

**TOTAL MAXIMUM DAILY LOAD (TMDL)
IMPLEMENTATION PLAN
FOR MS4s**

E.COLI TMDL

CITY OF EAST LANSING

JANUARY 2019

I. INTRODUCTION TO TOTAL MAXIMUM DAILY LOADINGS (TMDL)

Keeping residents and visitors to Michigan safe while pursuing their recreational interests in Michigan's waters is a Michigan Department of Environmental Quality (MDEQ) priority. To help attain the goal of enhancing recreational waters, Michigan continues to expand its efforts to reduce E.coli contamination of its surface waters through the establishment of the Total Maximum Daily Loading (TMDL) for E.coli. The TMDL represents the maximum loading that can be assimilated by a water body while still achieving its designated Water Quality Standard (WQS).

The TMDL requirements established for the City of East Lansing's water bodies are the same as those established for all other surface waters in the State of Michigan that are impaired by E.coli. The ultimate goal of the TMDL as established in Michigan is to identify problem areas, address sources of E.coli statewide, and provide guidance to restore these waters.

Currently the E.coli TMDL only applies to the Red Cedar River Watershed (RCRW) area within the City of East Lansing. However, it is likely that the TMDL requirement for E.coli will someday be extended to the Looking Glass River Watershed portions of the City of East Lansing.

The National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (NPDES MS4) Permit issued by MDEQ to the City of East Lansing requires the City to implement a Stormwater Management Program to reduce the discharge of pollutants, including E.coli, to the maximum extent practicable.

II. LEGAL REQUIREMENTS FOR ESTABLISHING A TMDL

Section 303(d) of the federal Clean Water Act (CWA) and the United States Environmental Protection Agency's (USEPA) Water Quality Planning and Management Regulations (Title 40 of the Code of Federal Regulations, Part 130) requires states to develop TMDLs for water bodies that are not meeting WQS. The list of water bodies that are not meeting their designated uses are listed in the 303(d), 305(b), and 314 Integrated Report which partially fulfills Michigan's requirement to assess the designated uses of its waters. Michigan's Integrated Report (MDEQ 2016a) is updated every two years. In addition to containing a list of impaired bodies, it also contains the causes of the impairment and a schedule for TMDL development.

A TMDL establishes the allowable level of pollutants for a water body based on the relationship between pollution sources and in-stream water quality conditions. TMDLs provide a basis for determining the pollutant reductions necessary from both point and nonpoint sources to restore and maintain the quality of water resources.

III. NUMERIC LIMITS FOR THE E.COLI TMDL

Water bodies are evaluated for the Total Body Contact (TBC) and Partial Body Contact (PBC) recreation designated uses using E.coli as an indicator for other harmful pathogens. This is consistent with USEPA recommendations for fresh water recreational water quality criteria for protecting human health.

Michigan's designated use rule (Rule 100 {R323.1100} of the Part 4 Rules, WQS, promulgated under Part 31, Water Resources Protection of the Natural Resources and Environmental Protection Act (NREPA), 1964 PA 451, as amended) states that water bodies be protected for TBC recreation from May 1 through October 31 and PBC recreation year-round. The target levels for these designated uses are the ambient E.coli WQS established in Rule 62.

The State of Michigan has officially established the limits for its E.coli TMDL to be a concentration based standard as follows: "For this TMDL, the WQS of 130 E.coli per 100mL as a 30-day geometric mean and 300 E.coli per 100mL as a daily maximum to protect the TBC use are the target levels for the TMDL reaches for May 1 through October 31, and 1,000 E.coli per 100mL as a daily maximum year-round to protect the PBC use."

IV. CITY OF EAST LANSING WATERSHEDS

The City of East Lansing discharges into both the Red Cedar River Watershed and the Looking Glass River Watershed. The break between the two watersheds is near Saginaw Highway. The exact areas discharging to the two watersheds is based on the development of the sewer systems (both combined and separate sewer systems) serving the City.

