Total Suspended Solids Reduction Implementation Plan Swift Run

October 2011 — September 2016

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

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

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Implementation Plan for the Swift Run Creek Biota TMDL

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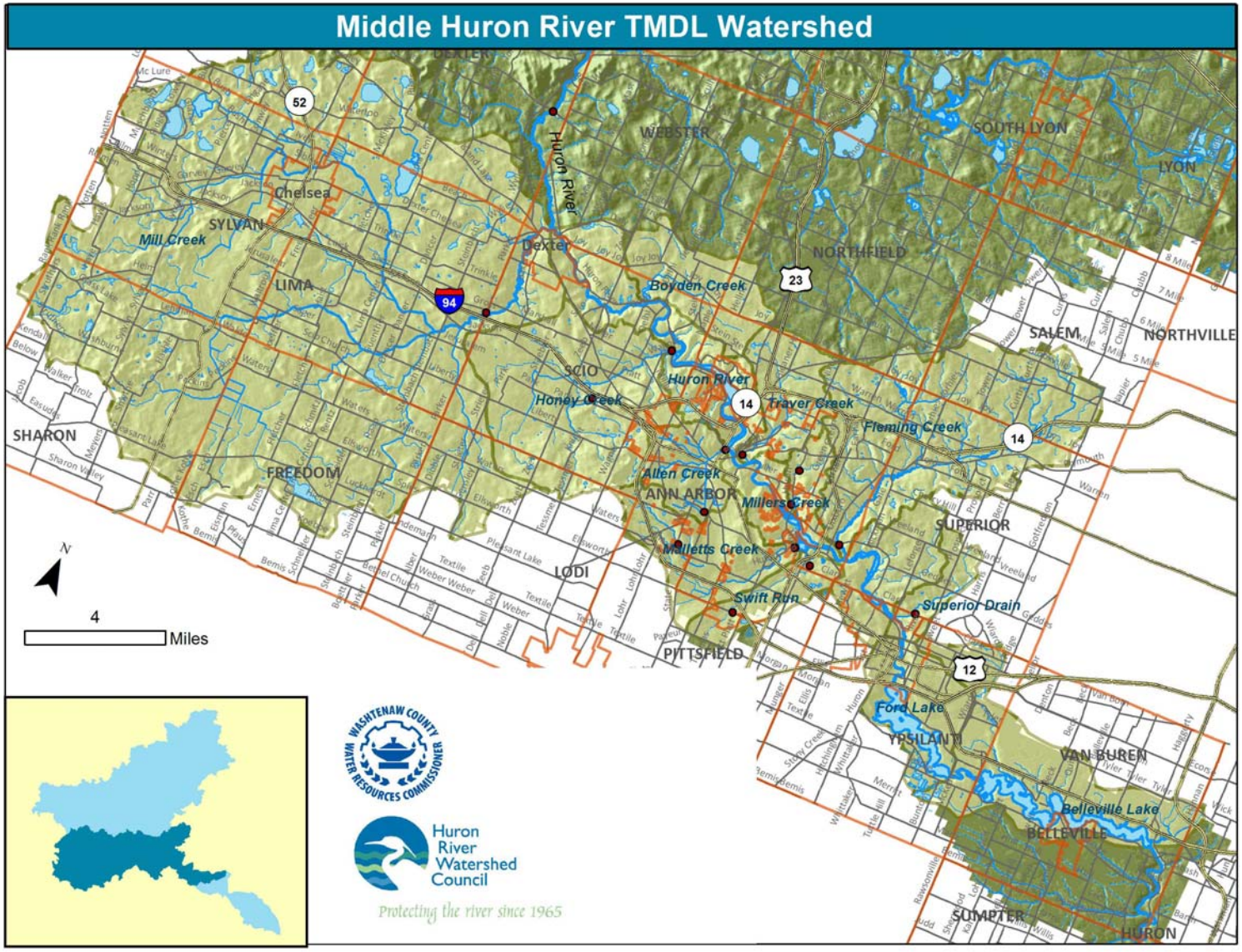
I. Background

Swift Run Creek, an urban freshwater stream located in the greater City of Ann Arbor, Michigan, suffers from the ills that plague similarly encroached upon waterways. State biologists and local volunteer stream monitors recorded problems with Swift Run 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 Swift Run Creek, was the state's decision to employ the tool granted them by the federal Clean Water Act to develop pollution budgets, the Total Maximum Daily Load.

