Genesee County
Phase II Municipalities

Annual Report
Nov. 1, 2004 to Oct. 31, 2005

Submitted to:

State of Michigan Department of Environmental Quality
Surface Water Quality Division

Submitted by:
Genesee County Drain Commissioner
December 2005

CONTENTS

Background Information

To implement the permit requirements and perform watershed management planning, Genesee County has established a Storm Water System Service district for the entire County under the authority of the Michigan Public Act (PA) 342 of 1939. In addition, each of the communities in the County have executed a contract to use the County 342 Storm Water System Service District as the lead agency to provide Phase II permitting services, including watershed management planning.

Five major watersheds were delineated in the permit application including:

- Lower Flint River
- Middle Flint River
- Upper Flint River
- Shiawassee River
- Cass River

The Shiawassee River Watershed boundary was adjusted this year to avoid overlap with effort proceeding in Livingston County. It now roughly parallels the county line.

These watersheds were divided into a total of 20 sub watershed-planning areas. Because the magnitude of work involved to perform watershed planning for all of these areas within a two-year period is beyond the staff and financial resources available, areas were ranked and prioritized to focus on designated Phase II areas, highly developed and rapidly developing areas, and water quality concerns. The Middle Flint River Watershed was scheduled and had their watershed plan completed by March 1, 2005. The Lower Flint River Watershed Plan was to be completed on September 1, 2005. The Shiawassee River Watershed Plan is due March 1, 2006. The Upper Flint Watershed Plan is due September 1, 2006. The Cass River Watershed Plan is due March 1, 2007.

Genesee County Stormwater Advisory Committee

This committee is made up of all the Communities in Genesee County (except the City of Flint, which is a Phase I community) and the agencies and departments of Genesee County. All the Communities in Genesee County have elected to participate, although not all are Phase II Communities. This committee will guide the implementation of the entire Phase II Program and has three main sub-committees set up to address specific issues. Each Community serves on at least one sub-committee. A brief explanation of the duties of these sub-committees follows.

Public Education and Participation Sub-Committee

The Public Education and Participation Sub-Committee guides the overall Public Education and Participation Process for the Watershed Management Planning effort.

Construction Standards and Practices Sub-Committee

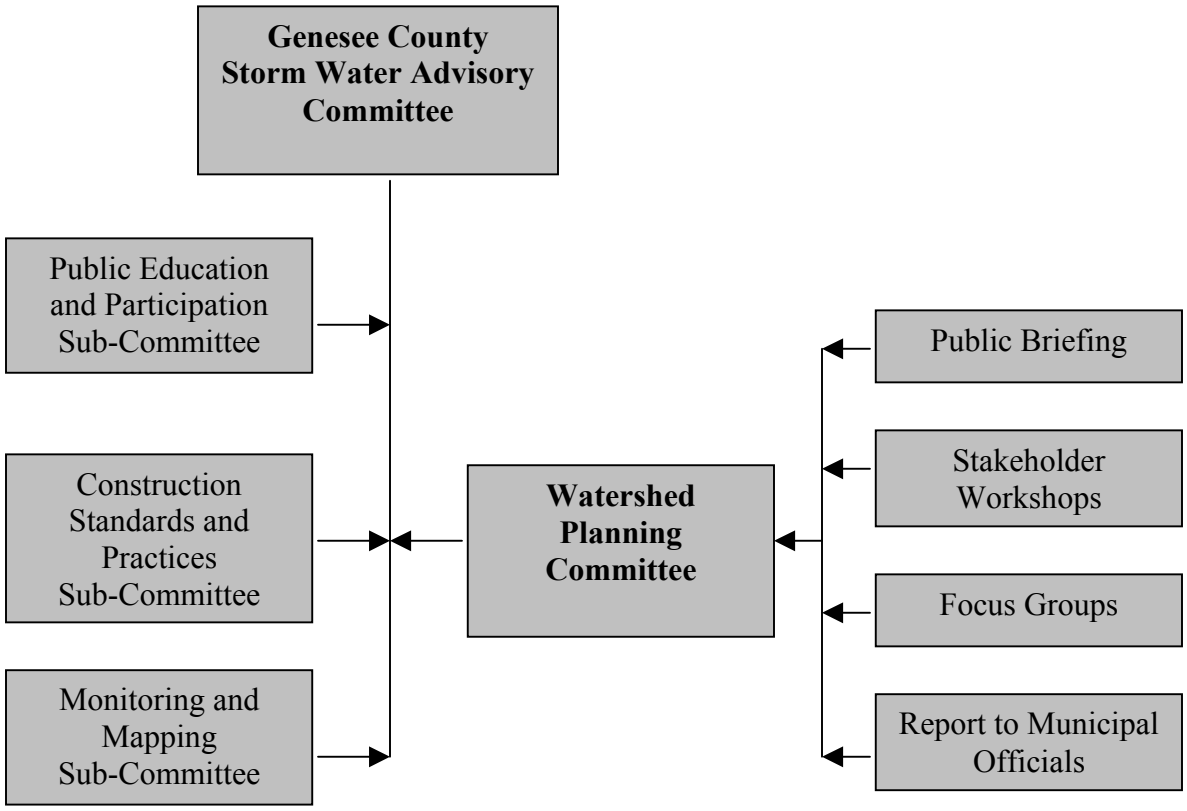
The Construction Standards and Practices Sub-Committee examines new construction standards and post construction practices for Genesee County. They will work to update

existing ordinances to make sure that consistency and EPA elements are met. This group is also responsible to oversee the IDEP program.

Monitoring and Mapping Sub-Committee

The Monitoring and Mapping Sub-Committee guides organization and implementation of the illicit discharge elimination program (IDEP), mapping guidelines, field-sampling protocols, and how the watershed will be monitored for progress.

Figure 1.0 Decision Making Flowchart



Local government leaders share their insights and views of the watershed throughout the project at workshops and meetings, as well as at other formal and informal exchanges. The value of such insights should not be underestimated and are invaluable to a plan development process led at the local level.

Work being conducted by these Sub-Committees is being used in the development of the Middle Flint, Lower Flint, and Shiawassee River watershed management plans.

Genesee County Watershed Planning Communities (Contract Communities)

Argentine Township
Atlas Township
City of Burton
Clayton Township
City of Clio
City of Davison
Davison Township
City of Fenton
Fenton Township
Flint Township
City of Flushing
Flushing Township
Forest Township
Gaines Township
Village of Gaines
Genesee Township
Village of Goodrich
City of Grand Blanc
Grand Blanc Township
Village of Lennon
City of Linden
City of Montrose
Montrose Township
City of Mount Morris
Mount Morris Township
Mundy Township
Village of Otisville
Richfield Township
City of Swartz Creek
Thetford Township
Vienna Township
Genesee County

IDEP (Illicit Discharge Elimination Plan)

The Genesee County Drain Commissioner was awarded a Clean Michigan Initiative (CMI) grant to conduct investigations for the Gibson Drain. The Quality Assurance Project Plan (QAPP) was submitted to MDEQ in December 2004 and was approved in January 2005. A consultant has been hired to conduct the IDEP investigations.

