Washtenaw County
Water Resources Commissioner
Huron River 2013 SRF Project Plan

July 1, 2013

Prepared For:

Huron River Green Infrastructure Drainage District
705 N. Zeeb Road
Ann Arbor, Michigan 48107

HUBBELL, ROTH & CLARK, INC
Consulting Engineers

Michigan Department of Environmental Quality
Rick Snyder, Governor
Dan Wyant, Director

http://www.michigan.gov/deq

Clean Water Revolving Funds
SRF/SWQIF Project Plan Submittal Form

Name of the Project Huron River Green Infrastructure Drainage District	**Applicant's Federal Employer Identification Number (EIN)** 38-6004994
Legal Name of Applicant (The legal name of the applicant may be different than the name of the project. For example, a county may be the applicant for bonding purposes, while the project may be named for the particular village or township it serves.) Huron River Green Infrastructure Drainage District	**Areas Served by this Project** Counties Washtenaw Congressional Districts 7 & 15 State Senate Districts 17 & 18 State House Districts 52, 52, 54, & 55
Address of Applicant (Street, PO Box, City, State & Zip) 705 N. Zeeb Rd PO BOX 8645 Ann Arbor, MI 48107-8645	
Brief Description of the SRF Project Stormwater best management practices to reduce nonpoint source pollution, particularly phosphorous, total suspended solids and E. coli within the Allen, Millers, Malletts, Swift Run and Traver watersheds to address the E. coli TMDL of Geddes Pond, the phosphorous TDML of Ford/Belleville Lake and the biota TMDLs of Malletts and Swift Run watersheds: porous surfaces, bioinfiltration, hydrodynamic separators, trees, cisterns, downspout disconnection, construction of sediment forebays, detention basins with native plantings and stream bank stabilization projects.	
Estimated Total Cost of the SRF Project **$44,000,000**	**SRF Construction Start Target Date** **May 1, 2014**
Brief Description of the SWQIF Project	
Estimated Total Cost of the SWQIF Project	**SWQIF Construction Start Target Date**
Does the Owner Intend to use a Construction Management Firm? ☐ Yes ☒ No	
Name and Title of Applicant's Authorized Representative Evan N. Pratt, P.E., Water Resources Commissioner Washtenaw County	
Address of Authorized Representative (if different from above)	**Telephone** 734-222-6860 / **FAX** 734-222-6803
	E-Mail Address pratte@ewashtenaw.org
Signature of Authorized Representative Evan N. Pratt, P.E.	**Date** 6/25/2013
Joint Resolution(s) of Project Plan Adoption/Authorized Representative Designation attached check here ☐	

A final project plan, prepared and adopted in accordance with the Department's *Clean Water Revolving Funds (SRF and SWQIF) Project Plan Preparation Guidance*, must be submitted by July 1st in order for a proposed project to be considered for placement on a Project Priority List for the next fiscal year. Please send your final project plan with this form to:

REVOLVING LOAN SECTION
RESOURCE MANAGEMENT DIVISION
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
PO BOX 30241
LANSING MI 48909-7741

Washtenaw County
Water Resources Commissioner

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Date: July 1, 2013

Prepared by:

HUBBELL, ROTH & CLARK, INC
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P.O. Box 824 • 555 Hulet Drive
Bloomfield Hills, Michigan 48303-0824

HRC JOB NO. 20120639

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Changes Made Since Draft Publication

The following items summarize corrections and/or changes made from the draft Project Plan made available for public review (dated, May 23, 2013) to the final version of this Project Plan, issued on July 1, 2013.

1. The public hearing information and information related to approval of the Project Plan were updated.
2. The adopted resolution was added to Appendix C, additional correspondence made after publishing of the draft Project Plan was added to Appendix B, and the public hearing notice and transcripts were added to Appendix B.
3. The replacement of the six culverts under Oakbrook Drive on the portion of the Mallett's Creek Stabilization was added in.
4. Additional information was added regarding the Lawton Park, Churchill Downs Park, and Lans Basin projects
5. Several of the sites were updated to include either porous pavement or an HMA section with a subsurface stone reservoir rather than first flush storm sewer.
6. Pollutant removal tables were finalized.
7. Cost estimates were updated. The costs were increased substantially from the public notice due to the substantial estimated costs of the Lawton Park project. This was discussed at the Public Hearing.
8. User costs were updated based on the updated project cost estimates.

Section I - Introduction

The Huron River Green Infrastructure Drainage District (HRGIDD), with the support of the Washtenaw County Water Resources Commissioner (WCWRC) and the City of Ann Arbor (City) has chosen to take action to improve water quality in the Mallett's, Allen, Millers, Traver, Fleming, and Swift Run Creek watersheds, as well as the watershed which directly discharges to the Huron River. The purpose of this Project Plan is to help reduce non-point source stormwater pollutants (NPS), flooding, and flow to the Huron River and the surrounding community by detention and treatment or retention and infiltration of stormwater runoff.

Focusing on NPS pollutant removal will help the County and City achieve the Michigan Department of Environmental Quality's (MDEQ) enforced Total Maximum Daily Loads (TMDL) for phosphorous, *Escherichia coli* (*E. coli*), and biota along the Huron River. Associated volume reductions will improve hydrologic conditions throughout the basin and limit downstream hydraulic impacts.

In 2005, the County and City developed a SRF Project Plan for the Doyle Park project located in the Mallett's Creek watershed. In 2008 and 2009, the County and City developed two similar SRF Project Plans to reduce NPS pollution in the Allen Creek watershed. An expanded SRF Project Plan was compiled in 2010, reaching out to the four remaining subwatersheds within the City. This plan was updated with an amendment in 2011. With a history of successfully completing SRF Projects, the County is very familiar with the SRF process and is committed to completing these projects as funding allows.

The Huron River watershed experiences high amounts of runoff due to urbanization which causes neighborhood flooding and poor downstream water quality. The previous Project Plans recommended various types of stormwater improvement projects to address these issues. A number of the improvements have been or are being implemented, with construction of the first SRF NPS funded project started in 2006 with the Doyle Park Project. The County has completed limited monitoring of the impacts and benefits resulting from the implemented projects, and will continue to use the information collected in order to evaluate alternatives and systematically plan for NPS pollution reduction both in the City as well as in portions of the neighboring Townships.

The locations and projects presented in this Project Plan were individually evaluated to determine the quantity of stormwater runoff and/or pollutants that could be captured and mitigated. Best Management Practices (BMPs) were then selected based on watershed storage or stream bank protection needs, together with individual site conditions and constraints. The data was then used to preliminarily design each BMP to maximize the pollutant removal, with emphasis on total suspended solids (TSS), total phosphorous (TP), and *E. coli* removal, as well as onsite infiltration. The 20 projects that will be presented in this year's Project Plan are listed herein. Projects were selected based on those included in the City's Capital Improvement Plan (CIP). The CIP is developed based on inventory, assessment, and coordinated asset maintenance and improvements. All projects involving road reconstruction will include components in order to treat and detain at minimum the first flush or larger volumes per City and County standards. Infiltration will be used to the extent necessary based on soil conditions. While some soil conditions are known, additional infiltration may be able to be proposed during design based on more comprehensive soil information. Where infiltration is not used, oversized pipes for extended detention, including sumps for maintenance, or stone reservoirs with underdrains, will be used to promote storm water quality.