In 2004, the Michigan Department of Environmental Quality developed a Total Maximum Daily Load (TMDL) for Swift Run Creek intended to restore the indigenous aquatic life to the stream – fish and aquatic bugs. The TMDL focuses on the pollutant Total Suspended Solids (TSS) as the main culprit in preventing aquatic life to flourish in Swift Run Creek. The concept is 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 Swift Run Creek and restoring its ecology through several watershed planning initiatives and project implementation. Swift Run Creek was included in the Watershed Management Plan for the Ann Arbor-Ypsilanti Metropolitan Area (1998, updated 2008) and the Phosphorus TMDL Implementation Plan for Ford and Belleville Lakes. Swift Run Creek is located within the section of the Huron River watershed (HUC 04090005) known as the middle Huron River watershed (figure 1). The multi-pronged strategy to meet the biota TMDL involves public education and outreach, policy solutions, and restoration projects within the stream channel and watershed. This Implementation Plan provides a discussion of the Swift Run Creek biota, the progress made towards restoring the creek for fish and insects, and past and proposed restoration activities to meet this goal.

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



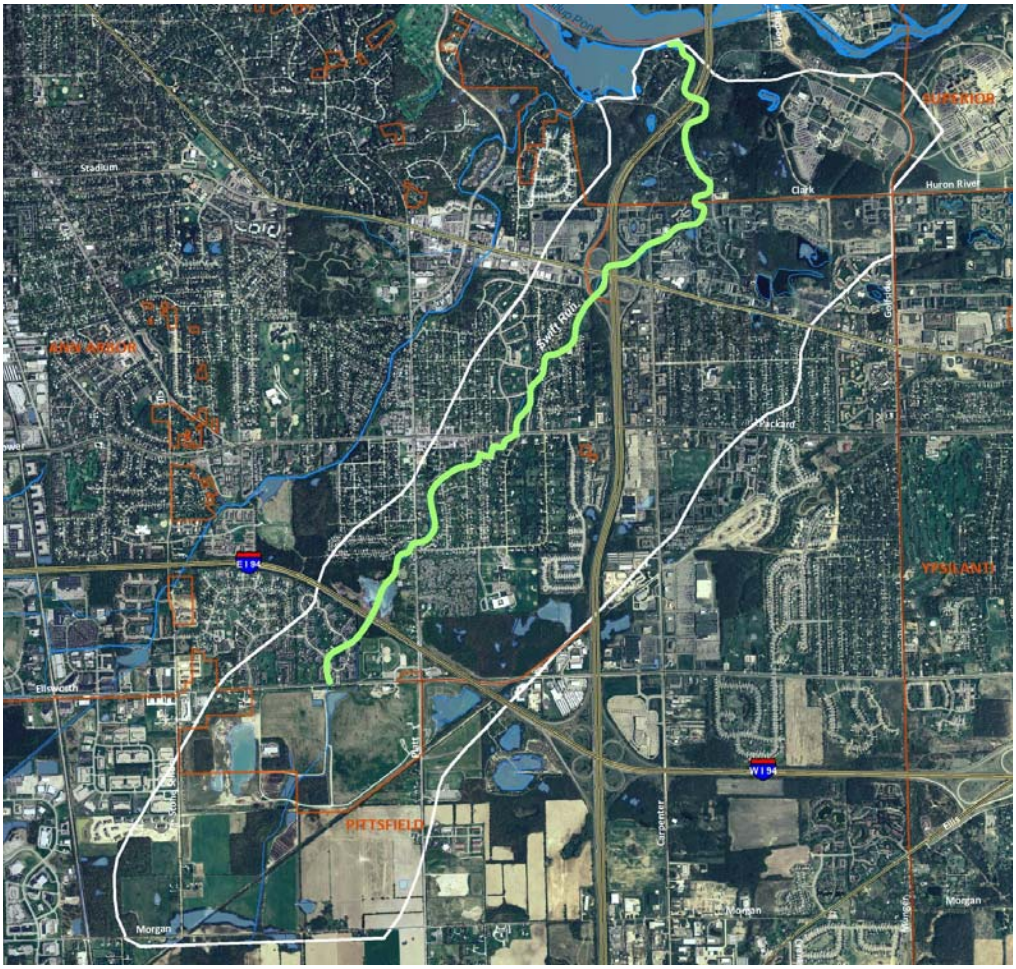
Implementation Plan for the Swift Run Creek Biota TMDL