In general, the Red Cedar River Watershed is characterized as follows:

- Contains a significant amount of the City's commercial development.
- Has little available undeveloped land. Most development will be by redeveloping existing sites.
- Has smaller lots and higher density single family residential development.
- Has wider paved roadways (Michigan Avenue, Grand River Avenue and portions of Saginaw Highway).
- Contains almost all of the combined sewer service areas of the City.

The City of East Lansing is tributary to the "Red Cedar River Subwatershed" as defined in the 319 Watershed Management Plan (WMP). Officially it is designated as HUC 040500040508. The 319 Watershed Management Plan notes that a significant source of pollution entering the Red Cedar River Watershed enters through the Montgomery Drain downstream of the City of East Lansing.

In general, the Looking Glass River Watershed is characterized as follows:

- Has larger lots and less dense single family residential developments.
- Contains a significant amount of the undeveloped land within the City.
- Is almost exclusively served by separate sanitary and storm sewer systems.
- Has the only parcels still served by septic systems.
- Has the only parcels still being tilled for agricultural crop production and a few small farms.

The difference in the characteristics of the two watersheds will have an impact on the development of the TMDL Plan as the sources of potential E.coli, the choices of Best Management Practices (BMPs) and the need for additional monitoring is evaluated in subsequent sections of this plan.

V. TECHNICAL BACKGROUND INFORMATION FOR DEVELOPING TMDL PLAN

Three technical sources were used extensively in developing the City of East Lansing's E.coli TMDL Implementation Plan:

1. MDEQ's document entitled "Michigan's Statewide E.coli Total Maximum Daily Load", dated December 2016.
2. MDEQ's website at www.mi.gov/ecolitmdl. This website has a significant amount of materials regarding the development of the Statewide E.coli TMDL; webinars explaining the TMDL requirements; an interactive mapping tool to find information for each watershed; MS4 requirements; etc...
3. The Red Cedar River Watershed Management Plan submitted by Michigan State University Institute of Water Research, Amended June 25, 2015. This 319 Watershed Plan explored the TMDL affects in the Red Cedar Watershed for E.coli; sediment and dissolved oxygen; mercury and PCBs; and nutrients.

The Red Cedar River Watershed Management Plan utilized previous monitoring results for the Red Cedar River as well as additional in-stream monitoring conducted as part of the study. The monitoring on the Red Cedar River was also able to measure the "flashiness" of the river. The term flashiness reflects the frequency and rapidity of short-term changes in stream flow. A stream described as flashy responds to rainfall by rising and falling quickly. MDEQ found the Red Cedar River at both Williamston and East Lansing to be one of the more flashy rivers in the lower peninsula of Michigan.

Monitoring, as noted in the RCRW 319 Plan, showed that water pollution was present during both dry and wet weather events. There were high levels of E.coli during dry weather. In addition, there were spikes in E.coli concentrations measured after wet weather events. Pollution presence during certain weather conditions can be indicative of the source of the pollution. Dry weather sources of E.coli can be attributed to such things as leaky septic tanks, illicit connections, livestock with direct access to surface waters, wildlife and regrowth of bacteria. Wet weather sources of E.coli are often associated with E.coli that is carried with overland runoff, such as animal feedlots, manure spread on crops, etc.... Source tracking did show the presence of both equine and bovine DNA in a majority of the subwatersheds analyzed.

One of the six major goals of the 319 Watershed Management Plan was listed as- "Restore water quality in the Red Cedar River to support the designated uses of total and partial body contact recreation for the impaired waters..."

Many of the assumptions, monitoring results, and other information presented in the Red Cedar Watershed Management Plan have also been extended and incorporated into our evaluation of the Looking Glass River Watershed.

VI. POTENTIAL SOURCES AND CAUSES OF E.COLI IN THE WATERSHEDS & BEST MANAGEMENT PRACTICES FOR REDUCING THE POLLUTANT

The Red Cedar Watershed Management Plan identified a wide variety of sources of pollutants and causes from across the Red Cedar River Watershed which were known or suspected of negatively impacting water quality. In general, all three of the TMDL resources listed potential non- point sources of E.coli to include: wildlife and pet wastes; contaminated overland run-off; agricultural operations; illicit sewer connections from residents and businesses; failing septic systems; dumping of trash; and biosolids and septage land applications.