Field crews began walking the main branch of the Gibson Drain in April 2005 to identify the ninety-one (91) outfalls in the original storm water permit. During the investigations 4 of the 91 were found not to be storm water outfalls. In many cases, a drainage system did not exist or the pipe was not a municipal separate storm sewer system (MS4). During the course of the investigations, 20 additional storm water outfalls previously not permitted were identified.

In November 2005, field crews began walking the branches tributary to the Gibson Drain; including the Sherwood Drain. To date, approximately half of the tributary branches have been investigated with thirty-five (35) outfalls identified.

During investigations of the Gibson Drain and all tributary branches, many private yard drains and sump pump discharge pipes were identified. These are generally 4-inch plastic pipes that protrude from the banks along the drain; when dry weather flow was present, crews sampled the flow to ensure no pollutants were entering the watercourse from these pipes.

A total of three illicit connections have been found to date during field investigations. The first illicit connection was found on an outfall discharging to the Gibson Drain from Mill Wheel Street near the intersection of Chapin Street. Turbid dry weather flow was found discharging

from a Stone and Marble cutting facility at the corner of Chapin and Saginaw Streets. The County was notified on September 23, 2005 of this issue and has referred the problem to the Department of Environmental Quality (DEQ). The DEQ conducted a site inspection of the facility and identified the discharge water was in violation of Part 31 of the NREPA. On November 15, 2005 the DEQ notified Genesee Cut Stone Co. they are required to either obtain an NPDES storm water permit or document how the discharge will be eliminated.

The second illicit connection was found on an outfall discharging to the Gibson Drain from Maple Road. A 4-inch plastic pipe was found discharging wastewater directly into the Gibson Drain behind the residence at 1362 Maple Road during the IDEP identification phase in May 2005. The County was notified of this issue and is currently working with the municipality and landowner to correct this problem.

The third illicit discharge was identified on an outfall discharging to the Gibson Drain at the intersection of Bristol and Fenton Roads. Dry weather flow with soap suds was found discharging directly into a catch basin from a Car Wash facility's wash activities into the drainage system of 7731005 storm water point source discharge (PSD). Genesee County was notified of this issue on October 18, 2005 and is working with the local municipality to correct this illicit discharge.

Part of the grant process is developing an illicit discharge removal process. Questions about authority to force a illicit connection removal are still being worked out.

Leaky sewer systems should not be a problem, since the municipality follows design standards outlined in the document *"Recommended Standards for Waste Water Facilities."*

A schedule for illicit connections is part of the removal process that is still being worked out.

The DEQ is working with the Marble and Stone cutting facility at Chapin and Saginaw Streets to remove the discharge water in violation or obtain an NPDES storm water permit.

The County was notified of the illicit connection at 1362 Maple Road and the illicit discharge originating from a commercial car wash facility and is currently working with the municipality and landowner to correct these problems.

A possible illicit connection was found on Lynton Avenue at the dead end, east of Southgate Street. The connection appears to be a sanitary tap observed in a manhole tributary to storm water PSD 7625751. Dry weather flow containing wastewater was observed to be discharging from the east pipe; originating between residences 3308 and 3314 Southgate Street. The County was notified on November 30, 2005 of this possible sanitary connection and is arranging dye test confirmation activities.

Dry weather flow was observed at the outfall (6705511) between residence 2207 and 2297 Rollins and throughout the upstream drainage network; while standing water was identified in the manhole at the intersection of Fern & McGrath Streets. Samples at the outfall identified elevated levels of E. coli; suggesting a possible illicit connection. The County was notified of

this issue and it was recommended to clean/flush the storm sewer system on Fern Street. Currently, the County is coordinating activities to clean and televise this storm sewer system.

PEP (Public Education Plan)

The PEP committee has contracted with U of M Center for Applied Environmental Research (CAER). This group has been focused on planning the public education implementation.

The Public Education Plan (PEP) follows the format recommended by the MDEQ and includes the seven major sections required in the Permit. The requirements as defined in the permit are as follows:

1. Encourage public reporting of the presence of illicit discharges or improper disposal of materials into applicant's separate storm water drainage system
2. Education of the public on the availability, location, and requirements of facilities for disposal or drop-off of household hazardous wastes, travel trailer sanitary wastes, chemicals, grass clippings, leaf litter, animal wastes, and motor vehicle fluids.
3. Education of the public regarding acceptable application and disposal of pesticides and fertilizers.
4. Education of the public concerning preferred cleaning materials and procedures for residential car washing.
5. Education of the public concerning the ultimate discharge point and potential impacts from the separate storm water drainage system serving their place of residence.
6. Education of the public about their responsibility and stewardship in their watershed.
7. Education of the public concerning management of riparian lands to protect water quality.

PEP Activities

The following public education activities were undertaken during the reporting period from November 1, 2004 to October 31, 2005, in compliance with the Certificate of Coverage under the MDEQ General Storm Water Discharge Permit MIG619000.

A. Website – Authorized in November 2005
Website development has begun. The structure of the website has been developed and content will be finalized by mid January 2006. The University of Michigan – Flint webmaster will be designing the site and will provide two to three designs for the Drain Commission to review near the end of January / mid – February.

B. Public Service Campaign
Not authorized to begin at this time

C. Speaker Materials – Authorized in November 2005

This task is in the development stage and is anticipated to be completed by the end of February 2006 and available on the website mentioned above.

D. Marketing Resources
Not authorized to begin at this time

PPP (Public Participation Plan)

Many communities, along with the Genesee County Drain Office Staff, noted that redundancies were beginning to occur due to communities being in multiple watersheds. The number and frequency of meetings was difficult for many of the Phase II Communities to attend and Stakeholder Workshop attendance was declining. These events precipitated the need to re-examine the strategy of the Genesee County Watershed Planning Efforts.

Genesee County has merged the Lower Flint, Upper Flint, and Shiawassee Watershed Management Plans (WMP) together to jointly conduct the meetings and planning effort. The Lower Flint WMP was due September 1, 2005, the Shiawassee WMP is due March 1, 2006, and the Upper Flint WMP is due September 1, 2006. These schedules were aligned together to all be submitted to the MDEQ by March 1, 2006. This means that the Lower Flint will be submitted six months late, the Shiawassee will be on time, and the Upper Flint will be six months early.

Both the Lower Flint and Shiawassee Watersheds have submitted Public Participation Plans (PPP) to MDEQ outlining how the watershed committee will solicit public input and participation. The Upper Flint PPP was due in 2005. Genesee County has developed a joint PPP for the Lower Flint, Upper Flint and the Shiawassee River Watersheds and submitted it in September of this year.

The first joint meeting for these watershed committees was held on July 27, 2005 to coincide with the regular meetings of the Lower Flint and Shiawassee Watersheds. This meeting served as the kickoff meeting for the Upper Flint and also brought each of the watershed committees up to speed with the change in strategy.