- Geddes Avenue (Arlington Boulevard to Huron Parkway) – Complete reconstruction. As part of the roadway design, stormwater treatment/storage options have been evaluated to treat the first flush and detain bankfull volume where possible and provide stormwater quality enhancements. Due to the limited right-of-way, all work will likely take place within the existing road footprint.

- Detroit Street (Catherine Street to Division Street) – Replacement of brick pavers similar to the existing roadway to maintain historic appearance of the area. Stormwater management incorporated into the design to treat the first flush volume and detain bankfull volume and provide stormwater quality enhancements. Based on the preliminary soil borings, this site is not suitable for infiltration.
- Farmers Market Parking Lot – This parking lot is to be reconstructed and will provide enhanced storm water management, including infiltration and capture opportunities. The currently paved areas will be repaved and the gravel area adjacent to the area will also be paved.
- Briarwood Mall Ponds – Water quality improvements at Von Maur, Holiday Inn Express, and Plaza Drive ponds. The Plaza Drive pond will be dredged and retrofitted for phosphorus and TSS removal and future maintenance.
- Street Tree Planting – Throughout City Rights-of-way, easements, and public properties.
- Mallett's Creek Streambank Stabilization – Various areas as noted herein:
  - ✓ Chalmers Drive to Huron River Drive – Streambank stabilization on the downstream end of the creek. Upstream stretch was completed in 2012 (approximately 9,000 lft).
  - ✓ Cranbrook Park – Streambank stabilization in creek from Fieldcrest Street to S. Main Street.
  - ✓ Oakbrook Drive to Eisenhower Parkway – Streambank stabilization from the six culverts site to Eisenhower.
- Millers Creek Streambank Stabilization – Project to take place from Geddes Road north to University properties to reduce streambank failures and address heavy sediment loading.
- Huron Hills Baffle Box – As identified in the Millers Creek Sediment Study prepared in 2013, a regional treatment for sediment will be constructed on the portion of Millers Creek which runs through the Huron High School Property.
- State Street (Eisenhower Parkway to south of I-94) – Complete reconstruction in order to improve the "gateway" to the City. Project will include elimination of concrete islands and replacement with green infrastructure. The NPS project includes median improvements to handle the stormwater from the roadway.
- Scio Church Road (Main Street to east of Seventh Street) – Complete reconstruction of roadway. Stormwater management options to extend time of concentration including oversized pipes with structures with sumps for sediment removal.
- Stadium Drive (Hutchins Avenue to Kipke Drive) – Complete reconstruction of the roadway. Swirl concentrators and extended detention to be used for stormwater management.
- Research Park Wetlands Detention – Construct a wetland area/detention basin inside Research Park loop along Mallett's Creek. Include streambank stabilization in the area from Research Park Drive East to RR Track where failures are causing the parking lot to become undermined.
- Huron Hills Golf Course – Construction of streambank improvements through golf course and construction of a wetland/buffer area before outlet under railroad tracks. Floodplain enhancement and outlet structure to be installed.
- S. Seventh Street (Greenview Drive to Scio Church Road) – Complete reconstruction, including narrowing roadway and providing stormwater management.
- 721 N. Main Street – Improvements to the site in order to provide flood protection and storm water quality improvements are proposed, including the construction of a stormwater wetland near the center of the site is proposed with planting beds and other stormwater quality improvements.
- Village Oaks – Improvements to the detention and stormwater management in the area to improve water quality and reduce volume downstream to facilitate pollutant removal.
- Maple Village Shopping Center – This shopping center, located at Dexter Road and N. Maple Road, will be redeveloped with improvements to the stormwater management system to promote reduction in runoff and infiltration.
- Lawton Park Detention Basin – A regional detention basin will be constructed on the existing park property to reduce flashiness downstream and improve water quality.

- Churchill Downs Park Stormwater Improvements – A regional detention basin will be constructed on the existing park property to reduce flashiness downstream and improve water quality.
- Lans Basin – Improvements will be made to provide additional storage and increased water quality improvements.

Section II - Project Background

A. Study Area Characteristics

1. Delineation of the Study Area

The Study Area is defined as that portion of the HRGIDD contributing flow from the Mallett's, Miller, Traver, Swift Run, and Allen creeksheds, as well as direct runoff into the Huron River within the City of Ann Arbor. The creeksheds are located in eastern Washtenaw County and drain into the Huron River as shown on Figure 1. The contributing area is approximately 20.8 square miles.

The Study Area is designated as a County Drainage District; storm sewers serving most of the community are owned and operated by the City of Ann Arbor and generally drain to County Drains. The County and City as well as the University of Michigan, Ann Arbor Public School District, and the Michigan Department of Transportation are National Pollution Discharge Elimination System (NPDES) Phase I or Phase II stormwater permit holders. There are also several watercourses located in the project area that are not under the jurisdiction of the County or the City and would require easements.

The activities proposed within this Project Plan are focused on numerous locations throughout the City. See Figures 2 through 4 for a general overview of the anticipated locations for stormwater improvements.

a. Lakes, Rivers, Ponds, and Wetlands

The general locations of wetlands are shown in relation to the proposed project locations according to data from the National Wetlands Inventory (NWI) (Figure 5). A more detailed review would be performed during design of each of the proposed projects to identify any potential wetlands areas that would be regulated under Part 303 of Public Act 451.

b. Existing Treatment Facilities

Not applicable to NPS stormwater improvement projects.

c. Effluent Disposal Locations

Not applicable to NPS stormwater improvement projects.

d. Sludge Disposal Sites

Not applicable to NPS stormwater improvement projects.

