Total Suspended Solids Reduction Implementation Plan for Malletts Creek

October 2011 — September 2016

For the purpose of achieving the Total Maximum Daily Load (TMDL) and removing the biota impairment of Malletts Creek

Developed by and for the Middle Huron Partners and Stormwater Advisory Group (SAG).

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I. Background

Malletts Creek, a warmwater, urbanized water body tributary to the Huron River, is located in Washtenaw County in the vicinity of the City of Ann Arbor, Michigan. This stream suffers from the ills that plague similarly developed waterways. State biologists and local volunteer stream monitors reported problems with Malletts Creek going back several decades – few fish and aquatic insects; severely eroded and undercut banks; scouring flood waters; baseflows too low to support life; and high levels of pollutants. Among the actions taken to restore some ecological balance to Malletts Creek, was the state's decision to employ the Total Maximum Daily Load (TMDL), a tool granted to them by the federal Clean Water Act to develop pollution budgets.

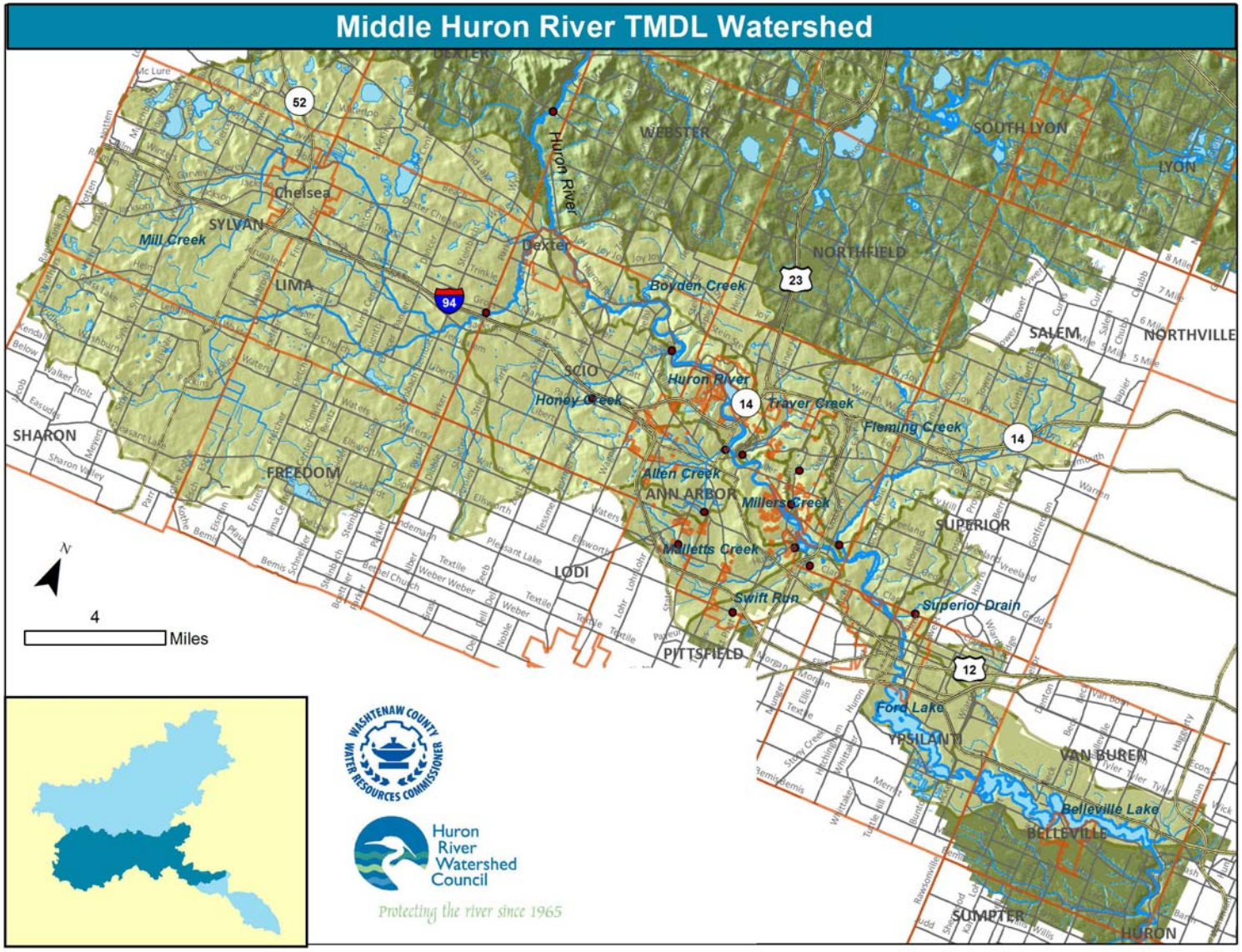
In 2004, the Michigan Department of Environmental Quality developed a TMDL for Malletts Creek that intended to restore the indigenous aquatic life to the stream – fish and macroinvertebrates. The TMDL focuses on the pollutant Total Suspended Solids (TSS) as the main culprit in preventing aquatic life to flourish in Malletts Creek. The concept became fairly straight-forward: reduce TSS to levels that allow native fish and insect species to thrive in the creek.

The land managers and water resource managers in this region have demonstrated on-going commitment to mitigating impacts to Malletts Creek and restoring its ecology. The multi-pronged strategy to meet the TMDL involves public education and outreach, policy solutions, and restoration projects within the stream channel and watershed. Much of the strategy was developed for the Malletts Creek Restoration Plan (2000), a watershed management planning effort shepherded by the Washtenaw County Water Resources Commissioner.

Since 2000, many of the projects described in the Restoration Plan and in the Watershed Management Plan for the Ann Arbor-Ypsilanti Metropolitan Area (1998, updated 2008) have been implemented. Both documents provide a more holistic discussion of the key problems facing the creek and best potential practices. This implementation plan serves as an appendix to the 2000 plan to provide a discussion of the Malletts Creek biota: more specifically, the progress made towards restoring the creek for fish and macroinvertebrates, and on present, past and proposed restoration activities to meet this goal.

Malletts Creek is located within the section of the Huron River watershed (HUC 04090005) known as the middle Huron River watershed (Figure 1).

Figure 1. Middle Huron River Watershed, Huron River Watershed (HUC 04090005), Michigan.



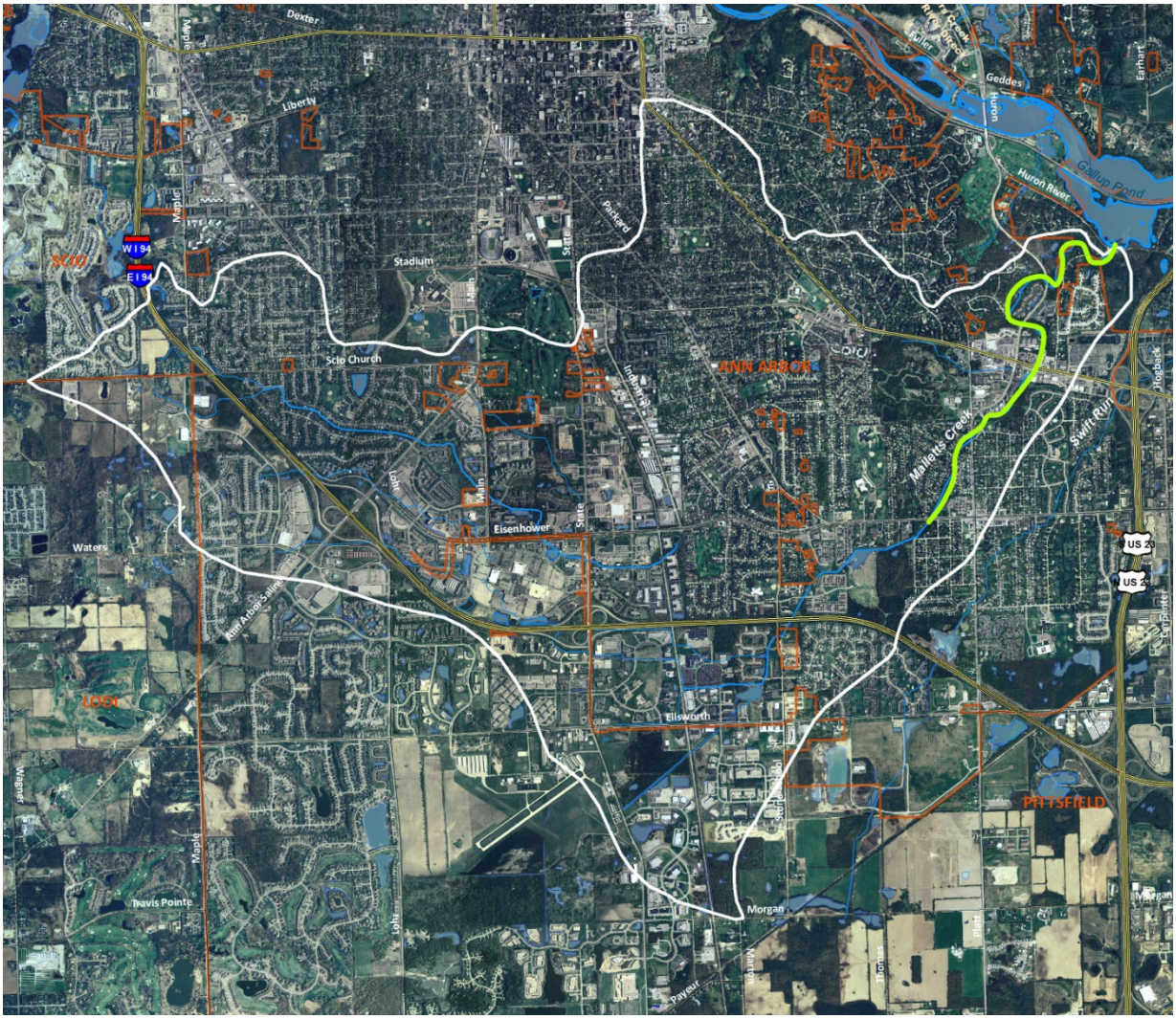
Implementation Plan for the Malletts Creek Biota TMDL