The revised schedule is as follows:

Table 4-1: Proposed Genesee County Watershed Planning Schedule

Committee Kickoff Meeting of WMP & Organization	June 2005
Brainstorm Goals (Section 6)	June 2005
Data Collection	June- August 2005
Draft Goals and Objectives (Section 6)	August 2005
Draft Introduction (Section 2), Watershed Characteristics (Section 3), Water Quality Indicators (Section 4)	August 2005
Review Goals and Objectives (Section 6)	August 2005
August 29, 2005 1:30 pm Workshop #2	August 2005
Committee Review of Section 2, 3, & 4	September 2005
Complete Goals and Objectives (Section 6)	September 2005

Determine Critical Areas	September 2005
Draft Action Plan (Section 8)	September- October 2005
Incorporate Committee Comments & Complete Section 2, 3, & 4	October 2005
November 30, 2005 1:30 pm Workshop #3	November 2005
Revise Action Plan (Section 8)	November 2005
Draft Evaluation Methods (Section 9) Draft Sustainability (Section 10) Draft Community Outreach (Section 5)	November- December 2005
Draft WMP for Committee to Review	January 2006
Incorporate Committee Comments into WMP and Distribute for Public Comment	February 2006
February 1, 2005 Workshop #4	February 2006
February 1, 2005 Public Meeting/Event	February 2006
Incorporate Public and Stakeholder Comments and Finalize	February 2006
Submit WMP to MDEQ (Due to MDEQ March 1st, 2006)	March 1, 2006
Draft SWPPI	March- May 2006
Community Review and Comment	May 2006
June 7, 2005 Community SWPPI Workshop	June 2006
Incorporate Comments and Finalize	June-August 2006
Submit SWPPI to MDEQ (Due to MDEQ September 1st, 2006)	September 1, 2006

Combined Upper and Lower Flint, and Shiawassee River Watersheds Planning Committee
The Combined Watershed Planning Committee consists of representatives from each community in each of the watersheds, the Genesee County Drain Commission as well as a representative from the Flint River Watershed Coalition. The committee meets monthly on the last Wednesday of the month. Two meetings are conducted, one in the morning at the Genesee County Drain Commission Office and one in late afternoon at the Fenton Town Hall. The meetings have identical agendas.

The PEP subcommittee work group met for the first four months of 2005. Then in May the full committee met to vote on the material developed by the work group. The Construction Standards and Practices Sub-Committee met on August 24th to review the actions contained in the SWPPI and provide feedback in to the final document.

Public Events
Local officials will host public events to hear from their constituents and area stakeholders about their concerns and visions for the watershed. One public event will be held across Genesee County to cover the geographic area for all the Public Participation Plans.

The event will be held at local schools or other equivalent facilities to invoke a feeling of community trust. Typically a presentation designed to inform and educate the participants is appended to existing meetings or delivered in response to invitations to speak at a community events.

The goal of this public event is to inform the public of the watershed management planning effort, invite them to participate in stakeholder meetings, show them how to access the website

and provide comments, and gather information of what the perceived problems and concerns are in the watershed.

All watershed citizens will be invited to these events through standard public notice procedures. Public Media will be used to inform the target audience of upcoming activities. Each meeting held will have at least three announcement methods e.g. postcard mailing, newspaper ads, radio announcements, public access channel announcements. The meeting announcements will go out for distribution no later than two weeks prior to the scheduled event.

Public events tools include a power point presentation, brochure on the watershed, and an evaluation survey. The survey will be distributed at each public event to obtain input from meeting participants. This information will be used to modify and adapt future meeting strategies and address watershed concerns.

A second set of events may be conducted based on the success of the first events. If held, it would be conducted to present the draft of the WMP. This meeting's goal will be to obtain comments and reaction to the draft WMP. The aim is to be able to address these comments prior to finalizing the watershed plan. Participants will be provided with information on how to obtain a copy of the WMP.

All public events are to take place upon completion of Phase I of the PEP when marketing materials and approaches will be created and developed.

Stakeholders Workshops

Stakeholders are the people, organizations, and agencies that are critical to the planning effort in order to gain relevant input and buy-in to the watershed process. This group is generally comprised of portions of the community that will want to have a say in how the watershed management plan is developed. Examples include manufacturing companies, large businesses, homeowners associations, environmental groups, developers, construction contractors, retailers, and agricultural representatives (if applicable). A specific list of our stakeholders is included in the PPP.

Workshops will be organized to gather information on the goals and desires for management of the watershed, provide input on priorities, and help refine the targeted action plan. In addition, the workshops will foster networking and promote partnerships to assist in future implementation of watershed goals and to provide incentive to participate in future activities.

Community representatives and key stakeholders were targeted with special invitations to solicit their attendance to the workshops. Letter invitations were followed up with a phone call to those attendees who have not already responded to the invitation. The call will explain the meeting purpose and provide a personal contact for the stakeholders. A follow-up e-mail or postcard closer to the workshop dates will remind people of the workshop prior to the workshop date. Workshops will be kept brief and productive.

Four workshops will be held during watershed management planning. The first workshop will solicit ideas on current problems that exist in the watershed, and gather information on goals and desires for watershed planning. The current status of the watershed findings and data will be

presented at the second workshop and the participants will be asked to comment and assist in prioritizing the problems to be addressed. The third workshop will focus on refining the targeted action plan to address the watershed problems identified. A fourth and final workshop will be held on February 1st to present the final watershed management plan and explain how and why the participants need to stay involved during the implementation phase of the watershed management plan.

The following Stakeholder Workshops have been held to date:

- January 31, 2005: Workshop #1 Lower Flint
- May 23, 2005: Workshop #1 Shiawassee
- May 23, 2005: Workshop #2 Lower Flint
- August 29, 2005: Workshop #2 Combined
- November 30, 2005: Workshop # 3 Combined

Attendance was very low for the first three workshops. For example, at the May 23rd, Shiawassee meeting there was only 8 people. The move to combine the planning process saw an increase in participation in the August and November meetings to over thirty people at each. Please see the Fact Sheets in Appendix I for more information on the Workshops.

Report to Municipal Officials

Local appointed and elected officials are critical players in adopting the watershed management plan and allocating resources toward its implementation. Obtaining buy-in and providing education to this group will help ensure the success of implementing the Watershed Management Plan. Local appointed and elected officials acknowledge their accountability to their constituents and embrace their role in shaping the future vision of the watershed management plan. As public officials, local government leaders value the advice, concerns, and issues that community residents see in terms of the watershed condition past, present and future.

Municipal Officials in Genesee County Project are provided with quarterly newsletters, developed by Genesee County Drain Commissioner's Office, updating the status of the Storm water and watershed planning efforts.

The stakeholder meeting fact sheets will also be a valuable resource to this process to show the elected officials what their constituents view as critical water resource issues in the watershed. The fact sheets contain a schedule of meeting to promote participation and input during the planning process.