For the purposes of this plan, the sources of E.coli are categorized by organism producing the E.coli: livestock, humans, wildlife, and pets.

Livestock

Causes of Livestock E.coli Contributions:

- Unrestricted livestock access to streams
- Improper application of manure
- Improper storage of manure
- Concentrated Animal Feeding Operation (CAFO) manure land spreading resulting in over or improper application of manure
- Livestock holding facilities

The following BMPs are proposed to reduce E.coli contributions in the watersheds from livestock sources:

<u>Structural/Vegetative</u>	<u>Management</u>
Alternate Water Sources	Agricultural Outreach
Wetland Restoration	Information and Education
Filter & Buffer Strips with Maintenance	Ordinances (e.g. wetland protection, Livestock exclusion)
Contained Manure Storage Areas	Agricultural Management Practices
Exclusion Fencing or Controlled Access	Incentives
Rotating Manure Storage	Wetland Preservation
Cover Crop	Field Tile Management
Tile Line Control Structures	Comprehensive Nutrient Management Plans
	Crop Residue Management

Humans

Causes of Human E.coli Contributions:

- Aging septic systems and/or improper maintenance
- Improper connections of septic and stormwater systems
- Over or improper application of biosolids
- Over or improper application of septage

The following BMPs are proposed to reduce E.coli contributions in the watersheds from human sources:

Structural/Vegetative
Septic Maintenance, Repairs or Replacement
Illicit Connection Repair

Management
Septic Outreach and Education
Septic Detection Policies
Illicit Connection Detection
Information and Education
Ordinances (e.g. Time of Sale or Transfer)
Incentives
Modify Application Rates

Wildlife

Causes of Wildlife E.coli Contributions:

- Improper management of wildlife and zoo animal waste, and illicit connection
- High populations of various wildlife
- Riparian management practices that encourage or attract wildlife

The following BMPs are proposed to reduce E.coli contributions in the watersheds from wildlife sources:

Structural/Vegetative
Shoreline Buffers
Wetland Restoration
Filter and Buffer Strips with Maintenance

Management
Work with Zoo
Information and Education
Ordinances (e.g. Riparian Setbacks, Waterfowl Feeding)
Wetland Preservation
Incentives
Discourage Feeding of Waterfowl

Pets

Causes of Pet E.coli Contributions:

- Dog waste not picked up

The following BMPs are proposed to reduce E.coli contributions in the watersheds from pet sources:

Structural/Vegetative
Wetland Restoration
Filter and Buffer Strips with Maintenance
Shoreline Buffers

Management
Ordinances (e.g. Pet Waste)
Information and Education
Wetland Preservation
Incentives

VII. EVALUATION OF POTENTIAL SOURCES AND CAUSES OF E.COLI CONTRIBUTIONS FROM THE CITY OF EAST LANSING

The City of East Lansing evaluated its discharges to the Red Cedar River Watershed and Looking Glass River Watershed for the potential sources and causes of E.coli that could contribute to the TMDL and thus the degradation of the surface water quality of each watershed.

Livestock Sources

The City of East Lansing is a highly urbanized and developed area. In particular, with the exception of MSU which is regulated under its own NPDES MS4 Permit, there are virtually no agricultural oriented facilities within the City's portion of the Red Cedar River Watershed area.

In the Looking Glass River Watershed, agricultural activities are limited:

- Some tillable lands along West Road, Coolidge Road and State Road used for feed crops
- A sod farm east of Abbot Road and north of Coleman Road
- Small farms on State Road and on Towar Avenue all less than 10 acres

Human Sources

The City is served by a municipal sewer system in over 99% of the City. As noted previously, the Red Cedar River Watershed is served by both a combined sewer system north of the Red Cedar River and west of Gunson Street and a separate sewer system in the remaining areas. There are no known septic systems within the city's portion of the Red Cedar River Watershed area.

