown in Attachment B. Those BMPs with the highest scores are listed in **Table 7** along with the associated TMDL pollutant. These BMPs will be implemented by ARC members on an ongoing basis or according to the frequencies/schedules listed in the collaborative plans and stormwater management plans.

**Table 7 – Best Management Practices to be Implemented**

Best Management Practice	Associated TMDL Parameter
TMDL #1: Activities listed in the Rouge River Watershed Collaborative Illicit Discharge Elimination Plan.	<i>E. coli</i>
TMDL #2: Review and approval of developer stormwater plans following the new Post-Construction Stormwater Standards.	SS and Stream Flow
TMDL #3: Construction of the stormwater management measures for permittee-owned projects on public property following the new Post-Construction Stormwater Standards.	SS and Stream Flow
TMDL #4: Activities listed in the Rouge River Watershed Collaborative Public Education Plan including education on septic system maintenance, the impacts of improperly disposed of pet waste, the impacts of feeding waterfowl, and the pollution complaint line.	<i>E. coli</i> and SS
TMDL #5: Miles of streets swept and/or number of catch basins cleaned, actual vs. planned as listed in each permittee’s Stormwater Management Plan	SS and <i>E. coli</i>

Note: SS=Suspended solids

## E. Evaluating Effectiveness

The effectiveness of this Plan will be measured using the tracking metrics indicated in **Table 8**. This information will be included in the permittees’ bi-annual report to the MDEQ. The evaluation dates provided below presume that all permits for the Plan participants will be issued by October 1, 2017.

**Table 8 – Tracking Metrics for Evaluating Effectiveness**

Metric	Milestone	BMP*
A. Success of Collaborative IDEP Plan	See plan	TMDL #1
B. Status of adoption of Post-Construction Stormwater Standards by Permittee	50% of communities adopt by March 30, 2017 Remaining communities adopt by March 30, 2018	TMDL #2, #3
C. Number of stormwater plans reviewed for private sites under new standards and previous standards	75% of actual vs total during the permit period	TMDL #2
D. Percentage of permittee projects constructed under new standards and previous standards	75% of actual vs total during the permit period	TMDL #3
E. Success of Collaborative PEP Plan	See plan	TMDL #4
F. Number of catch basins cleaned (actual and planned) or Length of streets where catch basins were cleaned (actual and planned)	60% of actual vs planned	TMDL #5

\*As described in Table 7.

Overall effectiveness will be determined based on the natural resource response as indicated by stream sampling conducted throughout the watershed. This monitoring will take place (every 10 years) and include assessments for dissolved oxygen, *E. coli*, stream flow, and suspended solids. The number of monitoring locations and frequency of monitoring are displayed in **Table 9**. **Figures 1 and 2** depict the monitoring locations.

A watershed-wide assessment report will be prepared that includes a summary of all monitored parameters. Dry and wet weather *E. coli* conditions will be determined based on flow duration curves and compared to previous results reported by the MDEQ. Other parameters will also be compared to previous results compiled by the Rouge Project and others.