A. Pollution Budget for Malletts Creek

Total Maximum Daily Load Targets

The TMDL reach of Malletts Creek extends from the confluence with the Huron River upstream to Packard Road (Figure 2), a distance of two miles. The impaired use for Malletts Creek relates to the indigenous aquatic life. The primary numeric targets are based upon Michigan's biological community and habitat quality assessment Procedure 51.

Figure 2. TMDL Reach of Malletts Creek (highlighted)



Michigan Water Quality Standards (Rule 100(1)(f), require, as a minimum, the protection of aquatic life among other designated uses. The TMDL states that the fish and macroinvertebrate communities of Malletts Creek are impacted due to habitat impairment and instability, unstable flow extremes, excessive bank erosion, and sedimentation. The biota TMDL target is a fish and macroinvertebrate community with acceptable, reproducible scores, each equal to or greater than the equivalent of "acceptable", based off of Procedure 51 criteria. Specifically, a target habitat score equal to or

greater than 130 assures protection of habitat conditions and minimized impairment to habitat. This score is deemed appropriately high enough to minimize the temporal and spatial variability with the watershed and provide a buffer for the variability within the Procedure 51 protocol.

In addition to the primary target for the aquatic community, the TMDL sets a secondary numeric target for TSS. Water quality goals for suspended solids (finely divided solids) may be represented by the following categories:

- Optimum = < 25 mg/l
- Good to Moderate = >25 to 80 mg/l
- Less than moderate = >80 to 400 mg/l
- Poor = >400 mg/l

Since the TMDL's purpose is to restore the biological community to an acceptable condition and attain water quality standards WQS, a value of at least 80 mg/l for TSS is the annual mean target. The TSS numeric target may be overridden if the biological and habitat numeric targets are achieved. Overall, the secondary TSS target is intended to evaluate solid loading influences and assist in orienting and focusing corrective actions for source reductions.

Sources of TSS and Stormwater

The source assessment in the TMDL describes the nature of the Malletts Creek watershed and how urbanization impacts the stream, specifically aquatic life. From the Huron River confluence upstream, land use in the watershed is dominated by residential, commercial and industrial development. In fact, storm water discharges from an area of 3,875 acres is composed of urban/industrial/built-up land use categories that represents about 58% of the land use area in the Malletts Creek watershed. As a result, rapid precipitation runoff, or stormwater, containing suspended solids and contaminants reaches the receiving waters via stormwater infrastructure and overland flow. Substantial reductions in vegetated riparian zones where stormwater can infiltrate exacerbate the velocity and quantity of the water entering the stream.

At its root, a TMDL is an equation comprised of three parts to produce the limit needed for the impaired water body. TMDLs are the sum of individual Waste Load Allocations (WLAs) for point sources, Load Allocations (LAs) for nonpoint sources of pollution, and natural background levels. TMDLs must include a Margin of Safety (MOS), either implicitly within the WLA and/or the LA, or explicitly, that accounts for uncertainty in the relation between pollutant loads and the quality of the receiving water body. The biota TMDL for Malletts Creek focuses on TSS loading, the secondary numeric target of the TMDL. Stormwater volume is not allocated directly in the TMDL, making TSS the surrogate measure for tracking attainment of the impaired designated use.

The WLA Components are split between the five NPDES individual/general permitted point sources and the NPDES permitted stormwater entities (four entities with at least 161 outfalls)[1]. The five point sources contribute an estimated ten percent of the TSS load to the creek with the remaining 90 percent coming from the stormwater component, and specifically, from the residential, industrial, commercial, and transportation sources. The projected annual TSS load from the NPDES permitted point sources is considered acceptable. The TMDL calls for a sixteen percent reduction in TSS loads from 2004 WLA levels of 1,301,184 lb/yr, or 208,190 lb/yr, to achieve the goal of 80 mg/L TSS as an annual average during wet weather events (see Table 1).

The LA Components are divided among agricultural land, and the background sources of forested land, wetlands and water bodies. The TMDL prescribes a 45 percent reduction in TSS loads from cropland in the Malletts Creek watershed, or 29,695 lb/yr. The overall prescribed reduction in TSS load from WLA and LA is 15 percent, or 1,191,784 lb/yr.

[1] NPDES individual/general permitted point source facilities identified in the TMDL are Galcorp Bulk Plant, Berkshire Creek GWCU, NTN Technical Center, Federal-Mogul Corp. Tech Center, and Federal-Mogul Corp-Seal Products. NPDES permitted stormwater entities and their respective estimated outfalls (in parentheses) are City of Ann Arbor (137), University of Michigan (11), MDOT (2), and Washtenaw County (11).

Table 1. Annual TSS loads based on NPDES permitted point sources and various land use categories in the Malletts Creek watershed. Estimated annual TSS loads and recommended TSS reductions (WLA and LA) are derived.

Source Category	Acres	Estimate Current TSS	TMDL Target Load TSS
Waste Load Allocation (WLA)			
NPDES Non-stormwater load (TSS)		127,396	127,396
NPDES Permitted Stormwater load (TSS)			
Residential	2,422	496,343	
Commercial and Service	686	405,831	
Industrial	535	202,971	
Transportation/Communications/Utilities	232	68,643	
Subtotal		1,173,788	985,853 (16% reduction)
WLA Total	**3,875**	**1,301,184**	**1,113,249**
Load Allocation (LA)			
Agriculture	787	53,822	29,695 (45% reduction)
Forested/Shrub/Open Land	2,013	48,395	48,395
Water Body	21	445	445
LA Total	2,821	102,662	78,535
Overall Total	6,696	1,403,846	1,191,784 (15% reduction overall)

Source: Biota TMDL for Malletts Creek, 2004.

B. Water Quality Sampling Data Summary

Water Quality data collected since 2003 by HRWC and partners at the Malletts Creek monitoring station at Chalmers Drive (Figure 3) is the primary source information to gauge TSS levels. The HRWC Water Quality Monitoring Program collects water samples for analysis of TSS, among other variables. Since the data collection began in 2003, the **average TSS concentration is 18.1 mg/L**, with samples showing a slight declining trend over that period of time. The mean concentration is well below the target of 80 mg/L. But this average represents all samples collected across a variety of conditions (i.e., wet and dry). **Wet weather** monitoring resulted in event concentrations of 33 and 222 mg/L or an **average of 127.5 mg/L** (Figure 4).

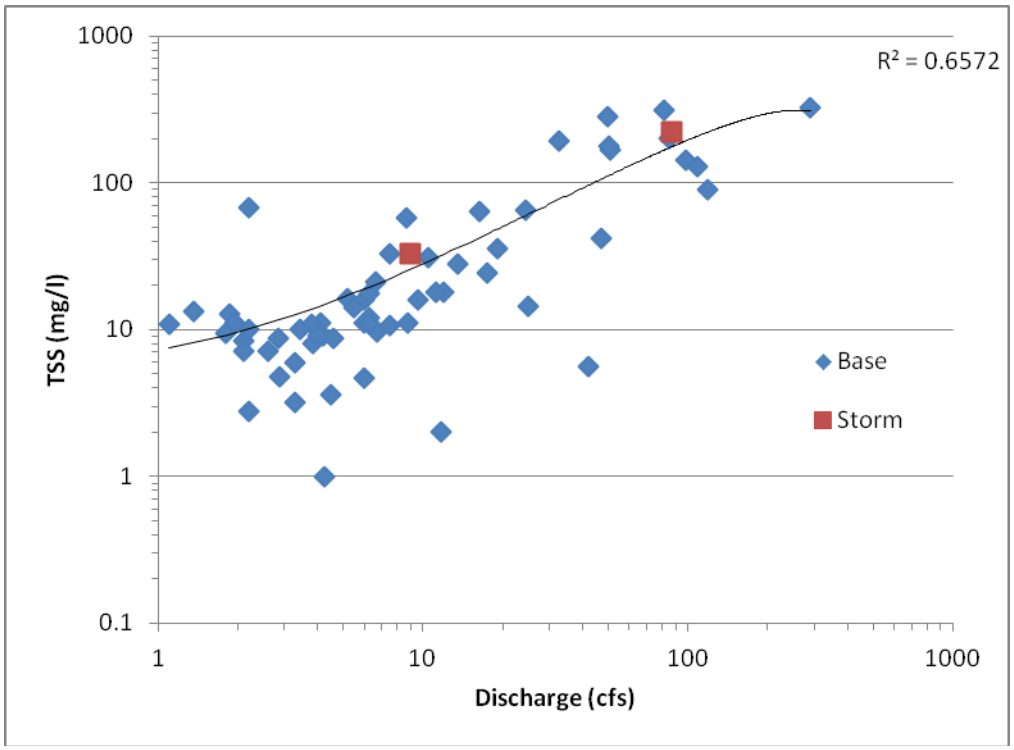


Figure 3. TSS samples showing the relationship to observed stream discharge in Malletts Creek at Chalmers Rd.