A. Pollution Budget for Swift Run Creek

Total Maximum Daily Load Targets

The TMDL reach of Swift Run Creek, a warmwater designated water body tributary to the Huron River, is located in Washtenaw County in the vicinity of the City of Ann Arbor. The watershed drains portions of Pittsfield Charter Township, the City of Ann Arbor, and Ann Arbor Charter Township. Specifically, the perennial reach extends from the confluence with the Huron River upstream to Ellsworth Road (Figure 2), a distance of 3.7 river miles. The impaired use for Swift Run 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 Swift Run 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 Swift Run Creek are impacted due to habitat impairment and instability due to unstable flow extremes, excessive bank erosion, and sedimentation. The primary numeric targets in the TMDL point to the state's biological community and habitat quality assessment

Procedure 51. The biota TMDL target is to establish both a fish community and macroinvertebrate community with acceptable, reproducible scores, each equal to or greater than the equivalent of “acceptable.” Specifically, a target habitat score equal to or greater than 110 is provided to demonstrate restoration of acceptable habitat quality. This score is consistent with the acceptable habitats assessed at Shetland Drive at the writing of the TMDL. This score is deemed appropriately high enough to account for both 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 numeric 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 = $\leq$ 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 WQS, a value of 80 mg/l as a mean annual TSS is the goal. 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 solids loading influences and assist in orienting and focusing corrective actions for source reductions.

Implementation Plan for the Swift Run Creek Biota TMDL

Sources of TSS and Stormwater

Source Assessment in the TMDL describes the nature of the Swift Run Creek watershed and how urbanization impacts the stream, and specifically aquatic life. From the Huron River confluence upstream, land use in the watershed is dominated by residential, commercial and industrial development. In fact, stormwater discharges from an area (1,918 acres) of urban/industrial/built-up land use category that represents about 64% of the land use area in the Swift Run 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 and previous areas 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 Swift Run 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 estimated annual TSS load from the point sources (WLA) versus the NPS land use categories (LA) in the Swift Run Creek watershed is about 511,844 pounds and 40,945 pounds, respectively (Table 1). The percentage of the total estimated annual TSS load to the Swift Run Creek from NPDES non-storm water point sources and storm water sources (WLA), and nonpoint sources (LA) is approximately 552,789 pounds, representing 0%, 93%, and 7% of current contributions, respectively.

Table 1. Land use categories and TSS loads in the Swift Run Creek watershed.

Source Category	Acres	Estimate Current TSS	TMDL Target Load TSS
Waste Load Allocation (WLA)			
NPDES Non-stormwater load (TSS)		None	None
Urban/Industrial/Built-Up			
Residential	678	138,943	138,943
Commercial and Service	627	185,514	185,514
Industrial	13	9,861	5,295 (46% reduction)
Transportation/Communications/Utilities	600	177,526	177,526
WLA Total	1,918	511,844	
Load Allocation (LA)			
Agriculture	349	23,868	13,168 (45% reduction)
Forested/Shrub/Open Land	702	16,886	16,886
Water Body	9	191	191
LA Total	1,541	40,945	30,245
Overall Total	2,978	552,789	537,523 (overall 3% reduction)

Source: S. Wade, LTI using 2002 (Ann Arbor) and 1998 (Township) land use data in the Biota TMDL for Swift Run Creek, 2004.

The WLA Component is composed solely of general built land use categories. The TMDL calls for a reduction in TSS loads of 4,566 lb/yr from built areas of the watershed to produce a projected <1 percent reduction of WLA levels overall to achieve the goal of 80 mg/L TSS as an annual average during wet weather events. No NPDES non-stormwater sources are located in the watershed.

Twenty-six stormwater outfalls are located in the watershed. One NPDES industrial stormwater outfall is present with an undetermined volume of stormwater to the headwaters of Swift Run Creek. Twenty-five stormwater outfalls were identified in the watershed as part of the City of Ann Arbor's MS4 program. The TMDL states that these MS4 permitted outfalls are not included in the formula since the NPDES program requires plan development to achieve the TMDL by minimizing pollutant loads to the Maximum Extent Practicable[1]. To achieve the primary (biota) and secondary (TSS) TMDL targets, the TMDL authors note, "NPDES permitted individual, general, and stormwater runoff flows from current or future point sources will need to be managed throughout the watershed to minimize stream bank erosion and habitat impairment that causes a poor macroinvertebrate community with the TMDL reach."