Septic Systems:

The Looking Glass River Watershed is served almost entirely by a separate sewer system. The only known remaining septic systems located within the City are as follows:

- Several existing homes on West Road and Coleman Road (approximately 15 single family parcels). Public sewers were constructed in 2006 to service this area. The existing single family homeowners with properly working septic systems were allowed to continue utilizing their septic systems. However, at such time as the existing septic systems are no longer functioning, those properties will be required to connect to the municipal sewer system.
- One home on the north end of Towar Avenue. Construction of municipal sanitary sewers serving this area is not anticipated in the near future.
- Four existing homes along the south side of State Road immediately east of Coolidge Road. There are no plans to extend sewers to this area at this time.

Illicit Discharges:

The most likely source of human waste that could have entered the waters of the State would be through improper or illicit connections to storm sewers or overflows from the combined sewer system. In the 1990s, the City of East Lansing undertook a major effort to separate portions of its combined sewers where feasible and to collect the overflow from the remaining combined sewers in a tunnel and ultimately in the Combined Sewer Overflow (CSO) Basin. The City's CSO system is categorized as a "controlled CSO" and is considered to not likely be a source of

E.coli. During normal rainfall events any overflows from the combined sewers is collected in the tunnel and CSO retention basin, stored, and ultimately pumped to the Water Resource Recovery Facility (WRRF) when the flow at the WRRF subsides. During heavy or extended rainfall events the CSO Basin may become full. In those instances, the sewage is stored and solids are allowed to settle out in the basin (primary settling) and then any excess flow is disinfected and released to the Red Cedar River through an NPDES permitted outfall. The requirements for settling, disinfection, monitoring, reporting, etc... is regulated under the WRRF's NPDES Permit.

In 2008, as part of the City's original MS4 permit, the City established its Illicit Discharge Elimination Program. This program is designed to systematically and routinely inspect all discharges to the waters of the state during dry weather conditions. The inspections are used as a means to ensure that no illicit connections are present in the City's separate storm sewer systems.

To-date, only three illicit discharges have been identified- one in 2008 and two in 2012- all in the Red Cedar River Watershed. The sources of the illicit discharges were identified and removed immediately.

The potential for illicit discharges is more likely in the Red Cedar River Watershed due to the age of the sewer system and the fact that many of the sewers are or were combined sewers. The sewers in the Looking Glass River Watershed are newer sewers and almost exclusively separate sewer systems.

Septage & Biosolids Application:

There are no known instances of septage or biosolids application being permitted or otherwise experienced within the City of East Lansing.

Wildlife Sources

High Populations of Wildlife:

Wildlife is considered a likely and significant source of E.coli in the watersheds. However, the wildlife populations were not counted or estimated as part of the Red Cedar River WMP as their populations are generally managed by the Michigan Department of Natural Resources and are less manageable through a WMP.

As noted in the Red Cedar River WMP, the feeding of waterfowl leads to naturally high concentrations of wildlife and should be discouraged. The WMP also stated that the campus of Michigan State University was noted during windshield surveys as being a problem area.

Riparian Management Practices:

Manicured grass in the riparian zones can attract and encourage wildlife to the water's edge without means of filtering their wastes. High habitation rates of Canadian geese were noted during the windshield surveys and through stakeholder comments as part of the Red Cedar River WMP. The amount of geese waste reaching the surface water can be managed.

In the City of East Lansing, riparian management practices will likely have its biggest impact on discharges to the Looking Glass River. The major open waterway in the Red Cedar River Watershed is the Red Cedar River itself. There are relatively few open drainage ways elsewhere in the watershed. The development along the City’s sides of the Red Cedar River are highly developed with little open or green areas that would attract wildlife.

However, in comparison there are several open areas throughout the Looking Glass River Watershed and an abundance of open drainage ways that attract wildlife.

Pet Sources

Dog Wastes:

Dog waste is often left on the ground. When collected, dog waste is not treated or spread and used as fertilizer. Collection of dog wastes from the ground can help prevent runoff from transporting E.coli bacteria present in the waste to the surface waters. Picking up dog waste is considered particularly important in the most developed areas of the watersheds such as from the City of East Lansing where the concentration of dogs is typically higher and the drainage systems are denser. The lack of proper riparian buffers within the urban areas leads to the increased likelihood of dog wastes reaching a surface water.