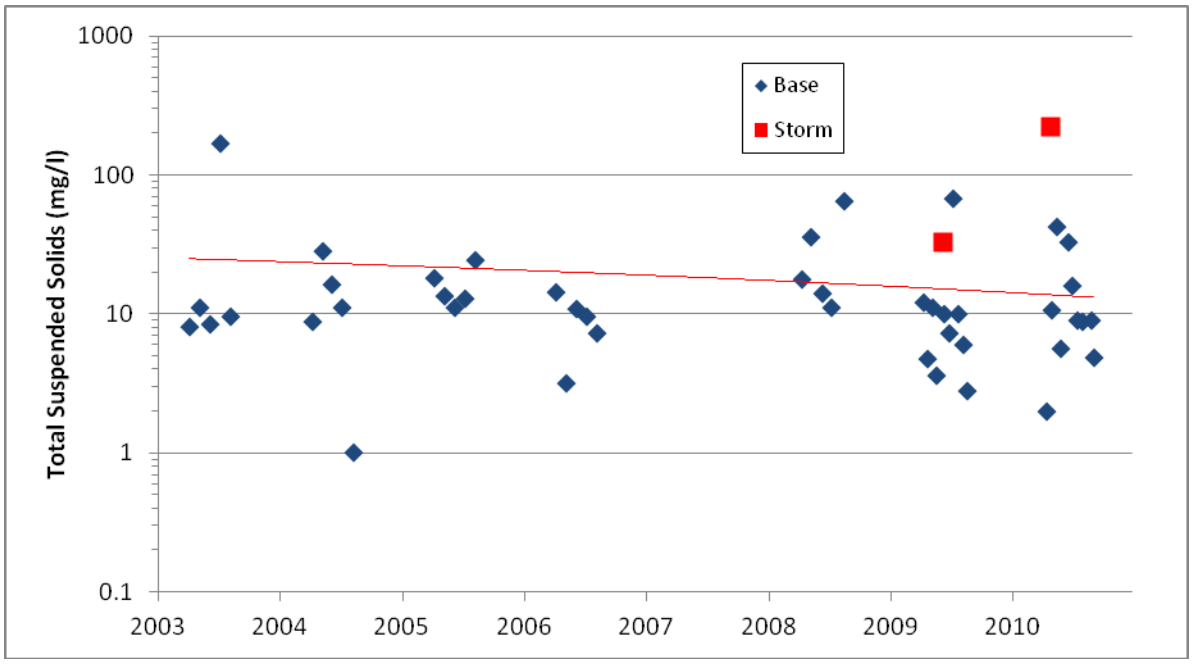


Figure 4. TSS samples by year from Malletts Creek at Chalmers Rd. Red line indicates a slight downward trend in concentration.

The estimated average daily load range is calculated at two to three times the target load. Inputting stream flow and the TSS sample concentrations into a load estimation model (LOADEST) results in an estimated average daily load range of 6,213 to 8,527 lb/day or roughly 1,100 to 1,500 ton/yr (2,464,000 to 3,360,000 lb/yr). The original TMDL model was based entirely on land use projections, while the estimation from HRWC is based on sampling data, so the estimates are not directly comparable. Further, the load estimates are imprecise because the sampling data were quite variable (Figure X). The full 95% confidence interval of load estimates ranges from 502 to 3,721 ton/yr (1,124,480 to 8,335,040 lb/yr).

C. Macroinvertebrate Sampling Data Summary

Macroinvertebrate data collected since 1992 by HRWC and partners at four monitoring stations is the primary source of information on the benthic macroinvertebrate community in Malletts Creek.

Insects living in the creek compose the benthic macroinvertebrate population, along with clams and other mollusks, crayfish, and some other taxa. Typically, monitoring focuses on insects (in aquatic stages of development) as they are representative of a variety of trophic levels, are sensitive to local environmental conditions, and are easy to collect. Since the benthic population depends on the physical conditions of the stream as well as water quality, its composition indicates the overall stream quality. Greater insect diversity indicates good stream quality, and is measured by the number of different insect families. Eighty-seven benthic insect families are found in the Huron River watershed.[i]

Much of the benthic macroinvertebrate data cited is from HRWC's Adopt-A-Stream Program, which relies on trained volunteers to monitor more than 70 sites in the watershed, including 30 in the Middle Huron watershed. Monitoring data has been gathered since as early as 1992 at some sites through annual spring and fall collection days, and a winter stonefly search each January. All sites have been monitored at least once per year since the commencement of the monitoring at that site.

Insect families belonging to the orders of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) are known as the EPT families, which are indicators of alterations in stream flow, temperature, oxygen and other changes that raise metabolic rates. Sensitive insect families, such as Perlidae (Perlid stonefly) and Brachycentridae (log-cabin caddisfly), are highly sensitive to organic pollution; 19 of the 87 benthic insect families living in the Huron River watershed are sensitive.[ii]

Winter stoneflies, which are active in January and require high levels of oxygen, are indicators of good stream quality. Absence of winter stoneflies suggests that toxic pollutants may be present. This is because organic pollutants, such as fertilizer and human or animal waste, are associated with stormwater runoff in warmer months. Because there is usually little or no stormwater runoff in January, there is a greater likelihood that any pollutants in the stream are persistent (long-lasting) inorganic toxic substances that are present in the bottom of the streambed. Conversely, at a site where insect diversity

is lower than expected but winter stoneflies are present, organic pollutants are more likely to be the problem.

The Adopt-A-Stream Program also rates the "ecological conditions" at each site, which are determined by both the biological and physical conditions of the site. Biological conditions include the diversity of insect families, EPT families, and sensitive families. Physical conditions are determined by conductivity results and "measuring and mapping" assessments of habitat. These assessments involve examining characteristics such as the stream banks, stream widths and depths, and bed material (such as sand, gravel, or muck). When interpreting the biological and physical conditions, more diversity is generally expected at larger sites or sites with cooler summer stream temperatures.

Following are the site summaries through January 2011:

Malletts Creek @ S. Main Street

This monitoring site is located on a headwater tributary to Malletts Creek and drains about 2 square miles. Approximately 75% of the watershed is developed. Monitoring began here in 1999 and has been visited 23 times by the Adopt-A-Stream program. Insect diversity is poor, and neither sensitive families nor winter stoneflies are present. The conditions of stream banks, streambed, and streamside vegetation are average. Water quality is poor.

The overall condition per the Adopt-A-Stream Integrated Model is POOR.

Malletts Creek near I-94

This monitoring site has a watershed of 4 square miles. Approximately 81% of the watershed is developed. Monitoring began at this site in 1992 and has been visited 31 times. Insect diversity is poor, and neither sensitive families nor winter stoneflies are present. The conditions of stream banks, streambed, and streamside vegetation are poor. Flashy stream flows are evident. Water quality is poor.

The overall condition per the Adopt-A-Stream Integrated Model is POOR.

Malletts Creek @ Scheffler Park

This monitoring site is located on the main channel of Malletts Creek and drains 11 square miles. Approximately 85% of the watershed is developed. Monitoring began here in 1992 and has been visited 29 times by the Adopt-A-Stream program. Insect diversity is poor, and neither sensitive families nor winter stoneflies are present. The conditions of stream banks, streambed, and streamside vegetation are fair to poor. Water quality is poor.

The overall condition per the Adopt-A-Stream Integrated Model is POOR.

Malletts Creek @ Chalmers Road

This monitoring site is located on the main channel close to the outlet into South Pond. Approximately 85% of the watershed is developed. Monitoring began here in 1993 and has been visited 31 times by the Adopt-A-Stream program. Insect diversity is poor, and neither sensitive families nor winter stoneflies are present. The conditions of stream banks, streambed, and streamside vegetation are fair. Flashy stream flows are evident. Water quality is poor.

The overall condition per the Adopt-A-Stream Integrated Model is POOR.