The LA Components are divided among agricultural land, and the background sources of forested/shrub land, and water bodies. The TMDL prescribes a 45 percent reduction in TSS loads from cropland in the

[1] A narrative standard for water quality that allows for maximum flexibility on the part of permitted entities as they develop and implement their programs to reduce the discharge of pollutants, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of pollutants.

watershed, or 10,700 lb/yr. The overall prescribed reduction in TSS load from WLA and LA is three percent, or 15,266 lb/yr, from 2003 levels.

B. Water Quality Sampling Data Summary

The authors of the TMDL recognize that sufficient, site-specific data regarding the stream flow and TSS concentration relationship (i.e., TSS loading) associated with stormwater sources was insufficient at the writing of the TMDL to establish specific numeric targets. This TMDL, then, was established as a phased TMDL to allow for additional data collection that could result in additional TSS targets that are flow-related. In response to the lack of data, the watershed entities under the leadership of HRWC developed a monitoring program for Swift Run Creek in 2003 to capture these data.

Data collected since 2003 by HRWC and partners at the Swift Run Creek monitoring station at Shetland 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 data collection began in 2003, the **average TSS concentration is 18.4 mg/L**. Including stream flow, this equates to an average daily load of 353 lbs/day or 128,933 lbs/yr (64 tons/yr) – well below the target load for the creek of 80 mg/L. However, these data are from routine sampling, rather than wet weather events. One wet weather event was sampled for TSS in Swift Run, and it resulted in a flow-weighted event concentration of 30 mg/l, still well below the target. Results from the 2011 monitoring season will be incorporated into this plan when available.

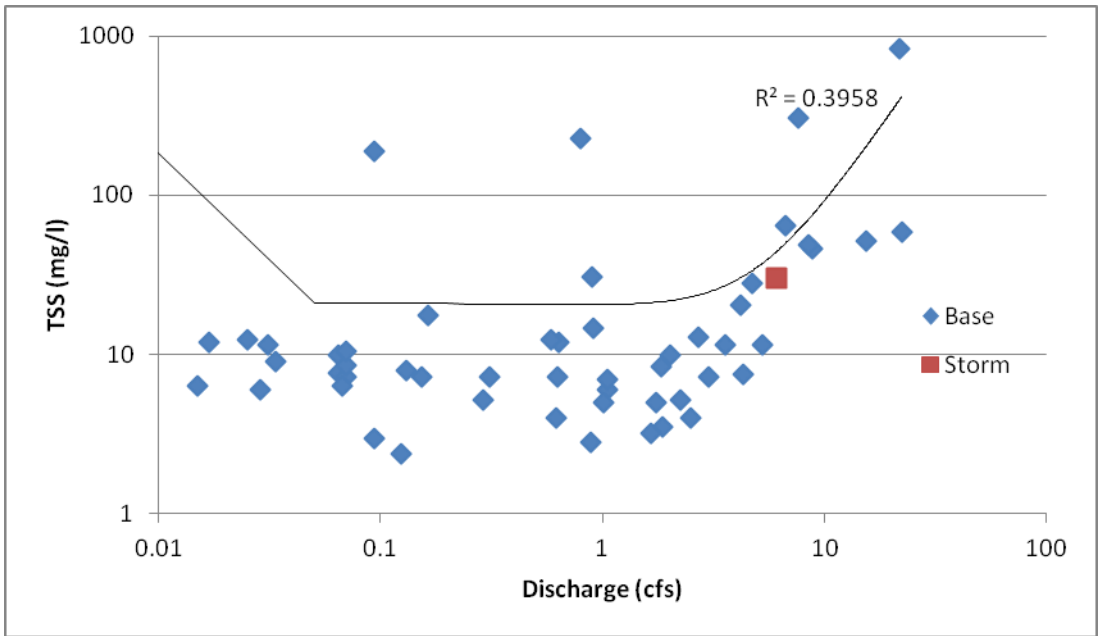


Figure 3. TSS samples showing the relationship to observed stream discharge in Swift Run Creek at Shetland Dr.