Table 1
Potential Sources of E.coli

<u>Source of E.coli</u>	<u>Red Cedar Watershed</u>	<u>Looking Glass Watershed</u>
Livestock:	0	1
Human: Septic Systems	0	1
Human: Illicit Connections	2	1
Wildlife: Riparian Management Practices	2	3
Pets: Dog Wastes	3	3

- Scoring:
- 0 The source is not present in the designated watershed.
 - 1 The source exists and has the potential to discharge E.coli into the designated watershed. However, local conditions are such that the likelihood and/or amount of discharge is relatively low.
 - 2 The source exists and has the potential to discharge E.coli into the designated watershed. However, local conditions are such that the likelihood and/or amount is considered moderate.
 - 3 The source exists and has the potential to discharge E.coli into the designated watershed. Local conditions are such that the likelihood and/or amount is relatively high.

VIII. Best Management Practices for Addressing Potential Sources of E.coli

As noted in Table 1, the highest potential for and likelihood of E.coli being discharged into the Red Cedar River Watershed and Looking Glass River Watershed are from pet wastes, wildlife and illicit connections.

The City of East Lansing's existing Stormwater Management Program contains existing ordinances; policies and procedures; specialized programs (e.g. IDEP, PEP, SWPPP, Good Housekeeping/BMPs, etc...) and specific BMPs to address the identification, evaluation and elimination of the various sources of E.coli that could potentially discharge into the Red Cedar River Watershed and Looking Glass River Watershed.

The City considers wildlife and dog wastes as being the most significant potential sources of E.coli within the City. These issues were recognized and addressed as part of the "Public Education Plan for the City of East Lansing". This plan was originally developed by the Greater Lansing Regional Committee for Stormwater Management's Public Education Committee and then further modified by the City to address its individual needs.

In general, public education as a whole is the primary tool for preventing unwanted discharges to waters of the state. As such, the Public Education Plan provides a wide variety of activities for which the City of East Lansing has committed itself to.

Specifically, the following individual activities listed in the City of East Lansing's Public Education Plan are focused on wildlife wastes and pet wastes:

Promote proper disposal practices for grass clippings, leaf litter, and animal wastes that may enter into the MS4.

Activity: Promote existing materials related to grass clippings, leaf litter and pet waste (PEP Action Item 2.31).

Corresponding topic area(s): A, K

Priority: Medium

Target audience: Public, small businesses

Key message: Use the best management practices for management of grass clippings, leaf litter and pet waste.

Delivery mechanism: Website and social media postings, promoted through the GLRC educational display. The City will provide brochures at City Hall, the Hannah Community Center and the East Lansing Public Library. The brochures are also available for downloading on the City's Stormwater Pollution Prevention website under "Public Education".

Year and frequency of implementation: 2013, continuous

Responsible party: GLRC Coordinator and City of East Lansing staff.

Evaluation: Number of flyers/brochures handed out and website traffic linked.

Activity: Continue to maintain pet waste reduction watershed signage at parks or designated dog areas (PEP Action Item 2.32).

Corresponding topic area(s): A, D

Priority: Medium

Target audience: Public

Key message: Promoting pet waste reduction for watershed protection, connecting the public to their surrounding environment.

Delivery mechanism: Passing vehicles, people biking, walking or running, and pet owners will view the signs

Year and frequency of implementation: The signs will be maintained indefinitely with help from the local Road Commissions. The City of East Lansing has developed its own Pet Waste Program and currently has signs at two of its larger community parks. During the Permit cycle the City will evaluate the locations where such signs are appropriate and install them.

Responsible party: City of East Lansing Department of Public Works (DPW).

Evaluation: 84 signs have been posted in the watersheds. The City of East Lansing DPW will maintain the signs at its two large parks and install new signs at additional locations as determined appropriate.



Activity: Explore other pet waste reduction efforts and avenues for implementation.