As mentioned above, Municipal Officials have been invited to participate in all events to date but formal presentations to municipal bodies will occur upon completion of Phase I of the PEP when marketing materials and approaches will be created and developed.

Focus Groups

No activity during the past year.

Website

Please see the PEP above.

Information Display at Public Places

Material is being developed. Please see the PEP above.

Middle Flint Watershed (CAER & GCDC)

Genesee County currently has two 319-grant projects underway. These include the Kearsley Creek Watershed Project, and the Swartz Creek Watershed Project. There is also a *Gilkey Creek Project* currently being conducted. The University of Michigan (U of M) Center for Applied Environmental Research (CAER) with the Flint River Watershed Coalition received a MDEQ 319 grant to prepare a watershed plan for the Swartz Creek. The Genesee County Drain Commissioner's office has also received a 319 grant to prepare a watershed plan for Kearsley Creek. Both watershed management plans are being developed to control nonpoint sources of pollution. Projects may include implementing structural Best Management Practices (BMPs), non-physical BMPs, and information and education activities to eliminate nonpoint source pollution.

Swartz Creek Watershed Project
The following is a summary of the activities that transpired on the Swartz Creek Watershed Project during 2005.

Physical Inventory
A physical inventory of the watershed has been completed including road stream crossings, identification of critical areas and specific sites for BMP implementation. (site specific BMPs have not been designed). Final details have yet to be released.

A draft of the watershed management plan has been submitted to the DEQ for review. The following is derived from the draft.

The water quality of the Swartz Creek Watershed is negatively impacted by the affects of non-point source pollutants. The impact of these pollutants becomes progressively worse as one moves downstream within the watershed. It also appears that water quality within the watershed is likely to continue to worsen if a coordinated and watershed wide plan is not implemented.

Historically development has taken place in the lower reaches of the watershed and has caused severe degradation to the system in only the lowest portions of the watershed. However, as increased growth continues in the relatively healthy portion of the watershed (i.e. the headwaters) it is likely we will see larger reductions in water quality then we have experienced in the past.

The Swartz Creek Watershed appears to have ***two designated uses that are impaired*** *including* ***total body contact, and warm water fisheries****. The partial body contact, aquatic wildlife, and agricultural uses appear to be threatened. The industrial water supply and public water supply are not current uses but are included as threatened because of the likely inability of these uses to be supported if it was so desired. Table 3 details the status of each of the designated uses and the known and suspected pollutants affecting each use. The designated use attainment table below excludes several areas upstream of the Ray Road stream crossing over the southern branch in section 1 of Fenton Township. Upstream of this crossing the watershed appears to*

currently be meeting all designated uses. This area will be addressed in the critical areas discussion as a priority for preservation of water quality.

Designated Use Attainment/Threats below Ray Road

Designated use	Status	Pollutants
Agricultural	Threatened (S)	**Hydrology (K)**
Navigation	Threatened (S)	**Hydrology (K)**
*Industrial Water Supply	Threatened (S)	**Hydrology(K)**
*Public Water Supply at point of water intake	Threatened (S)	**Hydrology (K)**
Warm Water Fisheries	Impaired (K)	**Hydrology (K)** Sediment (K) Nutrients(K) Pesticides (S) Thermal (S)
Other indigenous aquatic life and wildlife	Threatened (S)	**Hydrology (K)** Sediment (K) Nutrients (K) Pesticides(S) Thermal (S)
Partial Body Contact	Impaired (S)	Bacteria\pathogens (K) Toxins (K)
Total Body Contact	Impaired (k)	**Hydrology (K)** Bacteria (K) Toxins (K)

In order to protect water quality from the pollutants identified above specific source areas and causes of the pollutants were identified. Table 4 outlines the noted linkages between pollutants, sources and causes in the Swartz Creek Watershed. Each of the pollutants will be discussed further in the next portion of the watershed management plan where specific critical areas for each pollutant will be described and identified.

Pollutant, Source and Cause of NPS in Swartz Creek Watershed

Pollutant	Source	Cause
Hydrology (K)	1. Urban Storm water (K)	• Directly Connected Impervious Surfaces (K) • Insufficient storm water management practices (K)
	2. Channel Alterations (K)	• Removal of flood plain (localized) (K)
	3. Loss of Wetlands (K)	• Loss of wetlands for agricultural use (K)
	4. In stream structure (K)	• Western Branch dam (K)
Sediment (K)	Stream banks (K)	• Erratic flows / High Runoff (K)

	Road Stream Crossings (K) Developed and developing areas (K) Roads, parking lots (K) Agricultural Lands (K)	• Insufficient Riparian Buffers (K) • Erosive road or shoulder surfaces (K) • Undersized crossing (K) • Insufficient Riparian Buffers (K) • Inadequate soil erosion practices (S) • Inadequate storm water mgt in commercial & industrial parking lots (K) • Insufficient riparian vegetation buffers (K)
Toxins (K)	Parking lots (K) Roadways (K)	• Inadequate storm water mgt techniques (K) • Road Drains directly to stream (K)
Nutrients (S)	Residential Lawns (K) Residential Septic Systems (S) Agricultural application (s)	• Over application of Fertilizer (S) • Failing septic systems (S) • Insufficient Riparian management
Bacteria (S)	Human Waste (S) Animal Waste	Illicit connections to storm sewers (S) Direct Connection in urban areas (S)
Thermal (S)	Roads & Parking Lots (K) Direct solar radiation (K)	Insufficient storm water mgt. practices (K) Removal of overhanging vegetation (K)

Public Involvement
The three required public meetings that were required were completed this past spring. A total of 60 individuals including residents and officials attended the three meetings.

Public Education
A public education plan is included in the WMP. The goals and objectives of this plan are intended to focus on the specific pollutant identified in the planning process. The REP is divided into three phases including awareness, education and action phases. Target audiences, specific messages and tools have been identified to be used in the implementation of the public education plan. It is expected that portions of the PEP will begin to be implemented in the fall of 2006. A large portion of the early phases of the PEP implementation will be focused on assisting Phase II communities take advantage of recommendations set forth in the plan.

Gilkey Creek Project

The Gilkey Project 2005 activities include stream road crossing inventories for the entire watershed, and walking of priority areas in the City of Burton. Much of the GIS data was assembled early in 2005 for use in the inventories in the spring. Early September CAER held a stakeholder meeting at the Applewood Estate, presented at local neighborhood meetings and sent in an interim report. The end of the year consisted of reviewing historical engineering, biological, and cultural reports and studies of the region to better understand the watershed. This data is being used to identify prime areas for retrofitting to reduce storm water inputs. Major pollutant sources of hydrology, sediment, and historical industrial pollution have been identified. Zoning Ordinances and Master Plans have been reviewed for the area. This project is anticipated to be complete in the early summer. For more specific information please contact the Center for Applied Environmental Research, University of Michigan – Flint, at 810.767.7272.