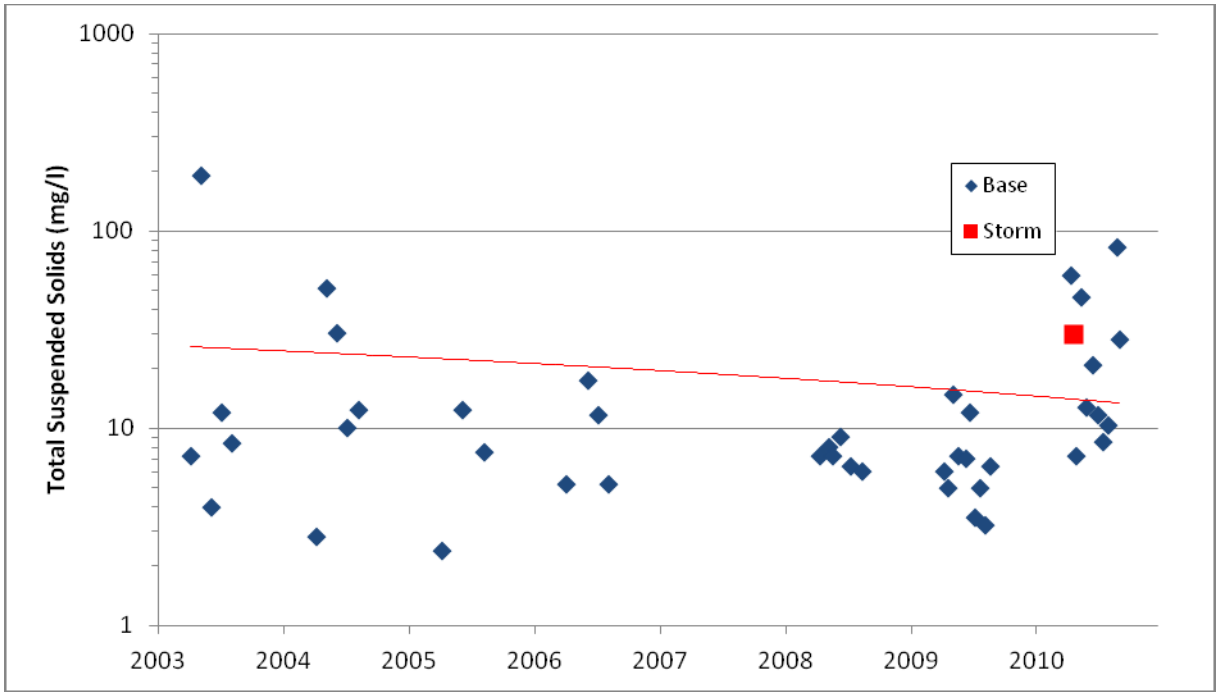


Figure 4. TSS samples by year from Swift Run Creek at Shetland Dr. The red line indicates a slight downward trend in concentration.

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 sampling data was quite variable (Figure 4), so load estimates are not precise. The full 95 percent confidence interval of load estimates ranges from 31 to 119 tons/yr. ***Thus, based on monitoring data, Swift Run Creek is currently below TSS targets and is meeting the secondary TMDL target.***

C. Macroinvertebrate Sampling Data Summary

Data collected since 1992 by HRWC and partners at a single monitoring station is the primary source of information on the benthic macroinvertebrate community in Swift Run Creek.

Insects living in the creek compose the benthic macroinvertebrate (no backbone) population, along with clams and other mollusks, crayfish, among 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. 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 in this plan 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 monitoring began at the 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 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.

- Site summary for **Swift Run Creek @ Shetland Drive** through January 2011:

  This monitoring site is located in the downstream reach of Swift Run Creek and drains five square miles. Approximately 50 percent of the watershed is developed or cultivated. Monitoring began here in 1992 and has been visited 30 times by the Adopt-A-Stream program. Insect diversity is poor, and neither sensitive families nor winter stoneflies are present. However, results in 2010 show a slight improvement in the insect community. Future monitoring will show if that trend continues or if the improved community stabilizes. The conditions of stream banks, streambed, and streamside vegetation were rated as average when the last assessment was made in August 2010. Recent

anecdotal observations at the site during water quality sampling suggest that the stream banks are eroding. Water quality is poor, based on high conductivity readings.

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 the TMDL that summarized habitat and macroinvertebrate surveys conducted in 1997 and 2003 in Swift Run Creek. 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 Swift Run Creek was poor. The results of the habitat survey and rating metrics indicated the habitat structure in Swift Run Creek ranges from good to fair. The report's authors concluded that extreme flashiness of Swift Run Creek controls channel morphology, limits bank vegetation and stability and, therefore, limits the aquatic community diversity and stability.

Based on the monitoring results for macroinvertebrates to date, one must conclude that the impairment of the indigenous aquatic life and wildlife persists in Swift Run Creek, and that the suitability of TSS as a secondary TMDL target may be a questionable loading measure to relate to stream biota.