The health of the macroinvertebrate community is not very different than conditions reported in a 1999 bioassessment of Malletts Creek completed as part of the Malletts Creek Restoration Plan (Riseng, C. and K. Lawrence. May 6, 1999. For the Washtenaw County Drain Commissioner, the City of Ann Arbor and Pittsfield Township) that included habitat and macroinvertebrate surveys based on data collected from six stations. In general, the macroinvertebrate community observed during the field survey was indicative of small, warmwater streams with high sediment loads and organic pollution. Based on calculation of the Procedure 51 summary metrics the quality of the macroinvertebrate community in Malletts Creek varied from acceptable to poor. The results of the habitat survey and rating metrics indicated the habitat structure in Malletts Creek ranges from fair to poor. The report's authors concluded that extreme flashiness of Malletts Creek controls channel morphology, limits bank vegetation and stability and, therefore, limits the aquatic community diversity and stability.

Based on the monitoring results for TSS and macroinvertebrates to date, one must conclude that the impairment of the designated use for indigenous aquatic life and wildlife persists in Malletts Creek.

D. The Role of Flashiness in Malletts Creek

The documented poor habitat conditions and insect populations that persist in Malletts Creek highlight the continued need to look beyond TSS to the stream flow regime if sustained restoration is going to happen, and to ameliorate the use of practices that can reduce extreme flows. One measure to assess the ecological function of a stream from a flow perspective is to evaluate the "flashiness," or the rate and degree to which the stream increases and decreases in flow rate in response to a rain storm or event. The Richards-Baker Flashiness Index was developed for wadeable Michigan streams to provide a standard measure of flow dynamics[iii]. The index varies from 0 to over 1, where an index of 0 would represent a stream that never changes flow rate and 1 would indicate a highly variable and rapidly changing stream.

The USGS manages flow gages in Malletts Creek at Mary Beth Doyle Park (#04174514) and at Chalmers Road (#04174518). HRWC analyzed daily mean discharges at the Chalmers Rd. station from 1999 to 2010. Year to year, the flashiness of Malletts Creek has varied slightly with a slight downward trend

(Figure 5). The most recent 3-year average flashiness index value is 0.723, which is among the flashiest quarter of all similarly sized streams in Michigan. It is also well above the median stream flashiness in a six-state Midwestern survey.

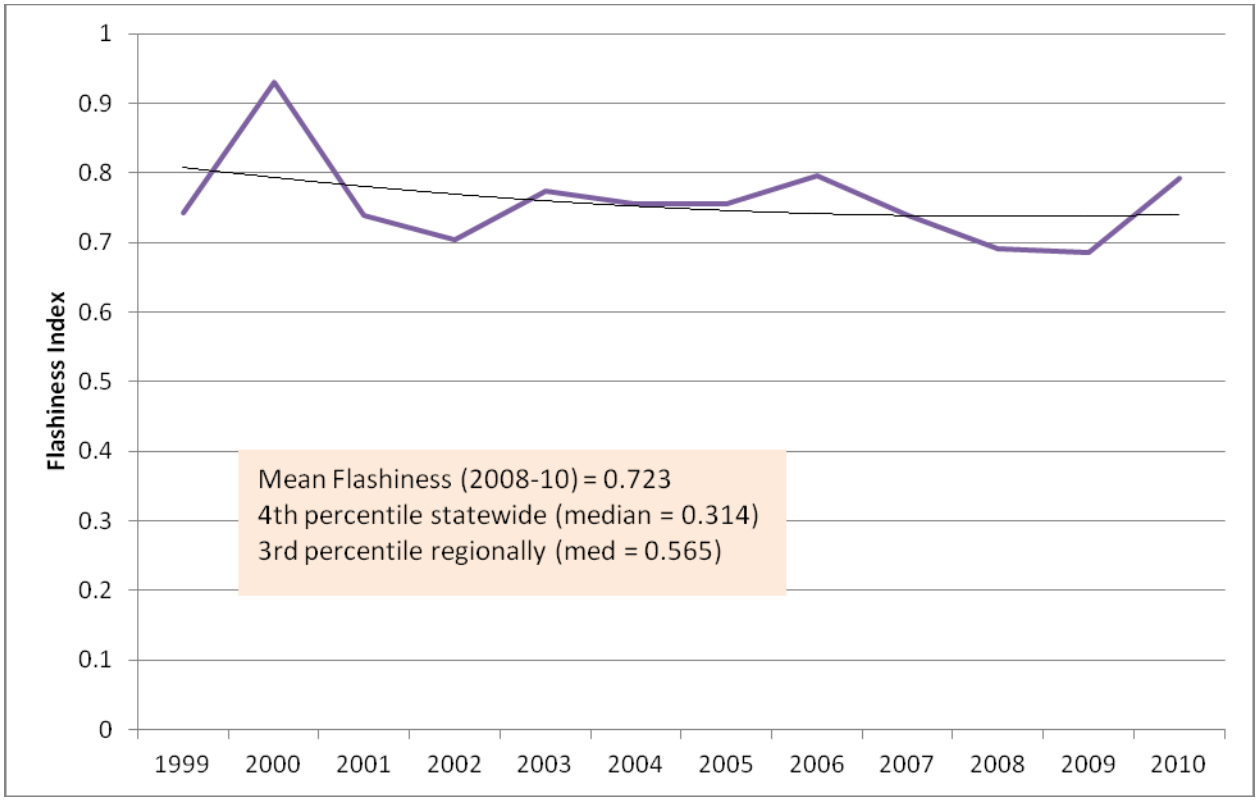


Figure 5. Observed stream discharge in Malletts Creek @ Chalmers Rd, from 1999-2010.

Erratic flows have been recognized as a key problem for Malletts Creek by others. Hydraulic and hydrologic modeling conducted for the Malletts Creek Restoration Project[iv] found that 22 percent of the land area in the watershed is impervious surface directly connected to the stormwater system and creek. In fact, half of the flow to the creek is contributed by runoff from just 20 percent of the watershed, known generally as the Burns Park neighborhood. This part of the watershed contains some of the oldest residential and commercial neighborhoods mostly built prior to the era of stormwater management.

At the writing of the TMDL, the stream flow conditions of Malletts Creek were described as unstable and flashy in response to storm events captured by the USGS records at Chalmers Road. “This condition results in excessive stream bank erosion, sedimentation, and erosivity of otherwise stable, inhabitable substrate suitable for macroinvertebrate colonization and fish community development,” notes the TMDL’s authors, “Therefore, the sources of sediment loadings to Malletts Creek are primarily

attributable to periodic erosion and storm water runoff from impervious surfaces . . . in the watershed"[v] . The TMDL allocates loading of TSS among WLAs and Las, yet does not attempt to set targets for stormwater volumes directly.

While the creek appears not to be meeting the TSS load limits despite a downward trend, and continues to exhibit measures of impaired biota and altered flow profiles, it is recommended that the DEQ consider revising the TMDL to include targets for stream flow.

Precedence for this approach has been established by states and their EPA Regional Offices, as mentioned earlier, that have employed stormwater flow reductions in TMDLs to meet aquatic life designated uses. While more study is warranted, recent scientific research has sought to quantify the impact of flows on the functions of river ecology. Researchers in the United Kingdom found in a study of 83 river basins in England and Wales that variables associated with the magnitude of the flow regime consistently produced the strongest relationships with macroinvertebrate community metrics.[vi]

II. Progress toward Achieving TMDL Targets

A. Stakeholders

Stormwater NPDES permit-holders in the TMDL watershed are the City of Ann Arbor and University of Michigan-Ann Arbor (Phase I); and Michigan Department of Transportation, Pittsfield Township, Ann Arbor Public Schools, Washtenaw County - Road Commission and Water Resources Commissioner's Office (Phase II). Additionally, Charter Township of Ann Arbor is a minor stakeholder for the few holdings under its jurisdiction that are within the permit area. Coordination of projects and reporting on progress in meeting the TMDL occurs through the activities of the Middle Huron Partners and the Stormwater Advisory Group. All above entities participate in one or both of the partnership groups, with the exception of the Michigan Department of Transportation. These partnerships provide a venue for the Malletts Creek stakeholders and their watershed neighbors to meet regularly to review progress toward meeting the requirements of the NPDES permits and the TMDLs in the middle Huron River watershed, and collaborate on projects, programs, studies, resources, and monitoring. These partnerships largely are responsible for the progress made to date on implementing projects and programs to reduce the targeted pollutants in Malletts Creek.

B. Projects and Programs to Date

The TMDL calls for implementation of Best Management Practices (BMPs) that stabilize flow extremes, bank erosion, and sediment loadings to Malletts Creek. Many of the stakeholders have a history of demonstrated commitment to reducing pollutants to the Huron River, and Malletts Creek, through voluntary and regulatory initiatives that have resulted in reductions of TSS and extreme flows. Among these initiatives are the National Urban Runoff Program (1990), the phosphorus TMDL for Ford and Belleville Lakes on the Huron River (1996), the E. coli TMDL for Geddes Pond on the Huron River (2004), the Ann Arbor-Ypsilanti Metropolitan Watershed Management Plan (1998, 2008), the Malletts Creek Restoration Project (2000), and several creek plans and internal planning processes and studies to meet state and federal water quality standards.