Kearsley Creek water Quality Improvement Plan (319)
The activities and progress on the Kearlsey Creek Water Quality Improvement Plan (319) are for the quarter ending December 31, 2005. This summary is laid out in the same order as the tasks identified in the WMP work plan timeline.

Task 1. Administration of Grants. All sub-tasks associated with this task have been completed in accordance with the timeline for this quarter. Specifically, the quarterly progress meeting was held in December with staff from the Genesee County Drain Commissioner's office, Spicer Group, Wetland and Coastal Resources and the U of M with a follow up meeting with MDEQ. GCDC will seek an extension of the grant through September 2005.

Task 2. Baseline Environmental Analysis. The QAPP re-submittal is postponed pending completion of the hydraulics analysis and modeling, and environmental review. (Tasks 2D, 2F) The physical inventory revealed that streambank erosion and sediment input was the primary pollutant identified during the physical assessment. Identification and implementation of appropriate BMP's that reduce or eliminate sediment inputs may be the appropriate mechanism for the baseline analysis.

Task 3. Hydrologic and Hydraulic analysis. Work continues for task 3 to determine the changes to the watershed with regards to the Master plan upon watershed build outs and the resulting impacts upon full build out. Time was also spent on verifying hydraulic capacity at the bridge and culvert structures at full build out in the watershed. Staff worked on tasks: 3A5.

Task 4. Identification of BMP's. Staff prioritized restoration work efforts based on a field inventory of 29 stream segments within Kearsley Creek from the county line to the Flint River. Based on this inventory a rating system was developed based on the severity of erosion within that segment. Of those segments inventoried, six were rated as "high" indicating substantial erosion and Seventeen stream segments were rated as "moderate". For-Mar Nature Center had the highest erosional rating of all stream segments. Potential BMP's may consist of cross vanes, vanes, j- hooks and gabion baskets at the For-Mar Nature Center where the bluff is over steepened and there is a potential for building failure.

Task 5. Ordinance and Policy Review and Implementation. Review of ordinances from the eleven governmental entities within the watershed has been completed. The review showed that

few ordinances are adopted to protect the Kearsley Creek corridor from development and runoff, and none of the ordinances provide the same review criteria for decision making.

Task 6. Long-Term Monitoring Plan. No work was scheduled for this task during the quarter.

Task 7. Information and Education Plan. Work continued on Task 7 to outline the information and educational plan to inform the public of the major issues within the Kearsley Creek watershed, and preliminary findings of the watershed management plan.

Task 8. Watershed Management Plan. Staff have initiated the preparation of the draft watershed management plan. Specific additional items for the plan which require analysis will be completed in the next quarter.

Tasks for next quarter: The next quarterly meeting is scheduled for March 2006 at 8:30 am in the GCDC offices. The hydrologic and hydraulic analysis and write up will be completed during the quarter. Once the H & H analysis is completed, specific BMP's will be proposed based on the prioritized restoration work. These proposed work sites and the plan will be submitted to the MDEQ for review. Task 8 work will continue during the quarter with the preparation of the draft watershed management plan

Other
The City of Davison continues to conduct a wellhead protection program. It is currently working to develop a pubic education program. The City has begun holding meetings with their consultant and the stakeholders. Stakeholders include participants from the City of Davison, Davison Township, Richfield Township, Davison Area Community Schools, and the general public.

Since 1999, the Flint River Watershed Coalition (FRWC) has executed a bi-annual Benthic-monitoring program that has been performed to meet the MDEQ requirements. This program has expanded from 18 sites to 30 since its inception. This program is possible due to volunteers who live in the watershed who give up 2 days twice a year to be trained to collect and log samples.

New Point Source Discharges of Storm Water

The permittee shall provide the information requested in Part I.A.4. of this permit on the discovery of new storm water point sources to the separate storm water drainage system.

Twenty (20) new point source discharges have been identified during IDEP investigations, listed below are the outfall IDs, location and receiving waterbodies. Due to tree cover and poor satellite positioning, GPS points were not taken. Field crews will continue to return during leaf off conditions and acquire latitude and longitude points.

Outfall ID	Pipe Size	Location	Receiving Waterbody
6705515	unknown	East of Fern & Rollins Street corner	Gibson Drain
6705519	15-inch	At Antoinette and MaryAnn intersection	Gibson Drain
6706260	24-inch	At Sandalwood Bridge over Drain	Gibson Drain
6706261	6-inch	200ft. d/s of 6706260	Gibson Drain

6706262	Unknown	At dead end of Sandalwood Drive	Gibson Drain
6706263	6-inch	Between 5124 & 5130 Sandalwood	Gibson Drain
6706264	OPEN	At bend along Sandalwood near Crestwood	Gibson Drain
6706265	24-inch	50ft. east of outfall 6706262	Gibson Drain
6706267	18-inch	North of Crestwood Drive	Gibson Drain
6706268	18-inch	150ft. east of Wishing Well/Moceri	Gibson Drain
6706269	15-inch	300ft. north of Wishing Well/Moceri corner	Gibson Drain
6706271	12-inch	Wishing Well/Mill Wheel intersection	Gibson Drain
6708000	OPEN	Just upstream of the enclosed section	Gibson Drain

SWPPI (Storm Water Pollution Prevention Initiative)

The Phase II Communities in the Middle Flint Watershed submitted their SWPPIs October 1, 2005. The SWPPIs incorporated actions for both good housekeeping and post-construction BMPs despite the Middle Flint WMP not containing these items. A select sample of actions from the SWPPI template used by the Communities is available in Appendix II.

It is too early to determine the effectiveness of actions contained in the SWPPI that have been implemented by the County since October 1. There are no anticipated revisions to the County's SWPPI's at this time.

Other Actions

The County Drain Office was approached by the Flint River Watershed Coalition to apply for a permit to hold multiple cleanups. The drain office participated by co-chairing and organizing multiple cleanups within the Flint River Watershed. On May 21, 2005, 278 volunteers came out to six sites, of which 4 were in Genesee County and 2 in Lapeer. The volunteers were able to clean up approximately 14 river miles and remove 3992 ft^3 of garbage from the river and it's banks.

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Nested Drainage System Agreements

Permittees which are primary jurisdictions shall update the list of each nested jurisdictional area or drainage system that should have its own separate storm water drainage system permit, originally submitted as part of the application requirements in Part I.A.2.

The Drain Commissioner's Office has met with all the school districts and all the Supervisors have indicated that they are interested in working together under a nested jurisdiction. At this time the Drain Office has signed letters of agreement for all the school districts except Carman-Ainsworth, Clio and Swartz Creek. Schools of choice do not need to sign an agreement because they don't own any property; they rent it from a corporation they all formed.

Special Reporting Requirements

The University of Michigan (Ann Arbor Campus), the Michigan Department of Transportation, and the Cities of Ann Arbor, Flint, Grand Rapids, Livonia, Sterling Heights, and Warren shall submit additional information.

This section is not applicable.