D. The Role of Flashiness in Swift Run Creek

The documented poor habitat conditions and insect populations that persist in Swift Run 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 where flow never changes and 1 would indicate a highly variable and rapidly changing stream.

HRWC installed a flow gage in Swift Run Creek at Shetland Drive in 2010. Data was collected between May and November. A gage was also installed previously and slightly upstream at Salem Court in 2007. HRWC analyzed daily mean discharges at these stations. In 2010, the flashiness index value for Swift Run Creek was 1.02, which makes it one of the flashiest streams of all similarly sized streams in Michigan. It is also well above the median stream in a six-state Midwestern survey. That year, the stream exhibited a peak flow of 273.5 cfs in response to a 2.6" rain event. In 2007, the gage measured flow only from June through August. Over that time period, the flashiness index was 0.418, with a peak flow of only 22.3 cfs following a 1.4" rain event. It is likely that the mean flashiness index for Swift Run is somewhere

between the two years, but much higher than the average for its stream size. The stream is also being gaged in 2011 at Shetland Drive.

Erratic flows have been recognized as a key problem for Swift Run Creek by others. At the writing of the TMDL, the stream flow conditions of the creek were described as unstable and flashy in response to storm events as captured by the flow extremes recorded during June, July and August 2003 surveys conducted by LTI for MDEQ. Excessive stormwater runoff to Swift Run Creek from the built areas of the watershed is considered the most probable cause of the creek's impairment. The TMDL allocates loading of TSS among WLAs and LAs yet does not attempt to set targets for stormwater volumes directly.

As the creek appears to be meeting the TSS load limits, but continues to exhibit measures of impaired biota and altered flow profiles, it is recommended that the MDEQ 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.[iv]

II. Progress toward Achieving TMDL Targets

A. Stakeholders

Stormwater NPDES permit-holders in the TMDL watershed are the City of Ann Arbor (Phase I), Ann Arbor Charter Township, Michigan Department of Transportation, Pittsfield Township, Washtenaw Community College, Ann Arbor Public Schools and Washtenaw County - Road Commission and Water Resources Commissioner's Office (Phase II). 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 and Washtenaw Community College. These partnerships provide a venue for the Swift Run 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 Swift Run Creek.

B. Projects and Programs to Date

The TMDL calls for actions to protect Swift Run Creek that are primarily directed towards installing best practices to reduce and minimize TSS loading with primary emphasis on reducing peak flows that result in increased flashiness in the stream, which increase TSS concentrations. Practices are needed that attenuate runoff delivery rates and volume inputs to the creek in order to reduce flashiness, stabilize and normalize stream flow conditions, and minimize streambank erosion, TSS resuspension, and sedimentation impacts. The TMDL recommends the following types of activities for implementation:

a) best practices in the stormwater permits program that reduce sediment loadings and moderate stormwater runoff release rates and excessive runoff to the creek and watershed;
b) monitor point source discharges to identify sources of excessive wet weather TSS loadings and flow volumes to the creek through NPDES permit conditions ; and
c) restore and maintain the streamside vegetated zone to reduce soil erosion and loadings to the creek to minimize the inputs from built areas adjacent to the creek.

Many of the stakeholders have a history of demonstrated commitment to reducing pollutants to the Huron River, and Swift Run 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 (Huron River) since 1996, the *E. coli* TMDL for Geddes Pond (Huron River) since 2004, the Ann Arbor-Ypsilanti Metropolitan Watershed Management Plan (1998, 2008), and several creek plans and internal planning processes and studies to meet state and federal water quality standards. The activities pursued by the stakeholders to date have been recommended in the planning documents prepared for Swift Run Creek and neighboring creeks.

Significant activities that have been completed in the Swift Run 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 under the phosphorus TMDL plan is 50 percent and well over the 2.3 tons per year of TSS reduction required by the biota TMDL for Swift Run Creek. 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 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 Swift Run Creek contributing area. Toward this end, local governments, and the Huron River Watershed Council 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 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. The Malletts Creek Coordinating Committee 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.

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.

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 Swift Run Creek watershed.

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 8.

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 one site on Swift Run Creek for benthic macroinvertebrates and aquatic habitat. Cost: $6,900

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

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 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 Swift Run 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 Swift Run Creek in order to temper the erosive flows that prevent the attainment of the indigenous aquatic life and wildlife use.