e. Existing Interceptors, Collectors, Pumping Stations, and Force Mains

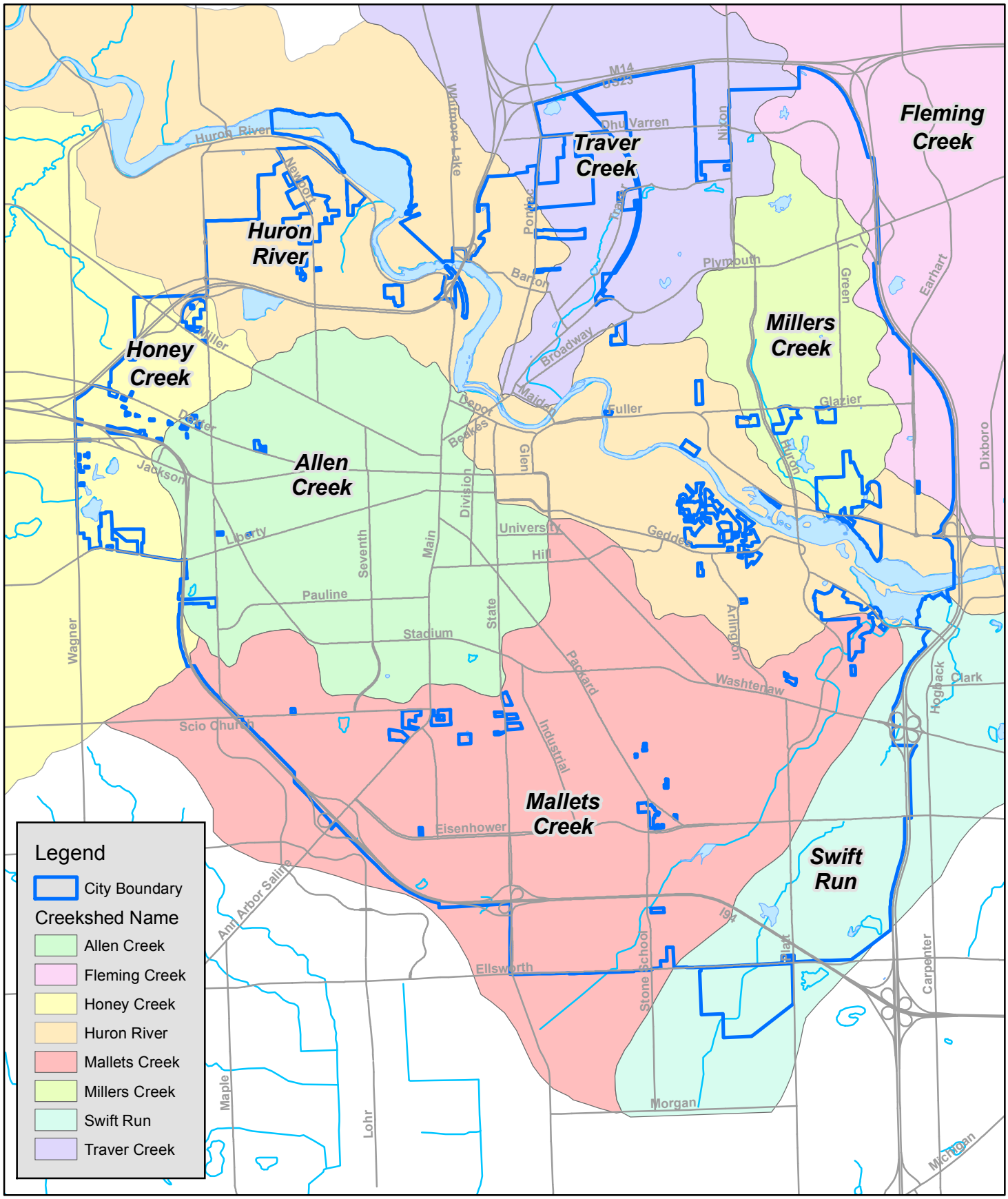
Not applicable to NPS stormwater improvement projects.

f. Population Distribution

Not applicable to NPS stormwater improvement projects.

g. Parks and Recreation Areas

See Figures 6 through 9 for locations of park and recreation areas owned by the City and County. There approximately 34 public properties where users have access to open surface water within the Study Area. Activities, such as canoeing, kayaking, hiking, swimming, and bird watching, are among the amenities supported by the surface water features.



Ann Arbor Creeksheds
HRGIDD 2013 Project Plan

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Figure 1

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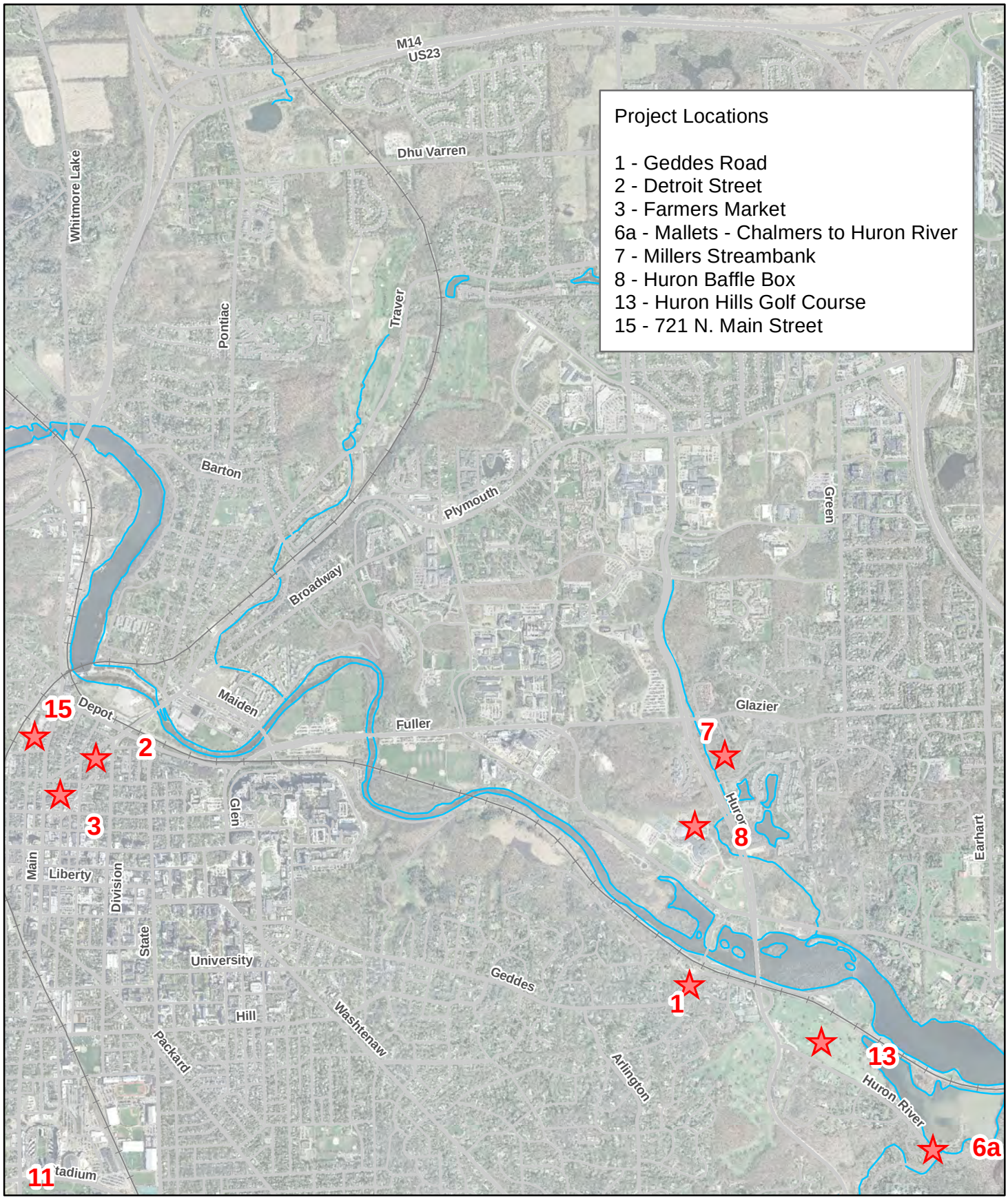

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Overall Project Locations
HRGIDD 2013 Project Plan