Appendix I:
Workshop Fact Sheets

Stakeholder Workshop Results

Shiawassee Watershed — May 23, 2005

Representatives from the communities and businesses encompassed by the Shiawassee River Watershed boundaries gathered at the Fenton Township Hall on May 23, 2005, to participate in a stakeholder workshop on the development of a watershed management plan for the area. **Eight individuals attended the workshop** hosted by Genesee County Drain Commissioner Surface Water Management and the Shiawassee Watershed Committee! Participants represented the following interests:

- Lake Fenton Property Owners Association
- Lake Ponemah Association
- City of Linden
- Fenton Township
- Flint River Watershed Coalition
- Michigan Department of Transportation
- Genesee County Drain Commissioner Surface Water Management

A watershed is an area of land that drains to a common water body, such as a river or a lake. The Shiawassee River Watershed, shown in the map above, encompasses portions of Genesee, Oakland, and Livingston Counties.

Participant Goals and Concerns

Participants were asked to provide input on their vision for the watershed and to identify concerns and desires they would like addressed in the watershed management plan. To obtain this input, facilitators engaged in a brainstorming activity to develop a list of watershed goals and visions. The results of the brainstorming process are presented below.

Watershed Goals and Visions

1. Proactive assessment of risks that may harm water quality
2. Minimum standards for development that are consistent countywide
3. Equitable funding mechanism needed
4. Smart planning should be used as a way to save money on infrastructure costs
5. Performance based best management practice (BMP) for a given waterbody based on waterbody sensitivity and unique characteristics
6. Promote watershed stewardship ethic
7. Education for:
    - School Children
    - Residential Homeowners & Associations
    - Elected officials, business managers
    - Property Owners, Golf Courses
    - Municipal staff, Planning Commissions
    - Riparian Landowners
8. Tree preservation

Watershed Concerns

1. Lack of enforcement of soil erosion practices
2. Lack of maintenance of BMPs
3. Wetland destruction
4. Pollution from motorboats and jet skis
5. Retrofit industrial parks for water quality impairments
6. Grease from food industry
7. Erosion from construction sites
8. Arsenic in groundwater
9. High runoff volume due to development
10. Public doesn't perceive stormwater as a problem
11. Fertilizer/Pesticide runoff
12. Pollution discharge from developed areas
13. Urban blight

Obstacles and Barriers

1. Lack of Money
2. Public Apathy/Negative attitudes

Ideas to Work around Obstacles

1. Conduct Surveys
2. Relate Meeting to Topics of Concern for Citizens such as:
    - Make Lake Fenton non-motorized
    - Ban fertilizer use
    - Consider consequences of non-action
3. Proactive wetland delineation on a local level
4. Promote Planned Unit Developments (PUD)
5. Provide both carrots and sticks to promote changes

Meeting Evaluation

All of the 8 people attending the workshop evaluated its effectiveness. Evaluation responses indicated that 100% of the attendees felt the workshop discussions were helpful and productive. 75% of the attendees plan on coming to future meetings.

Road Map for the Watershed Management Plan

Watershed management planning is an iterative process for identifying watershed goals, problems, and solutions, and implementing and evaluating those solutions to improve water quality. Involving stakeholders – the individuals that represent important interests and values of people in the watershed – is essential to the watershed management planning process.

Project Schedule

The schedule for developing the Shiawassee River Watershed Management Plan is as follows:

- Data Collection — May 2005
- Develop Goals & Objectives — May 2005 – Aug 2005
- Prioritize Goals & Identify Critical Areas — Aug – Nov 2005
- Stakeholder Workshop #2 — August 29, 2005
- Prepare Action Plan — Sep – Nov 2005
- Stakeholder Workshop #3 — October 24, 2005
- Draft WMP — Nov 2005 – Feb 2006
- Stakeholder Workshop #4 — TBD
- Community Forum — TBD
- Final WMP — March 1, 2006
- Implement the Plan — April 2006

NEXT WORKSHOP – August 29, 2005
Objective: Present watershed data and seek comments on prioritization

Contact Information

For additional information please contact Sue Kubic, Genesee County Drain Commissioner's Office, at (810) 732-1590 or e-mail address skubic@co.genesee.mi.gov

Or check out the informational website at http://www.gcdcwws.com/SWM and click on Phase II NPDES.

Stakeholder Workshop Results

Combined Watershed Effort August 29, 2005

Citizens and representatives from the communities and businesses encompassed by the Lower Flint, Upper Flint, and the Shiawassee River Watersheds gathered at Richfield Township and Fenton Township Halls on August 29, 2005, to participate in a stakeholder workshop on the development of a watershed management plan for the area. **Over 30 individuals attended the workshop** hosted by Genesee County Drain Commissioner Surface Water Management.

Revised Watershed Management Planning (WMP) Strategy

Many communities along with Genesee County Staff have noted that redundancies had occurred as communities and watersheds overlap during the watershed planning process. The number and frequency of meetings have been difficult for a number of the Phase II Communities to attend. These events have precipitated the need to re-examine the strategy of the Genesee County Watershed Planning Efforts.

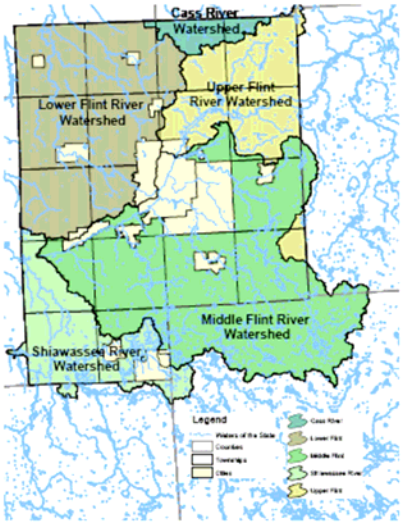
The Lower Flint, Upper Flint, and Shiawassee Watershed Management Plans (WMP) are being developed in concert with one another and therefore are meeting and planning jointly. The plan is to submit all the WMPs to MDEQ by March 1, 2006.

Participant Goals and Concerns

Participants were asked to provide input on the initial goals and major actions that have been compiled using the results from the first Stakeholder Workshop, Watershed Committee Input, and Survey Results. A summary of the major goals and permit requirements discussed included:

- Protect Public Health
- Establish Watershed Stewardship Awareness and Responsibility among the Public
- Reduce Impacts from Peak Flow and High Volumes
- Create, Restore, and Enhance Recreational Use
- Restore and Protect Aquatic Life, Wildlife, and Habitat
- Pollution Prevention and Good Housekeeping Activities
- Post Construction Controls for New and Redevelopment Areas

A watershed is an area of land that drains to a common water body, such as a river or a lake. The Lower Flint River Watershed, shown in the map, is located in Genesee County and drains to the Flint River.