Coordination of projects and reporting on the TMDL progress occurs through the activities of two primary partnerships. First, a well-established partnership called the Malletts Creek Coordinating Committee is composed of representatives from the Washtenaw County Water Resources Commissioner, the City of Ann Arbor, and Pittsfield Township, the citizen-led Malletts Creek Association, Huron River Watershed Council, the University of Michigan and Ann Arbor Public Schools. Second, the Middle Huron Partners and the Stormwater Advisory Group provide a venue for these stakeholders and their watershed neighbors to meet regularly to review progress toward meeting the TMDLs in the

middle Huron River watershed and collaborate on projects, programs, studies, resources, and monitoring. These two partnerships largely are responsible for all the progress made to date on implementing projects and programs to reduce the targeted pollutants in Malletts Creek.

Various activities pursued by the stakeholders have been recommended in the planning documents prepared for Malletts Creek, notably the Malletts Creek Restoration Project (2000) for the Washtenaw County Water Resources Commissioner, the City of Ann Arbor, and Pittsfield Township. The recommendations of the 2000 Malletts Creek Restoration Project, which focused on phosphorus reduction, included several that focus on reducing extreme peak flows, which would provide benefits to stabilizing flow extremes and reduce TSS.

- Analysis of the 10-year storm and the 100-year storm showed five locations along the creek that need in-system storage structures to three storm drains (the County Farm, Lansdowne and Burns Park areas) due to improperly sited, designed or constructed buildings or private stormwater management facilities.
- Modify existing detention basins to detain and treat smaller storms
- Create a new wetland pond at County Farm Park
- Renovate Brown Park pond (now Mary Beth Doyle Park)

The habitat analysis conducted for the Restoration Plan identified several projects to reduce excessive flow velocities from a thorough field reconnaissance that identified locations where structures and streambanks were in need of repair. The general recommendations were to:

- Increase detention in the watershed to reduce peak velocities
- Remove logjams and sediment islands
- Create meandering low flow channels between pools
- Stabilize streambanks with native vegetation
- Protect and create riparian wetlands
- Enforce soil erosion and sedimentation control ordinances
- Revise local government ordinances to reduce runoff and improve stormwater management
- Implement related public education and technical assistance programs (such as residential rain gardens)

Significant activities that have been completed in the Malletts Creek watershed are included in this plan in order to capture the majority of effort put forward by the stakeholders to meet the TMDL targets. This list is not intended to be exhaustive. The activities to date are presented by the primary stakeholder involved with each activity with details on effectiveness and cost when known.

Ancillary benefits to biota are projected from reductions in phosphorus through the implementation of the TMDL for phosphorus in Ford and Belleville Lakes. The overall phosphorus reduction target under the phosphorus TMDL plan is 50% and well over the 106 tons per year of TSS. Activities designed to address the phosphorus TMDL for Ford and Belleville Lakes will have the secondary benefit of

addressing the sediment loading reduction targets set for the Malletts biota TMDL targets. Refer to the Phosphorus TMDL Implementation Plan for Ford and Belleville Lakes for the activities pertinent to those TMDL targets.

TSS and Flow Reduction Activities by Entity

The stakeholders are committed to continued water quality improvement in the Malletts Creek contributing area. Toward this end, local governments, the Huron River Watershed Council and the University of Michigan have been conducting a variety of actions, prior to TMDL development, and following release of the TMDL, to improve water quality and promote stewardship. Activities included bio-monitoring, habitat assessment, chemical and flow monitoring,, mass media educational campaigns, development standards, water resources protection ordinances, wetlands protection and wetlands restoration.

Charter Township of Ann Arbor

Post-Construction Stormwater Ordinance: The Township's new ordinance (revised in 2010) presents a unique approach. The ordinance requires first-flush treatment and additionally requires any development with over 20% impervious surface to infiltrate or treat additional volume. TSS- and flow-reduction Benefit: minimizes runoff and erosion from all new developments.

City of Ann Arbor

City Stormwater Rates Structure: Adopted in 2007, the City constructed a system of incentives for the installation of BMPs by single and two-family property owners through reductions in stormwater utility rates for those properties. TSS- and flow-reduction Benefit: minimizes runoff and erosion from all new developments.

Revised local government ordinance and building standards to minimize impervious surfaces and increase areas for infiltration. Landscaping and screening ordinance requires a portion of the required interior landscape islands to be depressed and utilized as bioretention. Reducing impervious cover through City Parking Standards (Chapter 59 (Off-Street Parking) and in the Area Height and Placement Standards). TSS- and flow-reduction Benefit: minimizes runoff and erosion from all new developments.

Stormwater Ordinance (Ch. 63) amendment to require single family residential projects that increase impermeable surface to include first flush stormwater retention/infiltration on site: The new single family storm water ordinance change was approved by City Council on November 4, 2010 and went into effect on March 1, 2011. A web site has been set up to assist the public with compliance. The materials can be viewed at http://www.a2gov.org/stormresidentialconstruction. TSS- and flow-reduction Benefit: minimizes runoff and erosion from all new developments. Cost: $360,000.

Street Sweeping: Until budget cuts city-wide forced this program to be suspended in 2011, the City swept the streets and municipal parking lots to prevent sediment and debris in street from entering the storm sewer system. The downtown area was swept twice weekly. weekly during warm weather conditions. City streets were swept twice annually, spring and fall. Status: suspended indefinitely. TP reduction: 359 lbs/year. TSS reduction: not calculated. Cost: $129,000 annually.

Regular Maintenance of Stormwater Management Facilities: The City began an inventory of all detention facilities within the City (300+) in 2005 that suggests a detention pond retrofit program may be more effective than a maintenance inspection program at this time. MCCC recommends pursuing a retrofit program for detention facilities built prior to year 2000 and a maintenance inspection program for detention facilities built after year 2000. Pittsfield Township also is conducting an Inventory.

Additionally, the City has developed a natural features plan to preserve green infrastructure, and provided public education through its Waste Watchers publication and water bill inserts. The City completed labeling of all inlets to the storm drains and employed a public education campaign to complement the labeling program. The amount of TSS reduction and stormwater flow reduction varies per site and would be pollutants averted since these programs are proactive.

Charter Township of Pittsfield

Regular Maintenance of Stormwater Management Facilities: The Township conducted an inventory of all detention facilities within the township.

Washtenaw County- Water Resources Commissioner's Office

County Stormwater Rules Revisions: Stormwater management rules that detain first flush for 24-hour period and the bankfull storm are in place, and updates to require infiltration of first flush are in final draft to be completed in 2012. The amount of TSS reduction and stormwater flow reduction varies per site.

Mary Beth Doyle Park (formerly Brown Park): Involved the redesign of the flood control structure to improve water quality treatment and improve habitat. Design completed in 2005 and construction completed in 2007. Phosphorus reduction: 980 lbs/yr ; TSS and flow reduction were not calculated. Cost: $250,000 (design) + $2.244 million (construction).

Rain Barrel Sale: Washtenaw County promotes regional rain barrel sales via email and social media (i.e. Facebook). Washtenaw County Land Conservancy, Alliance of Rouge Communities and other events are promoted as they arise.

Continuous Stream Flow Measurement: USGS stream flow gages have been installed at Chalmers Rd and, more recently, at Mary Beth Doyle Park. Cost: $13,000 annually for O&M.

Good Housekeeping, Pollution Prevention: The Washtenaw County Facilities and Parks and Recreation Commission are current partners in the WCWRC's Community Partners for Clean Streams Program (CPCS). The CPCS program works with partners to find ways to protect water quality through pollution prevention and good housekeeping practices. Each facility submits to an evaluation and walk-through inspection which specifically focuses on maintaining engineered stormwater controls, equipment and vehicle maintenance, landscape and building maintenance, as well as waste management.

Washtenaw County – Road Commission

No activities in the Malletts Creek watershed.

The University of Michigan, Ann Arbor

Stormwater Storage at Parking Lot: The S. State Street commuter lot stormwater basin outlet structure was retrofit in 2009 to change the release rates to meet the WCWRC standards. Maintenance dredging of the basin was also completed during this project.

Stormwater Storage at Golf Course Driving Range: The Golf Course Driving Range installed detention and retention systems at the facility. The detention basin includes an outlet structure which meets the WCWRC standards.

Stormwater Storage at Wrestling / Tennis Complex: A detention basin was installed at the Wrestling Center along with a vegetated swale and detention basin along the road which connects the commuter parking lot and the Wrestling center and a bio-retention island in the Tennis Center parking lot.

Stormwater Storage at Soccer: The Soccer stadium has in-ground detention systems. Portions of the site also included pervious pavement.

Public Education Program: The University maintains a PEP which utilizes presentations, training events, brochures and a website for storm water management and best management practice information.