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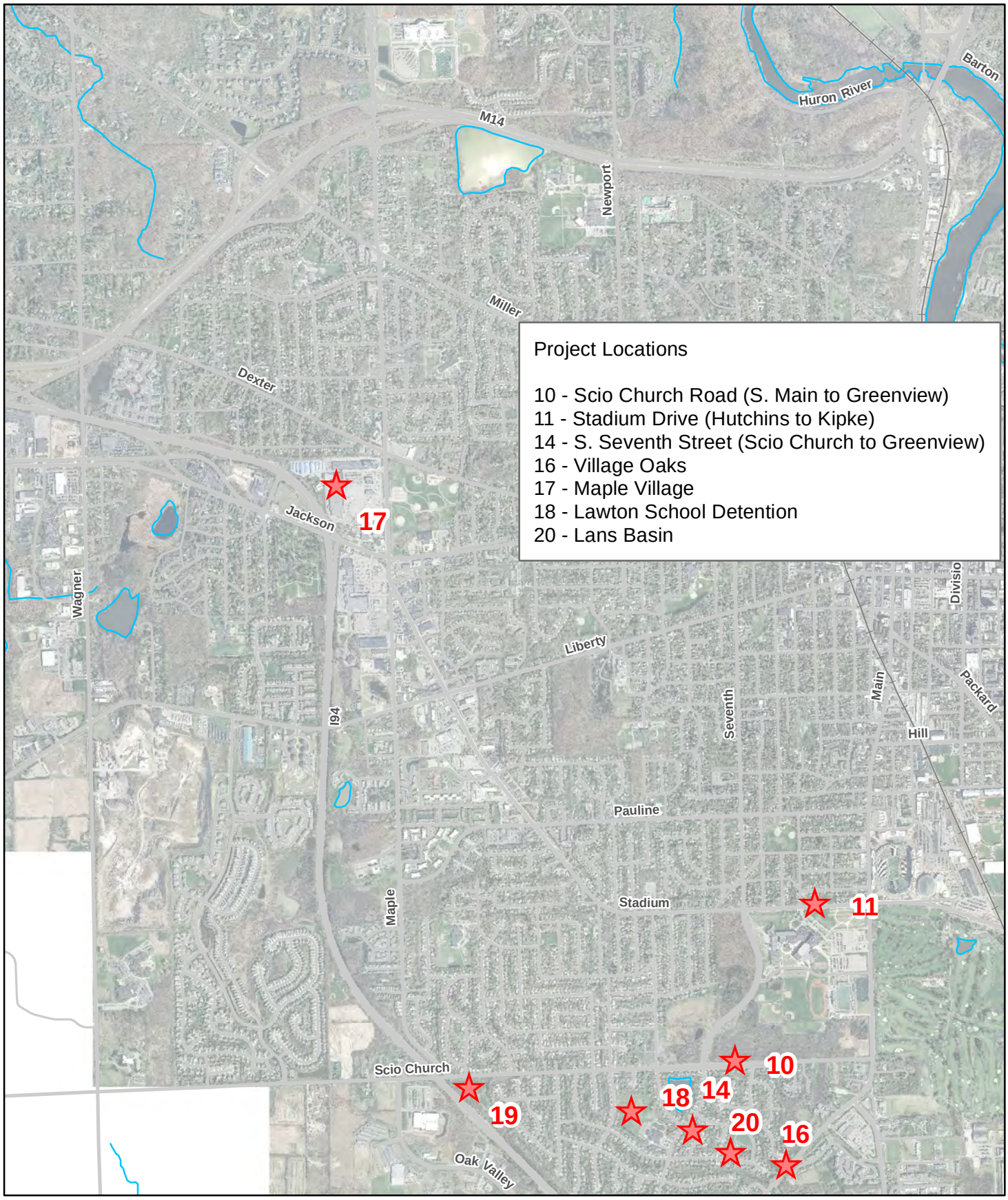

Overall Project Locations
HRGIDD 2013 Project Plan

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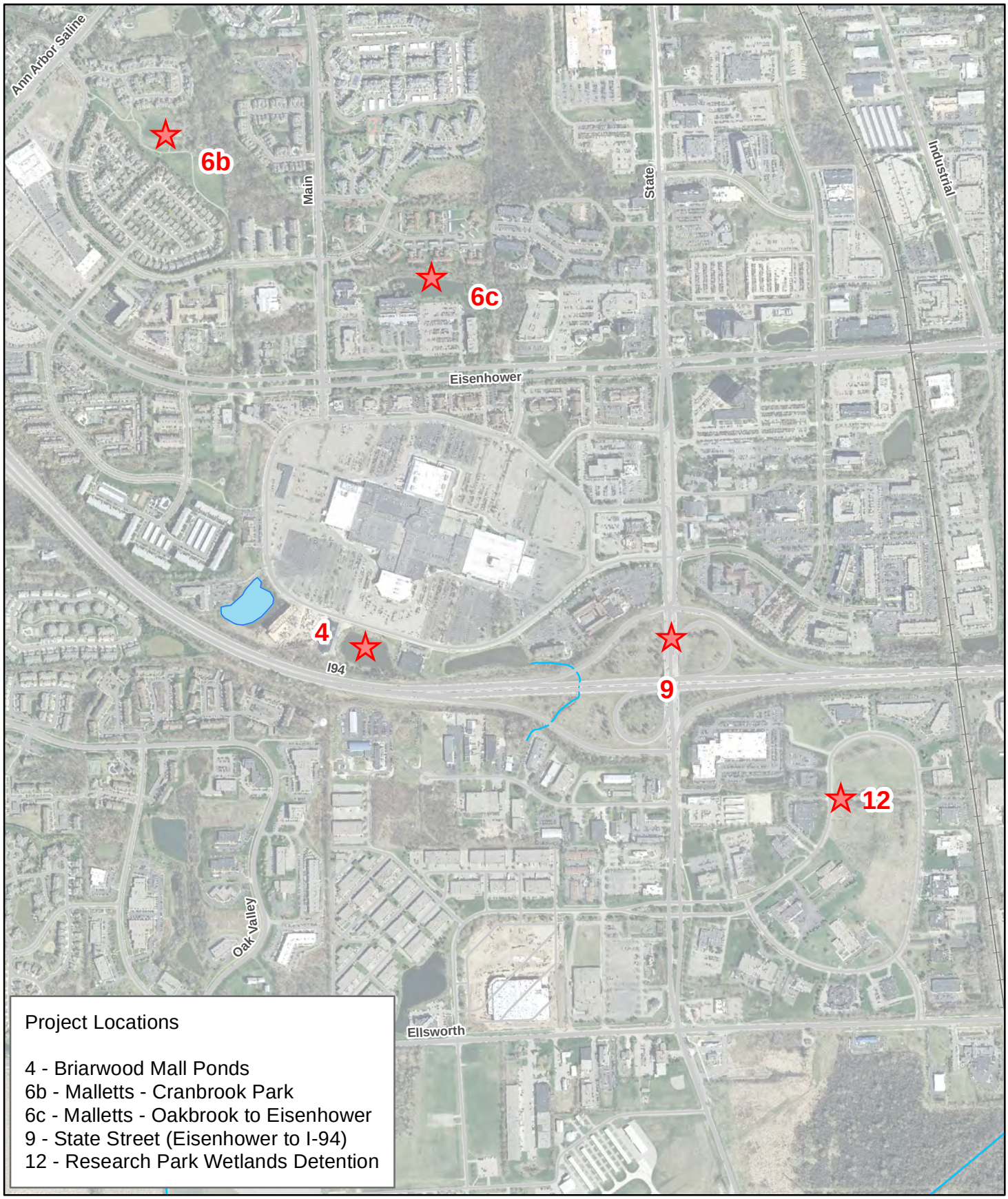

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Overall Project Locations
HRGIDD 2013 Project Plan