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.[v] 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 Swift Run Creek biota (2012-2016)

The stakeholders recognize that continuing efforts are needed to improve habitat and water quality in Swift Run 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 Swift Run Creek that will contribute to TSS reductions. Projects for Swift Run Creek are drawn from 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 Ann Arbor-Ypsilanti Metropolitan Area Watershed Management Plan (updated 2008), and a review of potential stormwater management projects.

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 available using the Watershed Treatment Model.[vi] 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.[vii]

Table 2. Summary of the 5-Year Restoration Strategy for Swift Run Creek (2012-2016)

Activity	TSS Load Reduction (*estimate*) (lb/yr)	Implementation Timeframe	Cost Estimate 2012-2016
MDOT Pollutant Removal Offline Detention Basin (SRF)	39,115	2014	$0.6M
Residential Best Practices on 200 targeted acres	8,378	2012-2016	$0.07M
Totals	47,493	--	$0.67M

Thus, these activities account for a larger reduction than the approximately 5,200 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.

Swift Run MDOT Pollutant Removal Offline Detention Basin Project: This proposed project will provide offline detention within the cloverleaf of the US-23 and Washtenaw Avenue intersection. A portion of the existing Swift Run Creek channel that flows through the cloverleaf will be redirected to the

detention basins. The project is scheduled to start in the 3rd quarter of 2014 at a total preliminary cost $640,000. TSS estimated reduction: 39,115 lb/yr.

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

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

City of Ann Arbor

Implement Stormwater Activities in Capital Improvements Plan: The city's 5-year Capital Improvement Plan identifies three projects in the Swift Run Creek watershed to repair, upgrade or otherwise improve stormwater infrastructure. However TSS reductions appear to not be expected from their implementation. Current plan is at http://www.a2gov.org/government/publicservices/systems_planning/capitalimprovements/Pages/CapitalImprovementsPlan.aspx. Cost and estimated pollutant reduction to be determined. Implement 2012-16.

Washtenaw County Water Resources Commissioner

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.

Washtenaw Community College

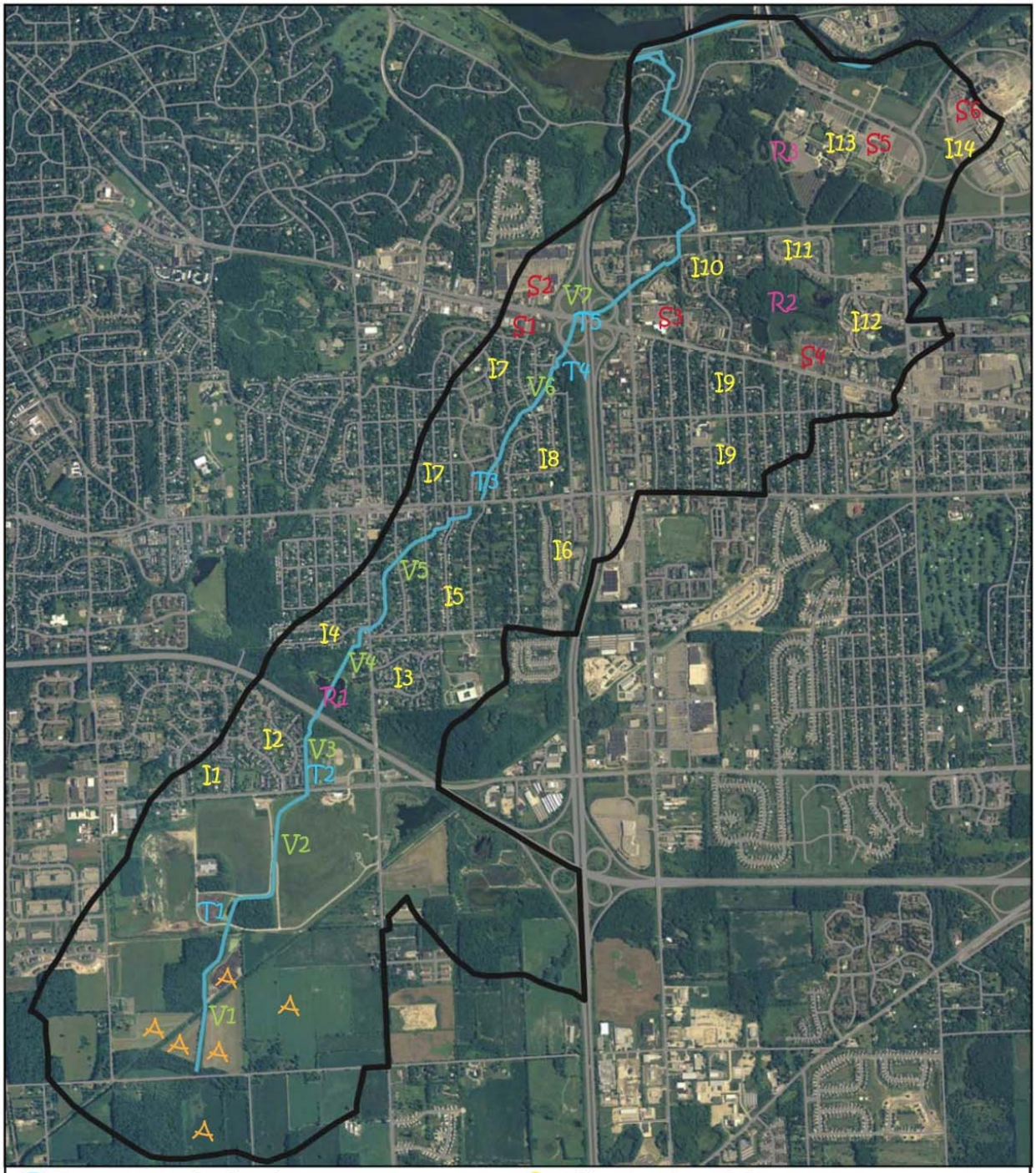
Stormwater Improvements: New infiltration and storage to capture and treat runoff from drainage from impervious surfaces to Swift Run and direct to Huron River. Cost and estimated pollutant reduction to be determined. Implement 2012-13.