Wetland Management: Invasive species treatment and removal projects and habitat enhancement projects have been performed at the Soccer complex. The project included restoration of native plants in surrounding upland areas to promote plant diversity, and increase the use of natives.
Should also include that UM swept parking lots/roadways and cleaned storm water catch basins.

Street Sweeping: The University continues to implement a campus-wide street sweeping program. In addition, storm water catch basins are maintained on a periodic basis to remove accumulated sediment.

Huron River Watershed Council

Public Education Program: Advertising, direct mail, calendars, presentations, and PSA's on storm drain awareness, lawn care, native plants, fall leaves, and rain barrel sale that distributed 1,250 60 gallon rain

barrels in the City of Ann Arbor. Workshops and trainings in soil erosion and wetland permitting, protection, and public comments.

Multiple Entities:

Activities below have been implemented on behalf of the multiple partner entities who have participated in the Middle Huron SAG, as listed in section II.A. on page 12.

Stream Water Quality Sampling: Through contributions to the Middle Huron Partners, the entities support the Water Quality Monitoring Program of HRWC that monitors Malletts Creek @ Chalmers Rd via a comprehensive protocol including stream flow and TSS. Cost: $8,860

Public Education Program: The Washtenaw County Water Resources Commissioner's Office water quality programs (i.e. RiverSafe Homes, Community Partners for Clean Streams, Homeowners Handbook) are promoted throughout the County. Each water quality program covers topics ranging from good housekeeping (street sweeping, catch basin cleaning, etc) to rain gardens and rain barrels. NPDES requirement of City of Ann Arbor, Pittsfield Township, and Washtenaw County. Cost: $720,000

Macroinvertebrate Sampling: The Adopt-A-Stream program of HRWC monitors four sites on Malletts Creek for benthic macroinvertebrates and aquatic habitat. Cost: $6,900

III. Overcoming Barriers and Refining Targets

As framed by the terms of the TMDL, the ultimate measure of implementation success will be documented changes in water quality, showing improvement over time. However, potential barriers to this accomplishment exist and must be considered in implementation planning.

A. Barriers to Overcome

Positive feedback in the form of target pollutant reductions from even the most diligent efforts may be several years in the future due to the lead time needed to implement best management practices throughout the watershed. Participants and MDEQ must set realistic expectations about the amount of time needed to continue identified programs while awaiting positive results. Otherwise, impatience, discouragement, or competition for limited local funding could lead to discontinuation of effective programs. Prompt communication of small successes through news releases, web sites, and community newsletters will be important to encourage the continued efforts of TMDL partner communities.

The tracking of quantitative results over time carries a set of technical and logistical challenges. Variation in weather patterns over the years of a study adds to the complexity of trend analysis of the data. Collecting correctly timed wet weather samples is daunting, as personnel may not be available during a particular major summer storm. HRWC's water quality monitoring program has evolved to be responsive to wet weather using professional staff and trained and dedicated volunteers, and has a comparable data set reaching back to 2003. Yet the trend analysis will strengthen as the program continues and collects more data on wet weather events and ambient conditions.

With several programs and projects completed or in process, the partners' commitment to achieving the TMDL targets is evident. However, with the current economic downturn restricting government and institutional resources, the challenge will be to identify the most cost-effective measures and to continue funding them. Managers and programs will both need to be adaptive, while continuing to appeal to the public's expectation that the waters of our state will attain the standards set forth by Congress through the passage of the Clean Water Act in 1972.

B. Refining Targets

Despite many initiatives, a few TMDL load allocation targets are unrealistic. First, the TMDL prescribes reductions in TSS loading from agricultural sources. A 45 percent reduction of TSS loading from cropland is difficult/unattainable. Agricultural lands in the watershed are diminished and now stand at a few hundred acres with conversion to developed land uses happening regularly. Furthermore, gains in water quality improvement on cropland can be difficult to attain due to the voluntary nature of the

conservation programs for agricultural producers. Equivalent reductions should be sought from elsewhere in the TMDL equation, most likely from the WLA Components.

Second, this TMDL would be improved if it set limits on flow volumes to address the extreme flashiness of Malletts Creek. To date, the TMDL program in Michigan has opted to not consider stormwater flow as a pollutant that is regulated under the Clean Water Act. Setting targets for flows in TMDLs is an underutilized strategy in Michigan and is recommended for inclusion in a future iteration of the biota TMDL for Malletts Creek in order to temper the erosive flows that prevent the attainment of the indigenous aquatic life and wildlife use. At the same time, it must be recognized that achieving reductions of flow volumes in a watershed as highly developed as Malletts is a very long term proposition that will require major capital investment.

Several states and EPA regions are setting limits on flow in TMDLs in order to attain designated uses in Delaware, Connecticut, Ohio and Vermont, among others (see http://www.epa.gov/region1/eco/tmdl/approved.html). For example, the Potash Brook TMDL (VT) addresses an aquatic life use impairment caused by stormwater runoff. The Vermont Department of Environmental Conservation determined the biological impairment (indigenous aquatic life) in Potash Brook was caused by stormwater-related stressors. As a result, the TMDL is for stormwater runoff volume as a surrogate for the pollutant sediment and a variety of other stressors associated with stormwater.[vii] Because the impairment is based on biological indices, there is no numeric pollutant criterion to use as the TMDL target. Instead, the instream target is expressed as a measure of the hydrologic condition believed necessary to achieve the Vermont water quality criteria for aquatic life. As described in more detail below, a target of a 16% reduction in the 0.3% flow (the flow that is equaled or exceeded 0.3% of the time) was established for Potash Brook, based on the hydrologic conditions of two reference (or attainment) watersheds where the aquatic life criteria are met. Use of this surrogate has the secondary benefit of addressing the physical impacts to the stream channel (such as scour and channel over-widening) caused by stormwater runoff. These physical alterations to the stream are additional contributors to the aquatic life impairment.

IV. 5-Year Restoration Strategy for Malletts Creek biota (2012-2016)

The stakeholders recognize that continuing efforts are needed to improve habitat and water quality in Malletts Creek to sustain fish and macroinvertebrate communities. They have committed to continue successful programs as well as target additional sites and practices that will address unstable flow extremes, excessive bank erosion, and sedimentation. Several watershed planning efforts have identified BMPs for Malletts Creek that will contribute to TSS reductions. The 2010 SRF Project Plan for the Huron River from the Washtenaw County Water Resources Commissioner, the City of Ann Arbor Capital Improvements Plan, the Malletts Creek Restoration Project, and the Ann Arbor-Ypsilanti Metropolitan Watershed Management Plan (updated 2008). In addition to the projects listed in those plans, the stakeholders have identified a few other projects that they would like to implement as part of this plan development.

Table 2 is a summary of the major pollutant reduction activities to be implemented over the next five years (2012-2016) to reduce TSS loadings below the TMDL targets. Loading reduction estimates are based on published estimates using the Watershed Treatment Model.[viii] Descriptions of activities and a map of potential stormwater management locations are fully discussed in the Huron River 2010 SRF project plan prepared by the WCWRC[ix].

Table 2. Summary of the 5-Year Restoration Strategy 2012-2016

Activity	TSS Load Reduction (*estimate*) (lb/yr)	Implementation Timeframe	Cost Estimate 2012-2016
Esch Ave Hydrodynamic Separator	193,617	2012	$2,700,000
Esch Ave Roadside Biofiltration	604	2012	
Platt Rd Hydrodynamic Separation	98,362	2012	$1,640,000
Malletts Ellsworth Basin Improvements	80,900	2011	$2,430,000
Stone School Rd Retrofits	2,875	2014	$550,000
South State Rd Pollutant Removal	39,115	2014	$590,000
Burns Park Porous Alley	422	2011	$200,000
Malletts @ Chalmers Dr/Huron Pkwy SS	21,000	2013	$320,000
Malletts @ S Huron Pkwy SS	514,000	2013	$1,700,000
Malletts @ Platt/Manchester SS	646,000	2013	$2,110,000
Malletts @ Packard Outfall SS	196,000	2013	$500,000
Malletts @ Research Park SS	134,000	2011	$720,000
Malletts @ Boardwalk/S State SS	130,000	2013	$930,000
Malletts @ Eisenhower/Oakbrook SS	102,000	2013	$970,000
Lans Basin	85,569	2015	$700,000

Totals	2,244,464	--	$16,060,000

Thus, these activities account for a larger reduction than the approximately 212,000 lb/yr load reduction called for as the TSS target for the watershed. The contributors to this plan generally want to use the precautionary principle to account for uncertainty and err on the side of being overprotective. It should be clear that loading estimates are not exact and computational methods vary.