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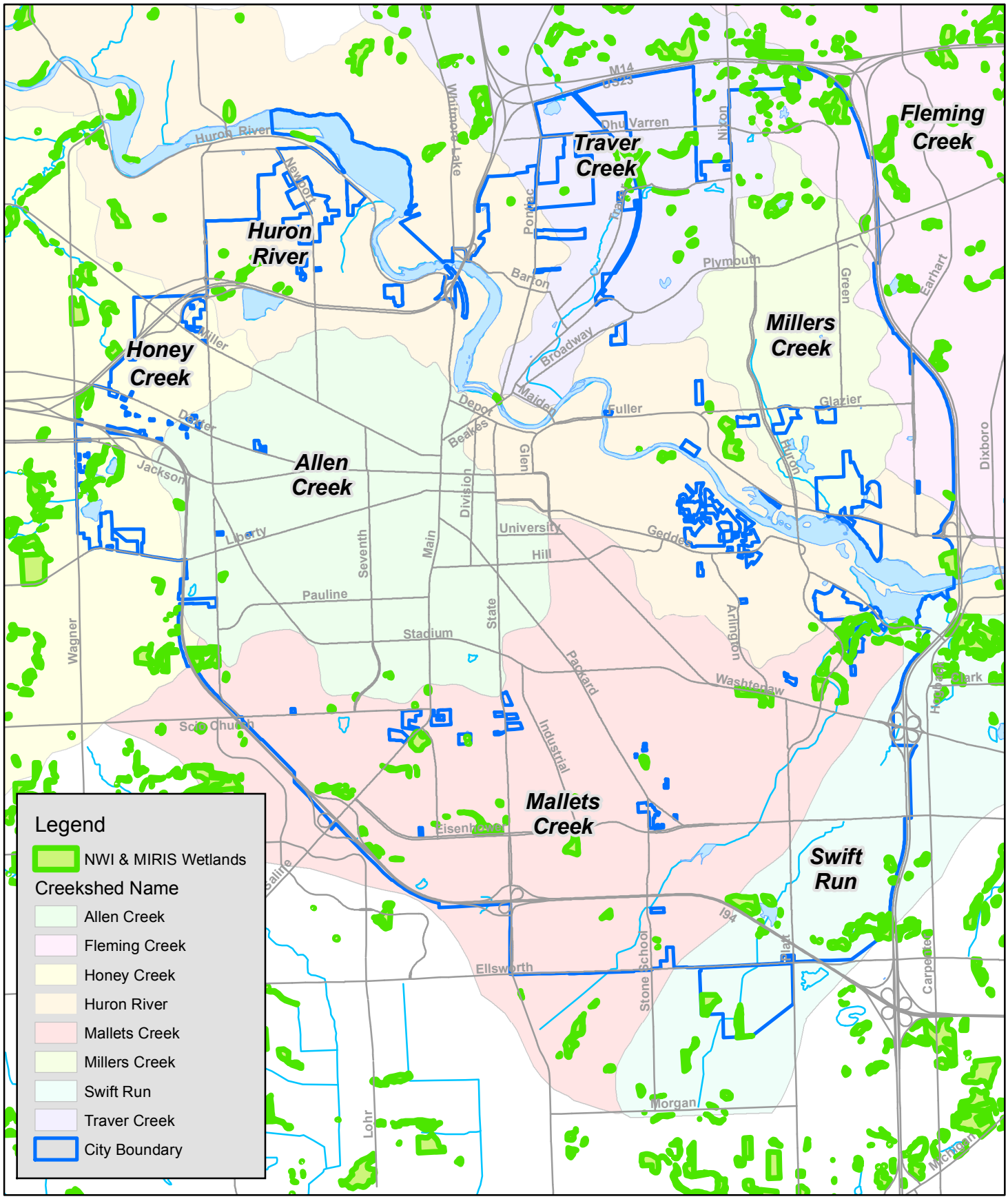

Wetlands Map
HRGIDD 2013 Project Plan

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Figure 5

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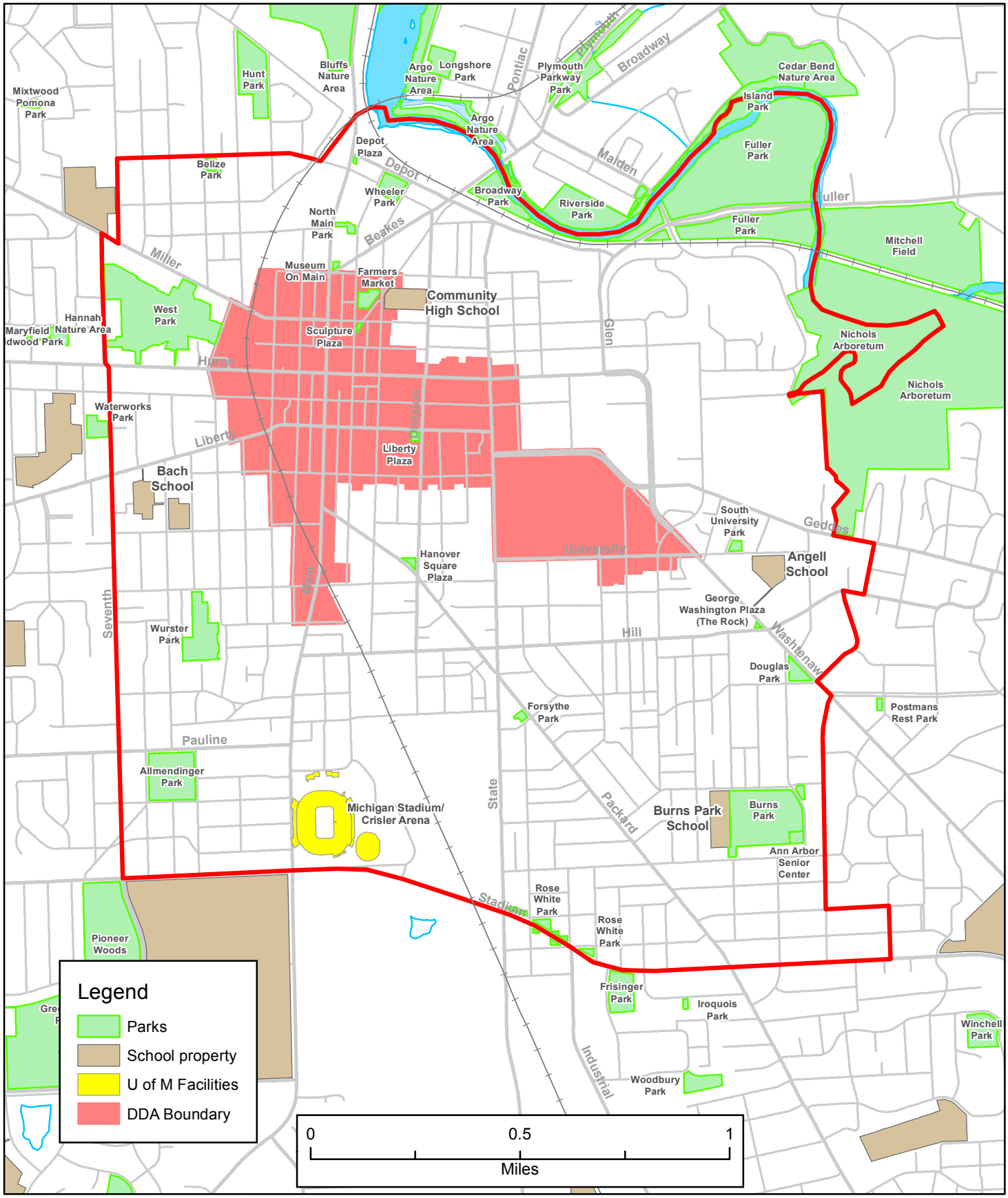