**Table 9 – Watershed-wide Monitoring Locations and Frequency**

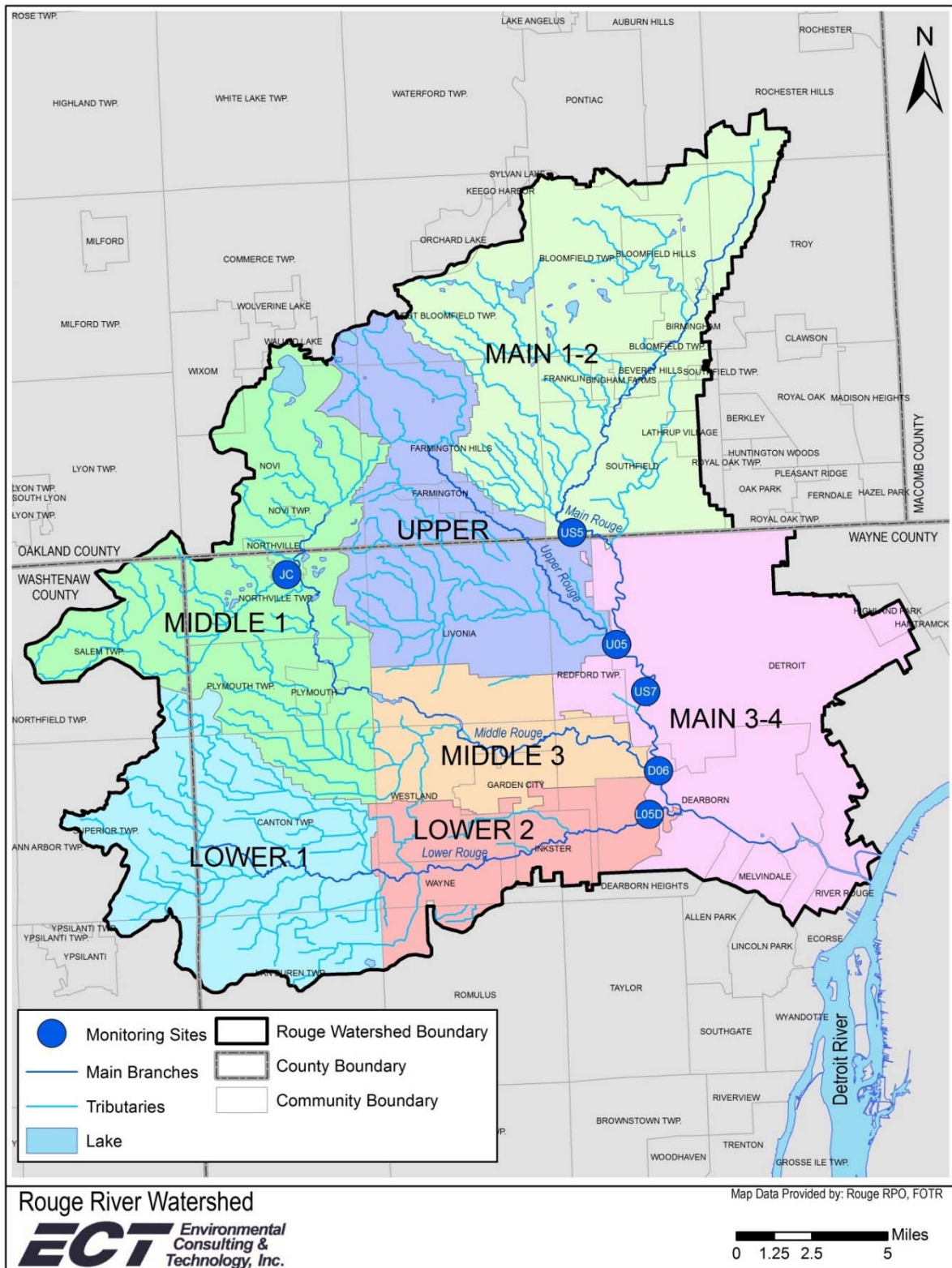
Parameter	Anticipated Monitoring Sites	Frequency	Schedule
Dissolved oxygen	Main (US5 and US7), Lower (L05D), Middle (D06) Upper (U05) and Johnson Creek (JC)	20 events	May – Oct 2017
Stream flow	Main (US5 and US7), Lower (US1), Middle (US2) Upper (US3) and Johnson Creek (JC)	Continuous	May – Oct 2017
<i>E. coli</i>	Similar to sites in the MDEQ <i>E. coli</i> TMDL Assessment – 85 sites	20 events	May – Oct 2017
Suspended solids	Same as DO sites	20 events	May – Oct 2017

Schedule:       Metric Summary Report: Due June 30, 2022.  
                       Watershed-wide Assessment Report: Due every 10 years by June 30 starting in 2018.