Some of the ideas and suggestions from the stakeholders regarding the goals and actions included:

- Coordinate with the Michigan Lakes and Stream Program
- Enact Wetland Protection Ordinances & Require County Road Commission to address impacts from road projects
- Conduct monitoring with strong legislative support
- Work with the plan to designate the Flint River as National Recreation Area

- Link up with local Adopt-A-Stream Programs in Linden, City of Fenton, and the Shiawassee River
- Change Local and County development standards and goals
- Keep rural charm along Linden Mill Pond
- Design lakeside communities with setbacks and walking paths around the waterbody
- Protect natural features when developing new sites
- Include all of Genesee County in this plan even though some will overlap with the Livingston County Plan

Watershed Concerns

The Stakeholders also noted a number of concerns and problems that they have witnessed in their watersheds. The following list was discussed at this workshop:

- Lack of response from MDEQ when concerns are voiced
- Developer's money and lawyers give them strategic advantage
- Local government not aware of impacts of development on local communities
- Agricultural drainage to Mud Lake and Yellow River
- Sediment filling up local lakes
- Wetland destruction and encroachment
- Sewage treatment plant impacts on Shiawassee River
- High cost of connecting to available sewers

Obstacles and Barriers

Stakeholders were offered to share their ideas on what obstacles and barriers we might face in the future with the planning and implementation efforts. The following ideas were identified during the meeting:

- Lack of Money
- Public Apathy/Negative attitudes
- Lack of Education

Meeting Evaluation

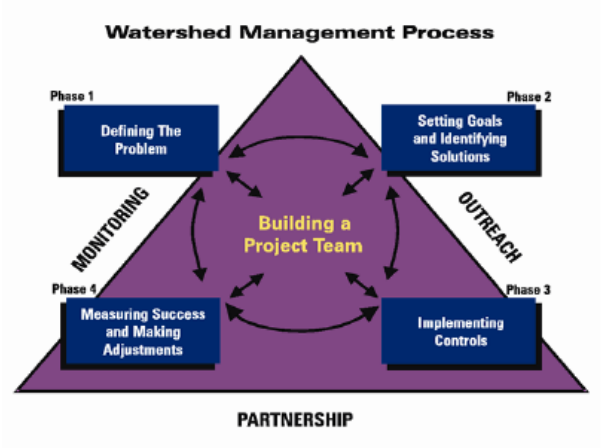
Of the 30 people attending, 18 individuals evaluated the workshop. These attendees rated the workshop overall an average of 3.8 out of 5. Some people indicated that the meeting should be kept to an hour and a half or less. Others thought that the meeting provided good information but needed to show concrete results.

Road Map for the Watershed Management Plan

Watershed management planning is an iterative process for identifying watershed goals, problems, and solutions, and implementing and evaluating those solutions to improve water quality. Involving stakeholders – the individuals that represent important interests and values of people in the watershed – is essential to the watershed management planning process.

Contact Information

For additional information please contact Sue Kubic, Genesee County Drain Commissioner's Office, at (810)



732-1590 or e-mail address skubic@co.genesee.mi.gov

Or check out the informational website at http://www.gcdcwws.com/SWM and click on Phase II NPDES.

NEXT WORKSHOP – November 30, 2005
Objective: Present Draft Action Plan

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Stakeholder Workshop Results

Combined Watershed Effort

November 30, 2005

Representatives from the Upper and Lower Flint River and Shiawassee River Watersheds came together for their third stakeholder workshop on November 30, 2005. The purpose of the workshop was for stakeholders to respond to proposed actions designed to meet the previously determined goals and objective for each of the watersheds. Nearly 30 individuals attended the afternoon and evening workshops, including representatives from:

- State and Federal Government
- County and Local Government
- Public Schools (Okemos, DeWitt and Bath)
- Commercial and Industrial Representatives
- Agricultural Representatives
- Residential Representatives
- Environmental and Conservation Groups
- University of Michigan

The Third Workshop

The workshop was the third in a series of four. The first and second workshops in each of the watersheds established goals and objectives for the watersheds based on stated concerns and desires. This workshop focused on reporting out and gathering feedback on the proposed action plan. Comments provided by the participants were incorporated into the action plan. A fourth and final workshop will be held to establish evaluation guidelines, present the final watershed management plan, and explain how and why the participants need to stay involved during the implementation phase of the watershed management plan.

Participants joined three groups centered on the seven goals. The groups were: 1) Protecting Public Health and Create, Restore and Enhance Recreational Uses; 2) Establish A Watershed Ethic Among the Public and Restore and Protect Aquatic Life, Wildlife Habitat and; 3) Reduce Impact from Peak Flows, Good Housekeeping and Post Construction Controls for New Development.

NEXT WORKSHOP
Wednesday, February 1, 2006
11:00 am or 6:00 pm
Flint Township Senior Center
Objective: Present draft watershed management plan and seek comments.

Breakout Sessions

In the breakout sessions actions designed to achieve each objective were proposed. The following are abbreviated examples of some of the actions proposed for each of the goals.

Goals and Associated Objectives

Goal 1: Protect Public Health

1a Time-of-sale septic ordinance
1b Connect to available sewer system
1c Education at time-of-sale (Septic, lawn, leaves, grass, carwash, etc, for new home owners)
1d Disconnecting of footing drains from sanitary sewers
1e Examine source of pollutants resulting in fish advisory
1f Identify existing wellhead protection programs
1g Drinking water well test at time of sale ordinance
1h Map Arsenic Levels for drinking wells

Goal 2: Establish a Watershed Stewardship Ethic Among the Public

2a Promote existing programs that public can participate in
2b Improve communication of water quality and threat to public
2c Direct mailing to riparian land owners
2d Expand existing efforts of household hazardous waste program
2e Enhance existing benthic monitoring program
2f Enhance existing Project GREEN program
2g Enhance existing frog and toad survey

Goal 3: Reduce Impact from Peak Flow

3a Storm water ordinance
3b Maintain drainage system to minimize flooding
3c Protect existing floodplains and wetlands from being filled or developed
3d Reduce storm water runoff quantity, peak flows, & peak velocity
3e Monitor water quantity to measure change

Goal 4: Create, Restore, and Enhance Recreational Uses

4a Education opportunities for passive and active recreational uses
4b Encourage investment in land (along water) for recreation/ Wildlife protection
4c Expand parks, trails, and river walk system
4d Examine the river and stream corridors and identify where additional access sites and river trails could be developed

Goals 5: Restore and Protect Aquatic Life, Wildlife, and Habitat

5a Re-establish stream buffers (stabilize disturbed soils to prevent further erosion)
5b Adopt a priority ranking process to protect areas with greatest need (floodplains and wetlands)
5c Protect key locations of threatened and endangered species and habitat
5d Identify key soil erosion issues/locations

Goal 6: Improve Municipal Good Housekeeping Activities

6a Maintenance activities, schedules, and inspection procedures for storm water structural controls
6b Controls for reducing or eliminating the discharges of pollutants from streets, roads, highways, parking lots, and maintenance.
6c Procedures for the proper disposal of operation and maintenance waste from the separate storm water drainage system
6d Ways to ensure that flood management projects assess the impacts on the water quality of the receiving waters
6e Implementation of controls to reduce the discharge of pollutants related to application of pesticides, herbicides, and fertilizers.