Park Locations
Central Planning Area
HRGIDD 2013 Project Plan

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Figure 6

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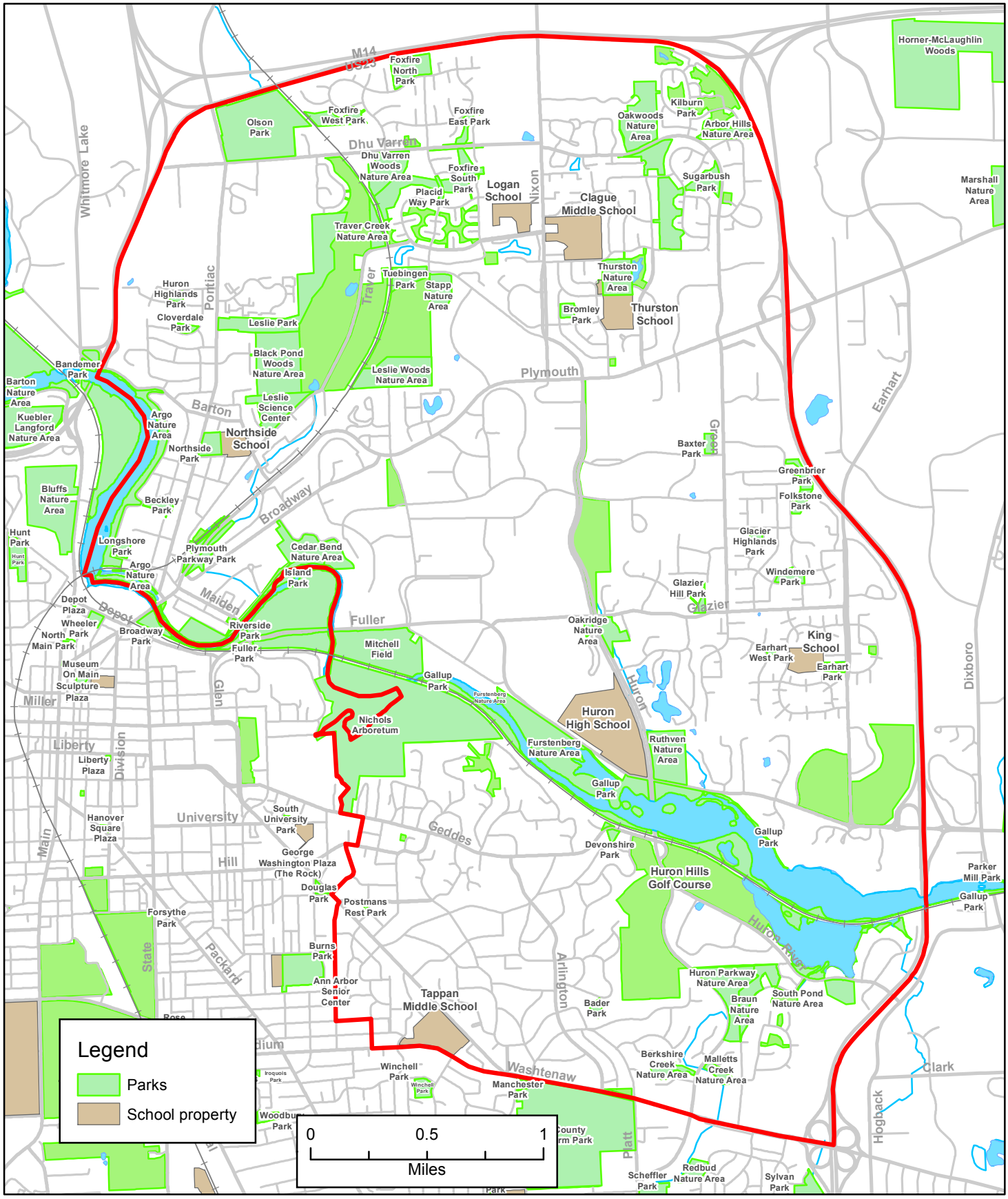

Park Locations
Northeast Planning Area
HRGIDD 2013 Project Plan

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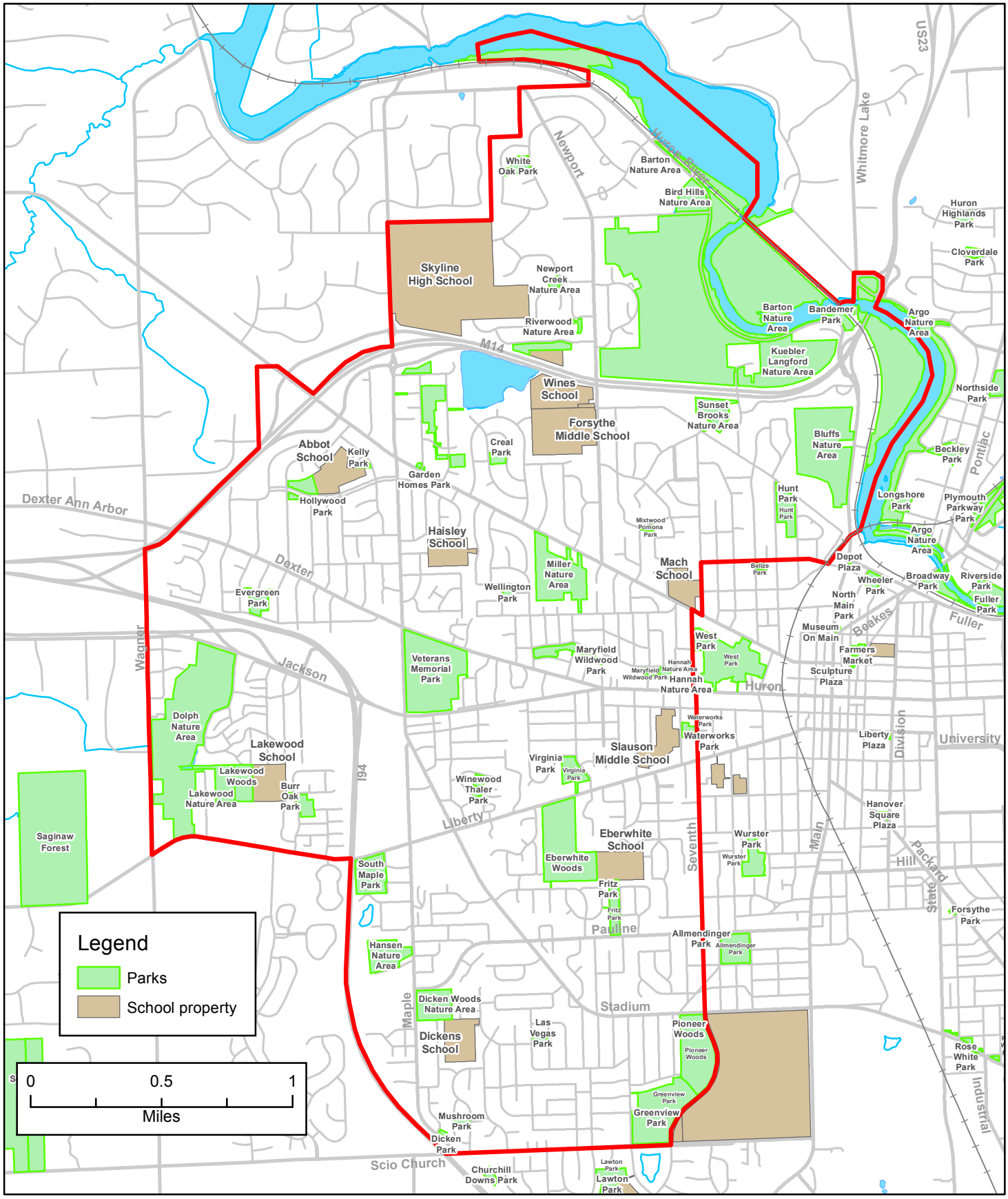