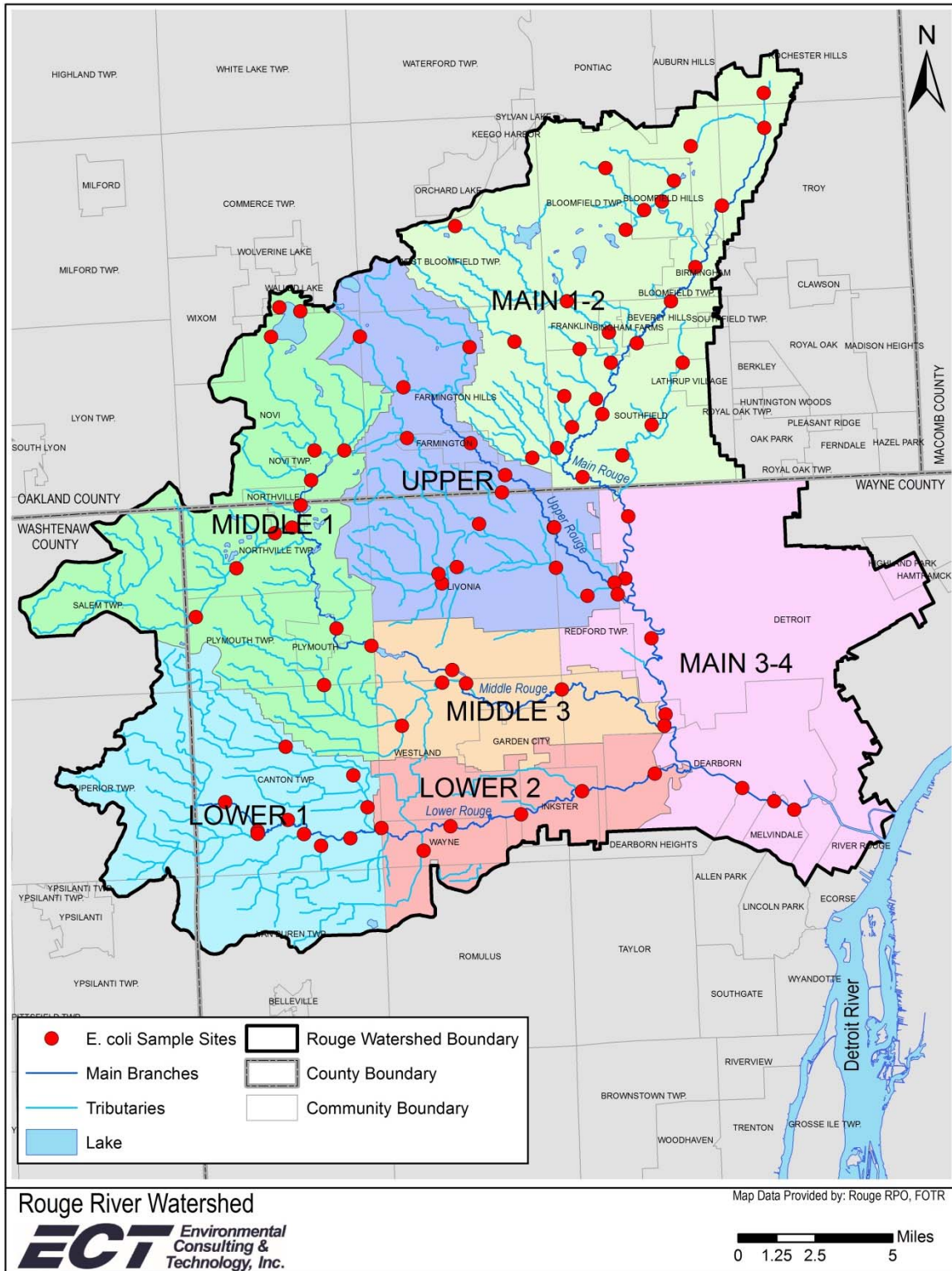
ARC Member Responsibilities:

- ARC (as contracted by the permittees)
  - Conduct instream monitoring for select indicators to determine the effectiveness of TMDL Plan.
  - Collect tracking metrics data from permittees.
  - Evaluate Metrics A and E by April 30, 2022.
- Counties (Road Agencies, WCDPS and OCWRC)
  - Keep records of Metrics B, C, D, and F as listed in **Table 8** and provide the data to ARC staff by April 30, 2022.
- Cities and Villages
  - Keep records of Metrics B, C, D, and F as listed in **Table 8** and provide the data to ARC staff by April 30, 2022.
- Townships and Schools
  - Keep records of Metrics C, D, and F as listed in **Table 8** and provide the data to ARC staff by April 30, 2022.