Corresponding topic area(s): A, D

Priority: Medium

Target audience: Public

Key message: Promoting pet waste reduction for watershed protection, connecting the public to their surrounding environment

Delivery mechanism: GLRC website, social media, other applicable mechanisms depending on efforts identified.

Year and frequency of implementation: Continuous

Responsible party: GLRC PEP Committee

Evaluation: Evaluation will determine effort identified and implemented.

Promote methods for managing riparian lands to protect water quality.

Activity: Riparian buffer brochure developed, other resources posted to the GLRC website (PEP Action Item 2.48).

Corresponding topic area: A

Priority: Medium

Target audience: Riparian landowners

Key message: The brochure provides general information about native riparian buffers and why they are important for water quality and habitat.

Delivery mechanism: GLRC website, social media, use with educational display, lobbies, etc. Once the City of East Lansing develops an inventory and listing of riparian landowners, it intends to mail the brochure to them.

Year and frequency of implementation: Continuous, will use at events.

Responsible party: GLRC Coordinator and City of East Lansing staff.

As shown in Table 1, illicit connections are also a potential source of E.coli contamination. However, as indicated, the City's Illicit Discharge Elimination Program has provided a sound foundation for continued inspection to ensure illicit discharges are not an issue. Specifically, the following individual activity listed in the City of East Lansing's Public Education Plan is focused on illicit connections:

Educate the public on illicit discharges and promote public reporting of illicit discharges and improper disposal of materials into the MS4.

Activity: Maintain the GLRC website for community and the state website and pollution reporting phone numbers for illicit discharges and acts of pollution. The City will explore different delivery methods (language, etc.) to make this more relatable to the public. The City of East Lansing's Stormwater Pollution Prevention website has a direct link to a page describing the IDEP. At the bottom of the page, the City asks the public to report any suspected illicit discharges to the City of East Lansing, Department of Public Works (PEP Action Item 2.26).

Corresponding topic area:

Priority: High

Target audience: Public

Key message: To report illicit discharges (description provided), illegal dumping, etc.

Delivery mechanism: GLRC website and social media and City of East Lansing website.

Year and frequency of implementation: Continuous posting on the website, social media.

Responsible party: GLRC Coordinator, PEP Committee, City of East Lansing staff.

Evaluation: Website link traffic.

Also, as shown in Table 1, septic systems are considered a minor source of potential E.coli discharge to the Looking Glass River Watershed only. The following individual activity listed in the City of East Lansing's Public Education Plan is focused on septic systems:

Inform and educate the public on proper septic system care and maintenance, and how to recognize system failure.

Activity: Promote and post local Point of Sale/Time of Sale septic/well inspection ordinances in Eaton and Ingham Counties. Also partner with local 319 groups addressing existing *E.coli* TMDL, post materials developed, explore educational opportunities, etc... (PEP Action Item 2.35).

Corresponding topic area: A

Priority: Low

Target audience: Public

Key message: Maintain your septic system; it could be contaminating local water bodies through stormwater runoff.

Delivery mechanism: GLRC website, social media, City of East Lansing Stormwater Pollution Prevention website. The City refers residents to the appropriate County Health Departments regarding specific details on the construction, maintenance and abandoning of all septic or other individual on-site wastewater systems.

Year and frequency of implementation: Continuous

Responsible party: GLRC coordinator and City of East Lansing staff.

Evaluation: Website link traffic.

IX. Establishing a Monitoring Plan for Addressing the E.coli TMDL

The MDEQ requires that each permittee receiving an NPDES MS4 Permit develop an implementation plan for outlining how it intends to “make progress toward achieving the pollutant load reduction requirement” for each TMDL listed in its watershed.

As indicated previously, the current TMDL for E.coli only applies to the Red Cedar River and not the Looking Glass River. As such, the City of East Lansing is committing to fulfilling only those portions of the Monitoring Plan described herein that pertain to the Red Cedar River. However, the City will endeavor to begin sampling and tracking the effects of its BMPs in the Looking Glass River if and where practical.