Park Locations
West Planning Area
HRGIDD 2013 Project Plan

Figure 8

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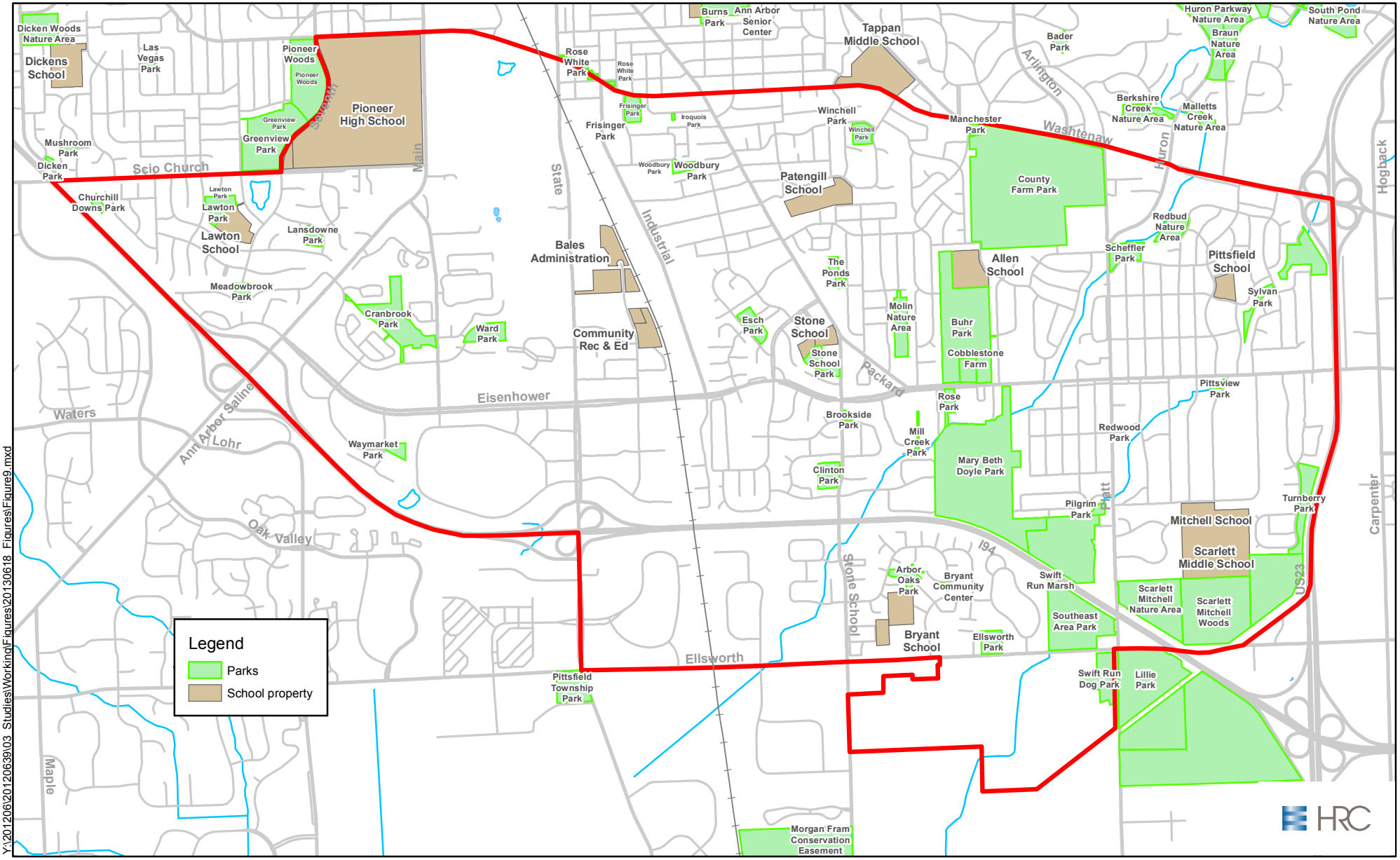
Legend
Parks
School property
Dicken Woods Nature Area
Dickens School
Las Vegas Park
Pioneer Woods
Pioneer High School
Greenview Park
Mushroom Park
Dicken Park
Scio Church
Churchill Downs Park
Lawton Park
Lawton School
Lansdowne Park
Meadowbrook Park
Cranbrook Park
Ward Park
Waymarket Park
Waters
Ann Arbor Saline
Lohr
Oak Valley
Maple
Eisenhower
Rose White Park
Frisinger Park
Iroquois Park
Woodbury Park
Burns Park
Ann Arbor Senior Center
Tappan Middle School
Bales Administration
Community Rec & Ed
Patengill School
Winchell Park
Manchester Park
Bader Park
Arlington
Washtenaw
Huron Parkway Nature Area
South Pond Nature Area
Braun Nature Area
Berkshire Creek Nature Area
Malletts Creek Nature Area
Huron
Hogback
County Farm Park
Redbud Nature Area
Scheffler Park
Pittsfield School
Sylvan Park
Allen School
The Ponds Park
Molin Nature Area
Buhr Park
Cobblestone Farm
Esch Park
Stone School
Stone School Park
Packard
Pittsview Park
Rose Park
Brookside Park
Mill Creek Park
Redwood Park
Mary Beth Doyle Park
Clinton Park
Pilgrim Park
Platt
Turnberry Park
Carpenter
Mitchell School
Scarlett Middle School
Scarlett Mitchell Nature Area
Scarlett Mitchell Woods
US23
I94
Arbor Oaks Park
Bryant Community Center
Swift Run Marsh
Southeast Area Park
Bryant School
Ellsworth Park
Ellsworth
Stone School
Pittsfield Township Park
Swift Run Dog Park
Lillie Park
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Park Locations
South Planning Area
HRGIDD 2013 Project Plan
Figure 9
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2. Land Use In the Study Area

a. Land Use In the Study Area

The following table summarizes the land use/cover within the City:

Table II-1: City of Ann Arbor 2008 Land Use/Land Cover (acres/%)

Land	Cover/Use	Acres
Residential	7,479	41.6%
Single-Family Residential	6,345	35.3%
Multiple-Family Residential	1,134	6.3%
Non-Residential	10,507	58.4%
Commercial and office	1,433	8.0%
Industrial	357	2.0%
Governmental/Institutional	3,160	17.6%
Transportation, Communication & Utility	3,119	17.3%
Park, Recreation, and Open Space	2,033	11.3%
Water	405	2.3%

Source: SEMCOG website, accessed December 26, 2012

b. Summary of Land Cover within the Watershed

The land cover within the Study Area is a nearly built-out, densely-urbanized environment. The dominant land covers are residential neighborhoods, mixed-use commercial, university campus, and public school property. The only available green space that is not developed is generally associated with City owned parks and open space on the public school properties.

c. Future Land Use

The majority of the Study Area creeksheds are built-out and there currently is little room for new development. However, redevelopment of areas from one land use to another is possible.