Goal 7: Institute Post Construction Controls for New Development and Significant Redevelopment

7a Evaluate and implement site appropriate, cost-effective structural and nonstructural best management practices (BMPs) that prevent or minimize the impacts on water quality
7b Establish long-term operation and maintenance practices for storm water BMPs

Each group was asked to review the proposed actions and answer the following questions:

- Do the actions meet the objective?
- Are the actions clear?
- Are the resources suggested sufficient?
- Is the timeframe adequate?
- Do you have any recommendations for the proposed actions?

Each group had a facilitator that recorded the input. Additionally, individuals were encouraged to provided written input. All the stakeholder feedback will be processed and incorporated into a revised action plan.

Reporting Sessions

The tables were convened in a plenary discussion at the end of the session. Each group was asked if there were any glaring omissions in the proposed action and if additional meetings on their topic were needed.

It was noted that there needed to be better integration of land use work into plans at the local level. In particular the regional greenways initiative was mentioned. Concern was also expressed over the need to address both public and private lands in future ordinances and BMP maintenance arrangements. There was recognition of the need to tie watershed issues and concerns to educational action. Finally, it was noted that there needed to be an agreed upon definition for wetlands and that acquiring funding for both wetland and habitat preservation was an issue.

Contact Information

For additional information please contact Sue Kubic, Genesee County Drain Commissioner's Office, at (810) 732-1590 or e-mail address skubic@co.genesee.mi.gov

Or check out the informational website at http://www.gcdcwws.com/SWM and click on Phase II NPDES.

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Appendix II:
Examples from the SWPPI Template

4.0 ACTIONS

The attached table provides the activities from the Watershed Management Plan (WMP) that, when implemented, meet the SWPPI requirements. Each Goal and Objective in the table has an indication of whether the objective is a WMP requirement or SWPPI requirement or both. The participating permittees are those municipal entities which are required to address this item in their SWPPI document. The supporting agencies listed in the table are also drawn from the WMP.

In the "Material Cost Estimate" and "Labor Cost Estimate" columns there is a reference to E342C that has been filled in for you. The presents of the E342C acronym in either of these columns indicates that the related action item will be paid for out of your current County Public Improvement Agreement (P.A. 342) with the Genesee County Drain Commissioner's office. For more information please see Section 5.0: Funding of the Phase II Requirements on page 31.

Goal 1: Protect Public Health

Objective 1 e: **Examine sources of pollutants resulting in fish advisory**

Permit Requirement: Yes, methods of assessing progress in storm water pollution prevention.

Participating Permittees: Villages, Cities, Townships, County

Supporting Agencies: Storm Water Management Committee (SWM), Monitoring and Mapping Committee, MDEQ

Action	Lead Agency	Schedule	Material Cost Estimate	Labor Cost Estimate	Evaluation Mechanism
Identify Fish advisory pollutants and thresholds	Monitoring and Mapping Committee	June '07	NA	E342C 40 hrs @ $50/hr = $2000	Pollutant Document
Identify source of pollutants	Monitoring and Mapping Committee	Sept '07	NA		Pollutant source document
Examine sources individually to determine if specific actions can be taken to reduce pollutant.	SWM	Dec '07	NA		Existing or new action items for each source
Include new actions into watershed plan with dates to be done	SWM	Mar '08	NA	E342C	Updated Middle Flint River Watershed Plan

NA = Not applicable
E342C = covered under existing P.A. 342 contract.

DEQ Requirement – Good Housekeeping Activities [*This list is not intended to be exhaustive and there are many additional activities (too many to list) that can constitute maintenance.*]

Objective 6 a: **Maintenance activities, maintenance schedules, and inspection procedures for storm water structural controls* to reduce pollutants (including floatables) in discharges from the permitee's separate storm drainage system.****

Permit Requirement: Yes, maintenance activities, schedules, and procedures for storm water structural controls to reduce pollutants (including floatables) in discharges from the permittee's separate storm water drainage system.

Participating Permittees: Villages, Cities, Townships, County

Supporting Agencies: Genesee County Road Commission, Genesee County Drain Commission

Action	Lead Agency	Schedule	Material Cost Estimate***	Labor Cost Estimate***	Evaluation Mechanism
Cleaning, clearing, restoring streams/ channels.	Local Communities				Record of these activities.
Tail ditch work; installation /maintenance of Rip Rap; other open channels erosion control measures & maintenance functions.	Local Communities				New structures, Maintenance schedules, Record of activities.
Storm and combined sewer maintenance and construction projects.	Local Communities				Maintenance schedules, Record of activities.
Infrastructure failures (sink hole repairs).	Local Communities				Structure restored.
Tie-in inspections/permits; other maintenance functions related to the storm water infrastructure.	Local Communities				Inspection schedule, Inspection schedule, maintenance schedule.

* Structural controls include: retention basins; detention basins, constructed wetlands, infiltration practices, filters, bioretention, biofilters (swales and filter strips). The storm water drainage system also includes pipes and other conveyance structures that require regular maintenance.

** Please note that each community will have to review their current practices as well as determine future additional activities to create their own unique list of Good Housekeeping Activities. A list of possible activities has been provided for your convenience.

*** If you are already conducting a maintenance activity then it is recommended that you indicate that this is an existing program (EP). If you plan to start a street sweeping program then indicate a range for the cost estimates.

DEQ Requirement – Post Construction Controls for New Development and Significant Redevelopment

Objective 7 a: **Evaluate and implement site appropriate, cost-effective structural and nonstructural best management practices (BMPs) that prevent or minimize the impacts on water quality. ***

Permit Requirement: Yes, the development, implementation, and enforcement of a comprehensive stormwater management program for post-construction controls for areas of new development and significant redevelopment.

Participating Permittees: Villages, Cities, Townships, County

Supporting Agencies: Genesee County Drain Commission, Genesee County Road Commission, Genesee County Health Department

Action	Lead Agency	Schedule	Material Cost Estimate	Labor Cost Estimate	Evaluation Mechanism
Assess site plan review process to determine the current level of requirements.	Local Communities				Assessment is completed.
Where appropriate, adopt additional measures to ensure water quality.	Local Communities				Additional measures or processes are adopted (if necessary).
Seek opportunities to implement additional measures to existing structures.	Local Communities				Existing BMPs may be enhanced.

* This Objective directs communities to go beyond Goal 3a above and for them to look at their local controls for both municipal operations and future development in addition to the proposed County ordinance, review, and maintenance schedules.

Common controls for urbanization include: policies and ordinances to direct growth to identified areas, to limit the rate and volume of storm water discharged to pre-developmental hydrologic levels, to protect sensitive areas such as wetlands and riparian areas, and to maintain and/or increase open spaces (including a dedicated funding source for open space acquisition); encouraging infill development in higher density urban areas and areas with existing infrastructure; establishing in-stream maximum flow targets designed to minimize stream bank erosion and maintain healthy aquatic populations; and coordinating release volumes and rates from detention basins to achieve in-stream maximum flow targets.