A. Red Cedar River Monitoring Plan: (Required)

For the City of East Lansing, this monitoring plan will take a two stage approach to meeting the City’s TMDL goals. First the City will continue to work with other communities and entities within the Red Cedar River Watershed to monitor the overall health of the entire watershed.

As such, the City will continue to participate in the ongoing sampling and monitoring program established by the Ingham County Health Department (ICHHD) in 2004. The ICHHD currently samples at 10 sites along the Red Cedar River. Four of the 10 sites- S. Hagadorn Road; Farm Lane; S. Harrison Road; and Kalamazoo Street are within the City of East Lansing. Sample results for the past 15 years can be found on their website under “Health Department Records, Data and Reporting Environmental Health Data Water Quality River & Stream Sampling Site Results”. In 2015 and 2016, samples were taken weekly at each location for 22 weeks from the beginning of May through the end of September.

Data from the two sites at the eastern- upstream end of the City (S. Hagadorn Road) and the western- downstream end of the City (Kalamazoo Street) may provide some indication of the affect discharges from the City of East Lansing and MSU have on the overall E.coli contributions to the Red Cedar River.

In 2016, the 22 weeks of sampling showed that in 17 of the 22 instances, the E.coli level at Kalamazoo Street (the downstream sampling point in East Lansing) was less than the E.coli level at Hagadorn Road (the upstream sampling point in East Lansing).

Additional sampling was also collected by the MDEQ from May to August 2009 as part of its TMDL development program. Additional sampling was also conducted in 2012 and 2013 by Michigan State University as part of the 319 Watershed Management Plan. The City will monitor the results of any follow up sampling conducted by these entities and evaluate any other relevant joint efforts to evaluate the overall health of the Red Cedar River Watershed.

The City of East Lansing is also committed to working with the other members of the Red Cedar River Watershed to implement the findings of the 319 Watershed Management Plan. In particular, the Watershed Management Plan outlines use of certain BMPs (Chapter 7- Structural BMP Implementation Plan), public education strategies (Chapter 8- Information and Education Strategy), and sustainability (Chapter 9- Sustainability).

Based on the evaluation provided in the Red Cedar River 319 Watershed Management Plan the overall condition of the Red Cedar River is affected by several different sources of E.coli. However, as discussed previously, many of the more significant sources including livestock sources and human sources from septic systems are not prevalent in or directly attributed to the discharges originating within the City of East Lansing and especially in the Red Cedar River Watershed. Thus, the City’s ability to reduce TMDL contributions from these and other potential sources is negligible and the City’s efforts, regardless of how effective, may be masked by the overall condition of the Red Cedar River Watershed.

As such, the City of East Lansing will implement a second approach to its TMDL monitoring plan. The City of East Lansing will implement a plan to analyze and track the actual contribution of E.coli from the City to the Red Cedar River by means of end of pipe sampling. The City will also endeavor to undertake an informal plan to analyze and track the contribution of E.coli from the City to the Looking Glass River if and where practical.

As part of its formal IDEP program, the City identified six subwatersheds that enter the Red Cedar River Watershed and twelve subwatersheds that enter the Looking Glass River Watershed.

Red Cedar River Watershed:

<u>Subwatersheds</u>	<u>Number of MS4 Discharges</u>
Red Cedar River	7
Goritz Drain	5
Greencrest Relief Drain	1
Greencrest Drain	ICDC Drain
Kierstead Drain	ICDC Drain
Proctor Drain	ICDC Drain

Looking Glass River Watershed:

<u>Subwatersheds</u>	<u>Number of MS4 Discharges</u>
• Sanderson Drain	17
• Taylor Drain	8
• Smedley-Coolidge Drain	14
• Friegal Drain	8
• Remy Chandler Drain	1
• Remy Chandler Branch No.2	3
• Moore Branch	7

- Foreback Drain 2
- Melvin Drain 1
- Melvin Branch No. 1 1
- Melvin Branch No. 2 3
- Towar-Snell Drain 0

Within these subwatersheds the City has identified over 200 individual public and private discharges to the Red Cedar River and Looking Glass River watersheds. The public MS4 discharge points identified above are permitted by MDEQ as part of the City’s NPDES MS4 Permit.