The projects laid out in the 5-Year Restoration Strategy include an emphasis on mitigating the impacts of unstable flows in the creek. A Technical Summary on Volume Reduction Practices (January 2011) prepared for the International Stormwater BMP Database offers conclusions and recommendations for specific practices based on an analysis of performance metrics, most notably the following:

- **Normally-dry vegetated BMPs were most effective** at reducing water volume into rivers, this was also true during smaller storms, which are most common. A 30 percent reduction was found for **filter strips** and **grass-lined detention basins**, 40 percent for **grass swales**, and greater than 50 percent for **bioretention with underdrains**.
- Retention ponds and wetland basins tend not to be successful and should be avoided when trying to achieve greater volume reductions. Volume reductions are more likely to be successful in locations with soils conducive to infiltration and designs promoted to induce infiltrations.

Priority Partner Pollutant Reduction Projects

In addition to the SRF project, partners identified additional projects during individual progress meetings in preparation for development of this plan.

Charter Township of Pittsfield

Porous Pavement Installation: Demonstrate infiltration practice at township property at southwest corner of Ellsworth Rd and S. State Street, location of Pittsfield Grange. Cost and estimated pollutant reduction to be determined. Implement 2012-2014

Adopt and Implement Local Ordinances and Policies for a) post-construction runoff management and b) native plantings: Township-wide. Cost and estimated pollutant reduction to be determined. Implement: 2012-2013

Flood Storage: At commercial development bordered by (w) S. State Street, (s) Ellsworth, (e) RR and (n) I-94. Cost and estimated pollutant reduction to be determined. Implement: 2012-2013

City of Ann Arbor

Implement State Revolving Fund Loan Plan Projects*:* In coordination with the Washtenaw County Water Resources Commissioner, projects are identified throughout the city in Malletts Creek watershed. Projects listed under Washtenaw County Water Resources Commissioner. TSS-reduction: 501,400 lbs/yr. Erosion reduction: 966 tons/yr. Cost: $16M. Implement 2011-15.

Implement Stormwater Activities in Capital Improvements Plan: The city's 5-year Capital Improvement Plan identifies 20 projects in the Malletts Creek watershed to repair, upgrade or otherwise improve stormwater infrastructure. These activities are prioritized upon their impact on reducing TSS and flows in stormwater out flows. Current plan can be found at http://www.a2gov.org/government/publicservices/systems_planning/capitalimprovements/Pages/CapitalImprovementsPlan.aspx. Pollutant reductions to be determined. Cost: $75,000 (design) + $1.2 million (construction) of in-system storage structures. Implement 2012-16.

Impervious Area Disconnection and Infiltration Project: Construction of three rain gardens in the Malletts Creek watershed to treat stormwater runoff. One rain garden will be constructed at Burns Park and two rain gardens will be constructed at 2000 S. Industrial Highway. This project involves retrofitting sites to incorporate infiltration Best Management Practices (BMP) on City properties where no infiltration facilities currently exist. Seven different facilities for stormwater infiltration improvements are planned at five different project sites (reference RFP-788 for more detail about proposed projects). The project is part of a State Revolving Fund (SRF) Project Plan that has been developed to improve water quality in the Middle Huron watershed. Cost and estimated pollutant reduction to be determined. Implement 2012-16.

The University of Michigan, Ann Arbor

Porous Pavement Installation: Increase use of porous pavement and porous pavers at construction and renovation projects throughout campus, as appropriate, based on site-conditions and project constraints. Note: Porous pavement has already been incorporated into the upcoming Varsity Drive project. Implement 2012-16.

Stormwater Detention & Treatment Using Vegetation: Continue to identify and increase utilization of vegetative best management practices, including green roofs, bioswales, vegetative buffers, etc. on construction and renovation project sites, as appropriate, based on site conditions and project constraints. Implement 2012-16.

Hydrodynamic Separators: Continue to target parking lot renovation and construction projects for use of hydrodynamic separators to aid in sediment removal.

Invasive Species Removal & Native Planting: Increase infiltration and nutrient uptake by continuing invasive species removal projects to encourage native species to re-establish. Implement 2012-16.

Street Sweeping: The University continues to implement a campus-wide street sweeping program. In addition, storm water catch basins are maintained on a periodic basis to remove accumulated sediment.

Washtenaw County Water Resources Commissioner

Implement State Revolving Fund Loan Plan Projects: In coordination with the City of Ann Arbor, projects are identified throughout the city in Malletts Creek watershed (Figure 6). Suite of practices (1, 2, 3, 4A, 5, 7, and 15): TSS-reduction: 501,400 lbs/yr. Erosion reduction: 966 tons/yr. Cost: $16M. Implement 2012-15.

The **Esch Avenue Project** is estimated to reduce TSS by 194,221 lb/yr. This proposed project will incorporate hydrodynamic separation and bioinfiltration – Site 1 on the map. The project is scheduled to start in the 3rd quarter of 2012 at a total preliminary cost $2,700,000.

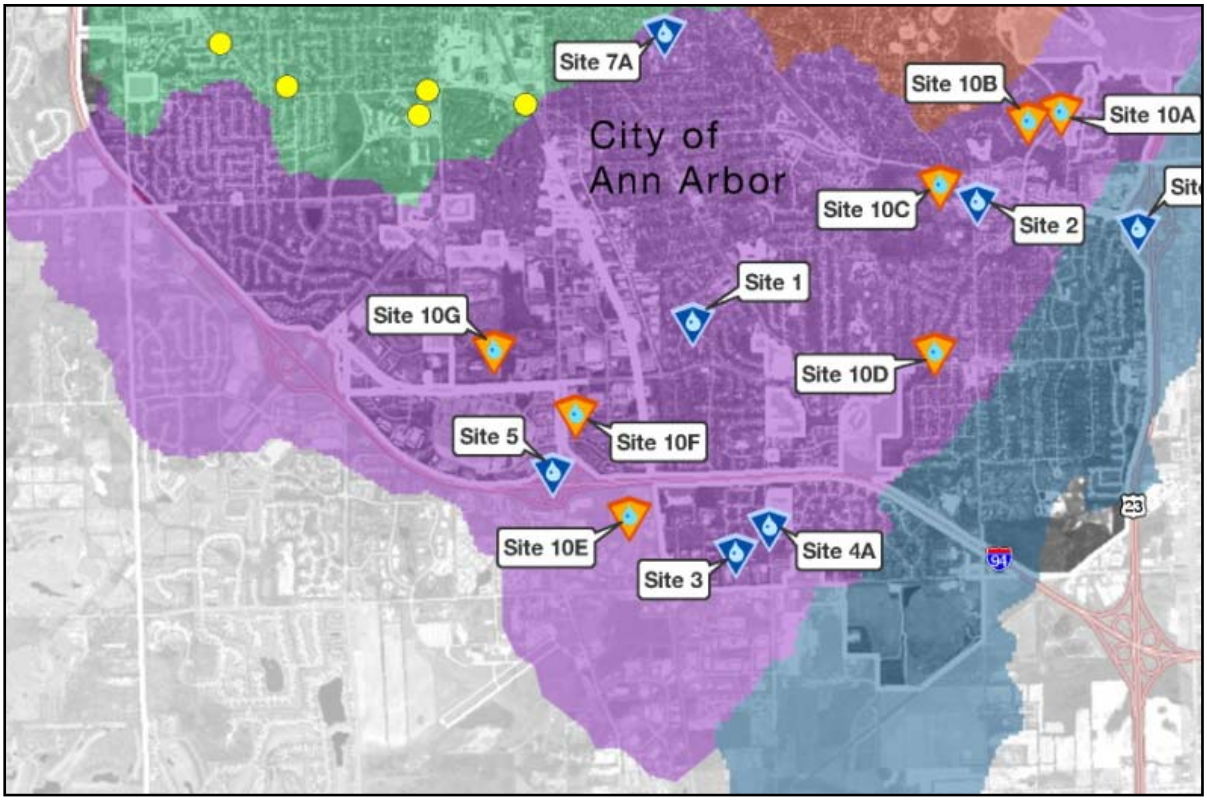


Figure 6. Malletts Creek watershed project sites in the Huron River 2010 SRF Project Plan.

The **Platt Road Project** is estimated to reduce TSS by 98,362 lb/yr (Site 2). This proposed project will incorporate hydrodynamic separation and bioinfiltration. The project is scheduled to start in the 3rd quarter of 2012 at a total preliminary cost $1,640,000.

The **Ellsworth Basin Improvements Project** (Site 3) will involve retrofits to an existing inline detention basin with TSS reductions of 80,900 lb/yr. The project is scheduled to start in the 4th quarter of 2011 at a total preliminary cost $2,430,000.

The Stone School Rd Retrofits at site 4 propose to incorporate bioswales, offline first flush storm sewer with underground detention and hydrodynamic separation for an estimated reduction of 2,875 lb/yr. The project is scheduled to start in the 3rd quarter of 2014 at a total preliminary cost $550,000.

The **South State MDOT Pollutant Removal** Project (site 5) will provide offline detention resulting in TSS reductions of 39,115 lb/yr. The project is scheduled to start in the 3rd quarter of 2014 at a total preliminary cost $590,000.