Additional Activities

Potential stormwater management projects have been identified in the Watershed Management Plan for the Ann Arbor-Ypsilanti Metropolitan Area and in a study prepared for HRWC by landscape architect Tina Fix (Figure 5). Both methods employed a desktop analysis of the creekshed (land use patterns,

hydrology, and critical areas for sediment transport) to inventory potential areas for projects specifically designed to reduce hydrologic and sedimentation impacts on aquatic habitat in Swift Run Creek. Nearly three dozen opportunities were identified within the creekshed that could control erosion, reduce sediment transport, detain or slow runoff, reduce channel erosion or increase storage capacity.

These opportunities will be further evaluated to determine the feasibility of each potential project and prioritize each project for implementation. A selection of these projects will be implemented over the next five years and site designs will be developed as needed, such as has been done already for the Pittsfield Village project. This potential project is highlighted in this plan since site design drawings are developed with preliminary stormwater detention calculations. Pittsfield Village is a multi-family housing development located north of Packard Road with potential for bioretention and/or inline detention. Appendix A presents details for this potential project that can be used in applications for funding, and for inclusion in the City of Ann Arbor CIP or Washtenaw County SRF list.



Prepared for Huron River Watershed Council by Tina Fix, July 2010. GIS information obtained from Huron River Watershed Council, City of Ann Arbor, and the Michigan Geographic Data Library. Site designs would require site specific investigation and analysis.

Figure 5. Potential Stormwater Management sites in Swift Run Creek watershed

V. Accountability Structure for Implementation

A. Participants

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

- Ann Arbor Charter Township
- City of Ann Arbor
- Huron River Watershed Council
- Michigan Department of Environmental Quality
- Pittsfield Charter Township
- Washtenaw Community College
- Washtenaw County Water Resources Commissioner's Office
- Washtenaw County Road Commission

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

- Michigan Department of Transportation

B. Reporting and Timeline

Although a great many ongoing actions to restore water quality and habitat in the watershed 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 Swift Run 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 are required under the permit regulations of the Clean Water Act. Within the TMDL area is one Municipal Separate Storm Sewer System (MS4) Phase I permit holder—the City of Ann Arbor; 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. Permit renewal applications will continue to need to include provisions consistent with the Swift Run Creek TMDL.

Phase II communities and entities must submit detailed compliance language that must also include provisions consistent with the Swift Run 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 Drain 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, are obligated to develop, implement, and enforce a storm water 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. Storm water controls designed to attain the goals of the TMDL must be incorporated into the storm water 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 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' storm water 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 Swift Run 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 Swift Run 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.

[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] 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).

[v] http://www.epa.gov/region1/eco/tmdl/pdfs/vt/potashbrook.pdf

[vi] Center for Watershed Protection. Watershed Treatment Model (WTM) – Version 3.1. Downloaded from http://www.stormwatercenter.net/. 2007.

[vii] Washtenaw County Water Resources Commissioner. Huron River 2010 SRF Project Plan. July 2010.