The following information is collected for all of the MS4 and private discharge points and maintained as part of the City’s IDEP Program:

- GPS coordinates
- Photos of the discharge structure
- Condition of the discharge pipe and structure
- Drainage area served

Each discharge point is also shown on the sewer atlas included in the City’s GIS with an identifiable number.

Due to the immediate focus on the Red Cedar River TMDL requirements, we would propose to perform wet weather sampling at all 13 MS4 discharges into the Red Cedar Watershed that are under the control of the City of East Lansing first (i.e. 2018). The City will also endeavor to sample isolated discharges into the three Ingham County Drain Commission Drains from their catchbasins or from other non MS4 sources located within the City Limits.

Per MDEQ, wet weather sampling should focus on the first flush within the first 30 minutes if possible but not longer than the first 60 minutes. Also per MDEQ, analysis must occur within 6 hours of collection of the sample.

If the level of E.coli found in an individual discharge within the Red Cedar River subwatershed, during the initial rounds of sampling is significantly higher than in other samples or if it exceeds the partial body contact limits (1,000 E.coli per 100ml), the subwatershed will be resampled and analyzed in further detail. The resampling will be performed during a wet-weather event within one year of the original sampling. Resampling will be taken from the same particular discharge and other samples may be taken from similar discharges from the same subwatershed. Microbial source tracking may also be used to try and identify high E.coli readings as being from livestock, human, pet or wildlife sources.

The information gathered from the sampling and evaluation of the E.coli levels in the individual subwatersheds will help direct the City’s efforts in implementing existing BMPs; establishing new BMPs; ordinances; policy and procedures; and other stormwater control efforts to ensure progress toward achieving the required TMDL pollutant load

reductions. Those efforts will be tracked and compared with the results of the E.coli testing to determine which efforts have a discernable relationship to the E.coli levels generated.

Ultimately, the goal is to be able to consistently sample individual discharges and show that they meet the statewide TMDL limits for E.coli for both Partial and Full Body Contact.

Thus for each group of drains shown above the following schedule will be followed:

- Wet weather sampling will be performed in year one of each drain's 5 year cycle.
- BMPs will be instituted in each subwatershed in which elevated levels of E.coli were found (significantly higher than in other samples or if it exceeds the partial body contact limits of 1,000 E.coli per 100ml) in years 2 through 5.
- Wet weather sampling will be performed again in year six (year one of each drain's second 5 year cycle) and an analysis as to the success or failure of the BMPs that were initiated and why.

B. Looking Glass River Monitoring Plan: (Not Required)

As previously noted, even though the City is not yet required to meet a TMDL E.coli limit in the Looking Glass River, they will endeavor to begin sampling its MS4 discharges and tracking the effects of its BMPs in the Looking Glass River Watershed if and where practical.

Subwatersheds in the Looking Glass Watershed with numerous discharge points may have two to four wet weather samples taken per subwatershed. Per MDEQ, wet weather sampling should focus on the first flush within the first 30 minutes if possible but not longer than the first 60 minutes. Also per MDEQ, analysis must occur within 6 hours of collection of the sample.

The selection of the discharge points in the Looking glass River Watershed will be based on trying to develop a database to be used for future decision-making. As such, discharges that have varying characteristics in their contributing area will be selected as well as discharges where the highest potential to discharge E.coli are thought to be present. As data is gathered and analyzed, the selection of discharge points can change to reflect lessons learned from the initial sampling.

The E.coli data will be recorded and analyzed to attempt to equate the characteristics of a subwatershed with the E.coli levels recorded at the individual discharges.

The plan and goal for the Looking Glass River Watershed is to proceed with a program on a voluntary basis in order to develop background monitoring data to show the effects from implementing appropriate BMPs on the E.coli concentrations being discharged into the Looking Glass River Watershed. Thus, when a TMDL is initiated for the Looking Glass River, the City will have the background information available to show the level of compliance already achieved.