The **Lans Basin Project** (site 15) involves a series of three sediment forebays that will be integrated into the existing inline detention basin to help control the distribution of sediment to a localized, maintainable area. The project is a principal alternative to the top tier of SRF projects and is scheduled to start in the 3rd quarter of 2015 at a total preliminary cost $700,000.

Burns Park Permeable Alley Project: Alley project (site 7) will incorporate a porous surface into reconstruction in Summer, 2011. The City of Ann Arbor and Washtenaw County Water Resources Commissioner's Office are working together on the project to fund it through the State Revolving Loan Fund and the City's Stormwater Utility Fund. TSS-reduction: 422 lbs/yr. Preliminary cost: $200,000. Implement 2012-14.

Detention Basin Retrofits: Three basins in the City of Ann Arbor were identified for retrofit designs to treat the first-flush of runoff and remove phosphorus. Concept designs have been completed for each, and a complete engineering design has been developed for one site in the Malletts Creek drainage. Cost and estimated pollutant reduction to be determined. Implement 2012-14.

Riparian Buffers and Bank Stabilization: Projects are planned at areas along Traver and Malletts Creeks and County Farm Park Drain. The Malletts Creek and County Farm Park Drain projects are currently underway (sites 10A-10G). They address 7,400 and 3,400 feet of unstable streambank respectively. Cost and estimated pollutant reduction to be determined. Implement 2012-14.

Rain Garden Installation and Demonstration*:* Rain gardens and bioswales are being installed at a number of locations in Ann Arbor, including road projects along Stone School Rd. Hydrodynamic separators will be installed where appropriate. Cost and estimated pollutant reduction to be determined. Implement annually 2012-16.

Revised Stormwater Standards and Soil Erosion Rules: The standards and rules are currently being revised to improve first-flush treatment and encourage greater infiltration and treatment of runoff during and after construction. These standards and rules apply to most of Washtenaw County. The amount of TSS reduction and stormwater flow reduction varies per site. Implement 2012.

V. Accountability Structure for Implementation

A. Participants

The stakeholders for this implementation plan are committed to continued water quality improvement in the Malletts Creek watershed. Those who have taken on this responsibility are:

- Ann Arbor Charter Township
- City of Ann Arbor
- Ann Arbor Public Schools
- Huron River Watershed Council
- Michigan Department of Environmental Quality
- Pittsfield Charter Township
- University of Michigan, Ann Arbor
- Washtenaw County Water Resource Commissioner
- Washtenaw County Road Commission

The following units of government will also be subject to the TMDL:

- Michigan Department of Transportation

Ann Arbor Township has negligible land within the contributing basin and is not expected to be involved in plan implementation unless new information indicates potential sources within these areas.

B. Reporting and Timeline

Although a great many ongoing actions to restore water quality and habitat in Malletts Creek are voluntary, each stakeholder has assumed responsibility to continue their efforts, as resources allow and needs dictate. Through initiating and continuing these voluntary actions, each stakeholder has assumed responsibility for a share of water quality restoration in the Malletts Creek watershed. These discretionary programs are dependent on funding, perceived needs, sound and reliable technical assistance, clear regulatory authority, constituent support, and demonstrated effectiveness.

Some actions have been required under the permit regulations of the Clean Water Act. Two units within the TMDL area are Municipal Separate Storm Sewer System (MS4) Phase I permit holders—the City of Ann Arbor and the University of Michigan; the other governmental stakeholders are all regulated under Phase II.

Phase I communities have been under permit since December, 1995. Their permits specify best management practices to achieve water quality improvement, including TSS reduction. Permit renewal applications will continue to include provisions consistent with the Malletts Creek TMDL.

Phase II communities and entities must submit detailed compliance language that must also include provisions consistent with the Malletts Creek biota TMDL. Phase II communities with Certificates of Coverage are required to submit an approvable plan to comply with all six minimum measures, including provisions consistent with any TMDL affecting the jurisdiction or watershed. The Michigan Department of Transportation, the Washtenaw County Water Resources Commissioner's Office, and public school systems received separate Certificates of Coverage and must meet the same requirements as local governments.

Taken together, these stakeholders have primary land use authority over the vast majority of the contributing area for the biota TMDL. Under their storm water permits, these communities and organizations are obligated to develop, implement, and enforce a stormwater management program designed to reduce the discharge of pollutants from the drainage system to the "maximum extent practicable," to protect the designated uses of the waters of the state, to protect water quality, and to satisfy the appropriate water quality requirements of state and federal law. Stormwater controls designed to attain the goals of the TMDL must be incorporated into the stormwater management plan, and each permittee must implement appropriate best management practices to comply with the TMDL implementation plan. Both separately and jointly, through a coordinated public education and involvement strategy, stakeholders will also engage in communication with the public that addresses biota TMDL problems, solutions, and successes.

Additionally, the permittees are required to submit annual progress reports to the MDEQ which shall contain the following: a description of the status of compliance with general permit conditions, an updated assessment of the water quality conditions within their jurisdiction, a description of identified water quality stresses, and a summary of all information collected and analyzed—including monitoring data. The report must include a summary of upcoming storm water activities and a description of planned changes in BMPs or measurement of goals. The City of Ann Arbor and the University of Michigan must also provide an assessment of the pollution reduction and probable receiving water quality effects associated with the program's implementation.

Since each stormwater permit requires annual reporting, and TMDL goals and activities must be incorporated into the measures prescribed by the permit, separate TMDL reporting is unnecessary. In 2012, and at subsequent five-year intervals, the MDEQ is scheduled to complete basin-wide monitoring of the Huron River watershed. Future projects under this implementation plan may incorporate additional monitoring if resources allow. Stakeholders' stormwater permit reporting will include an updated assessment of the water quality conditions within their jurisdiction in either narrative or numeric form. The purpose of this update is to show any obvious changes in water quality levels since

the previous progress report. Change may be demonstrated by use of data collected by other sources or a group monitoring program.

C. Monitoring and Adaptive Management

In 2008, most of the permitted MS4s in Washtenaw County joined to form the Stormwater Advisory Group (SAG) in an effort to coordinate stormwater management across the middle Huron watershed. As part of this effort, the SAG developed a monitoring plan to monitor water quality including TSS. Under that plan, HRWC collects samples from numerous sites in tributaries to the Huron River, including all the major tributaries to the section covered by this TMDL. HRWC has been doing much of this monitoring since 2003. Additionally, HRWC monitors macroinvertebrates and habitat at sites throughout the watershed. Much of this data has been summarized in earlier sections of this plan. TMDL stakeholders review the status of TMDL implementation on a regular basis (3-4 times per year) as part of SAG meetings for continuous improvement opportunities.

Through adaptive management—a process that assesses conditions and trends throughout plan implementation, and provides feedback to stakeholders so that adjustments can be made—this implementation plan is intended to ultimately achieve TMDL compliance. Through the annual meetings of the SAG, the TMDL Implementation Plan working group will meet to review NPDES program compliance plans. The MDEQ will track permit compliance through storm water permit oversight, including monitoring activities that address the TMDL implementation goals. Unless the EPA determines that it is necessary to separate TMDL enforcement from the storm water permit process, enforcement authority will reside in the MDEQ's authority under the provisions of the storm water rules.

Conclusion

The partners in the middle Huron River watershed take seriously the impairments that negatively impact local freshwater resources, such as Malletts Creek. Focused, coordinated efforts in the watershed have yielded tremendous public awareness of the threats, and their sources and causes, as well as actions to mitigate the threats. Meeting the TMDL for Malletts Creek requires a combination of supportive citizens and well-placed on-the-ground projects that target TSS and stormwater flows. This 5-year Implementation Plan provides the blueprint for reaching the secondary TSS target of the TMDL, and recommends the inclusion of stormwater flow reductions in the biota TMDL that is essential for attaining the primary target of a viable, sustained macroinvertebrate community.

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[i] Martin, J. and Dakin T. 2003b. The Quality of a Hidden Treasure: the Davis Creek Report. February 2003. Ann Arbor, MI: HRWC.

[ii] Dakin and Martin. 2003a.

[iii] Fongers, D., K. Manning, and J. Rathbun. 2007. Application of the Richards-Baker Flashiness Index to Gaged Michigan Rivers and Streams. Michigan Department of Environmental Quality.

[iv] Malletts Creek Restoration Team for the Washtenaw County Water Resources Commissioner. 2000. Malletts Creek Restoration Project.

[v] Wuycheck, J. , 2004

[vi] Monk, W.A., P. J. Wood, D. M. Hannah, D. A. Wilson, C. A. Extence, and R. P. Chadd. Flow variability and macroinvertebrate community response within riverine systems. *River Res. Applic*. 22: 595-615 (2006).
[vii] http://www.epa.gov/region1/eco/tmdl/pdfs/vt/potashbrook.pdf
[viii] Center for Watershed Protection. Watershed Treatment Model (WTM) – Version 3.1. Downloaded from http://www.stormwatercenter.net/. 2007.
[ix] Washtenaw County Water Resources Commissioner. Huron River 2010 SRF Project Plan. July 2010.