**Figure 1 – Non-Bacterial Monitoring Locations**



**Figure 2 – Bacteria Monitoring Locations**



## **F. REFERENCES**

Alliance of Rouge Communities (ARC). *Rouge River Watershed Management Plan* June 21, 2012.

Michigan Department of Environmental Quality. *Total Maximum Daily Load for E. coli in the Rouge River, Wayne and Oakland Counties, Michigan*. August 2007a.

Michigan Department of Environmental Quality). *Total Maximum Daily Load for Biota in the Rouge River Watershed including Bishop and Tonquish Creeks, Washtenaw, Wayne and Oakland Counties, Michigan*. August 2007b.

Michigan Department of Environmental Quality. *Total Maximum Daily Load for Dissolved Oxygen in Johnson Creek, Wayne and Washtenaw Counties, Michigan*. June 2007c.

# Attachment A

## Participating ARC Members

<b>Permittee (listed alphabetically)</b>	
<b>Communities</b>	
Beverly Hills, Village of	Northville, City of
Bingham Farms, Village of	Northville Township
Birmingham, City of	Novi, City of
Bloomfield Hills, City of	Oak Park, City of
Bloomfield Township	Plymouth, City of
Canton Township	Plymouth Township
Dearborn Heights, City of	Redford Township
Farmington, City of	Southfield, City of
Farmington Hills, City of	Troy, City of
Franklin, Village of	Walled Lake, City of
Garden City, City of	Wayne, City of
Inkster, City of	Westland, City of
Lathrup Village, City of	
Livonia, City of	
Melvindale, City of	
<b>Counties</b>	
Oakland County*	
Wayne County	
<b>Schools</b>	
Henry Ford College	

\*Participating but this plan is not part of their pending permit application.

**Attachment B**  
**BMP Selection Criteria and Ranking**



BMP Selection Criteria and Ranking for TMDL Parameters							Total Score
Ability of the BMP to affect human health impacts caused by direct contact with the river	Ability of the BMP to impact the concentrations of <i>E. coli</i> , suspended solids and/or reduce peak stream flows	Anticipated level of impact of the BMP as compared to added cost to implement it	Ability to impact multiple TMDL pollutants	Legal authority to implement the BMP?	Are there prerequisite projects that need to be completed?	Yes, No	
0=low, 1=moderate, 2=high							Yes, No
<b>BMP</b>							
Illicit discharge source identification and abatement	2	2	2	2	Y	N	8
New Stormwater Ordinance Implementation	0	2	2	2	Y	Y [1]	6
Green Infrastructure Installation on Public Property	0	1	2	2	Y	Y [2]	5
PEP Activities: Education on Pollution Complaint Line	1	1	1	2	Y	N	5
PEP Activities: Don't Feed Waterfowl Signage	1	1	1	1	Y	N	4
PEP Activities: Septic System Maintenance Education	1	1	1	0	Y	N	3
PEP Activities: Education on the impacts of Pet Waste	1	1	1	0	Y	N	3
Good Housekeeping Measures - catch basin maintenance	0	1	1	1	Y	N	3
Contractor Education	0	1	1	0	Y	N	2
Adopt Buffer/Setback ordinances	0	0	1	1	Y	N	2
PEP Activities: Riparian Corridor Education	0	0	1	1	Y	N	2
Streambank Stabilization	0	0	1	0	Y (on public property)	Y [3]	1
Woody Debris Management	0	0	0	0	Y (on public property)	Y [4]	0

Notes:

BMPs that will be implemented to address TMDL parameters.

[1] Pending the adoption of new stormwater standards and a program to implement the standards.

[2] Pending the adoption of new stormwater standards and funding to implement the standards on permittee properties.

[3] Pending reduction in stream flows and funding to implement.

[4] Pending reduction in stream flows.