3. Surface and Ground Waters

a. Contributing Creeksheds

Pollutants from the contributing areas are creating a significant impact upon the Huron River. The landscape is covered in significant amounts of impervious surface, allowing little opportunity for stormwater infiltration and natural pollutant removal. Currently, two impoundments and two connecting waterways to the Huron River within or upstream of the Study Area have established TMDLs requiring the community to achieve a reduction in NPS pollutants. See Appendix E for copies of the MDEQ established TMDLs. The TMDLs for the Study Area are as follows:

- Ford and Belleville Lakes – Phosphorous
- Geddes Pond (Huron River) – *E. coli*
- Mallett's Creek – Biota
- Swift Run Creek – Biota

b. Lakes, Rivers, Ponds, Wetlands, and Floodplains

There are several lakes and impoundments located within the Huron River Green Infrastructure Drainage District including Barton Lake, Argo Lake, Geddes Lake, and Sisters Lakes. In addition, there are several open channel waterways, inline detention basins, potentially regulated wetlands, and floodplains within the Study Area. The proposed stormwater improvements are located at various points along the surface waterways, as well as throughout the contributing creeksheds. See Figure 5 for the locations of the wetlands within the Study Area and Figure 10 for the locations of the floodplains and floodways. The following are the waterways within the Study Area:

- Huron River
- Mallett's Creek
- Allen Creek
- Miller Creek
- Swift Run Creek
- Traver Creek
- Fleming Creek

c. Drinking Water

The Ann Arbor water supply is drawn from both surface and ground water. About 85% of the water supply comes from the Huron River with the remaining 15% is from multiple wells located south of Ann Arbor. The water from all sources is blended at the water treatment plant. Since the water is primarily a surface supply, the United States Environmental Protection Agency (USEPA) and the MDEQ regulations require water to be treated, filtered, and disinfected to ensure that any harmful substances are removed. When treatment is complete, the water is distributed to homes, schools, and businesses in the City as well as to Ann Arbor and Scio Townships for resale to their customers.

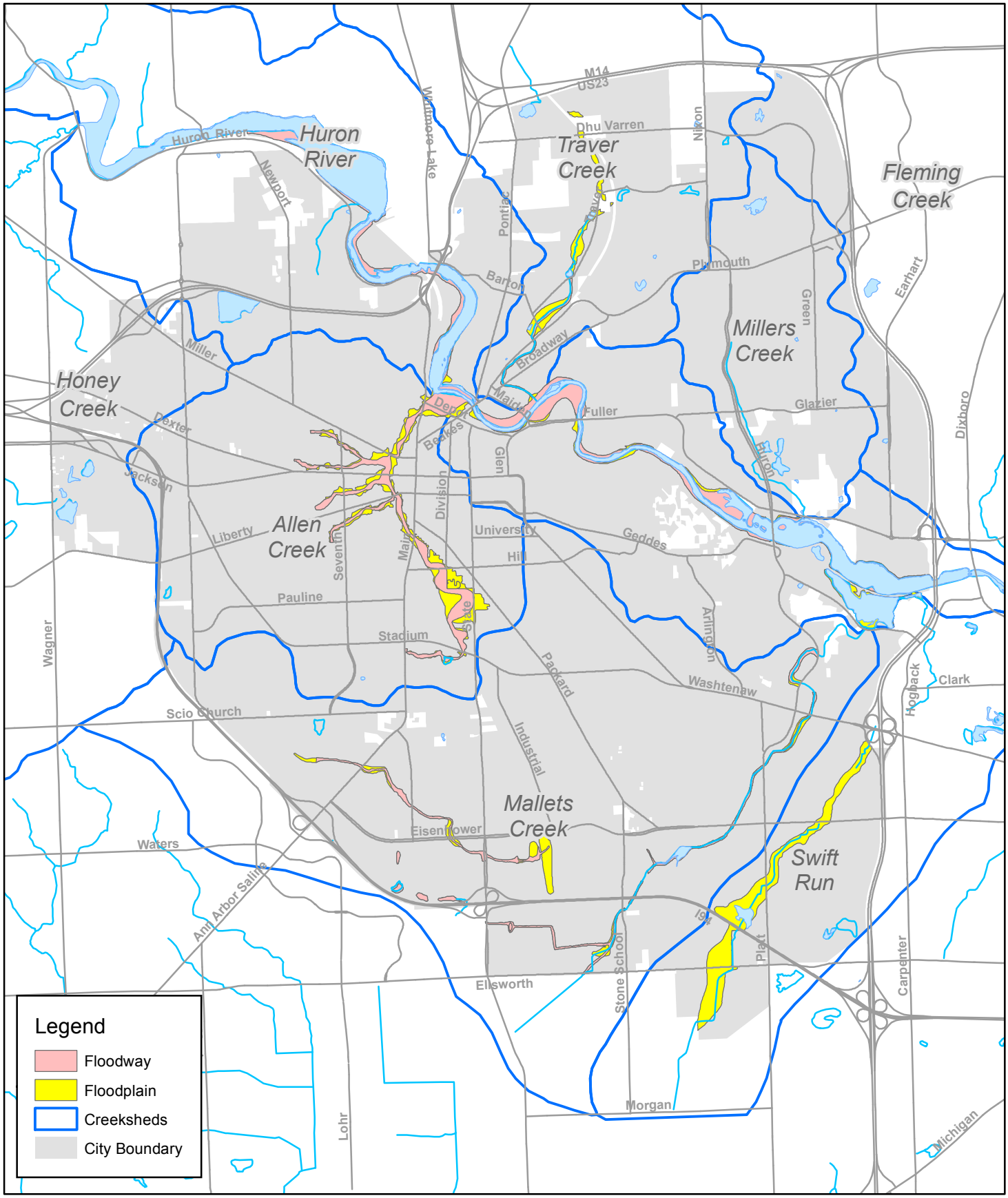
d. NPDES Permits

Entities discharging, or proposing to discharge storm or wastewater into the surface waters of the State are required by law to obtain a National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permit is intended to control discharge into the surface waters of the State by imposing effluent limits and other conditions necessary to meet the State and Federal requirements. See Appendix D for a copy of the City's current NPDES permit. The City's permit is currently under review for renewal.

B. Economic Characteristics

1. Major Employers

The major employers within the City of Ann Arbor are affiliated with the University of Michigan and the University of Michigan Health Service. The following table lists the Top Ten Employers by number of employees in Washtenaw County.



Floodplain and Floodway Locations
HRGIDD 2013 Project Plan

HRC

Figure 10

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Table II-2: Top Ten Employers in Washtenaw County and Number of Staff

Organization	Number of Staff
University of Michigan	16,143
University of Michigan Medical Center	12,000
Trinity Health	5,304
Ann Arbor Public Schools	3,578
Eastern Michigan University	1,976
Toyota Technical Center	1,500
Washtenaw Community College	1,559
Washtenaw County	1,339
Veterans Administration Medical Center	1,230
Thomson Reuters	1,100

Source: 2013 Ann Arbor SPARK (dated January 2013)

2. Household Income

The median annual household income in 2010 (per SEMCOG) in the City of Ann Arbor was $52,625.

3. Economic Climate

The City of Ann Arbor is most affected by the presence of the University of Michigan, which influences the composition of the City's economy and population. The University is a long-standing institution, which is expected to remain stable in the years to come. This is reflected in SEMCOG's projected population for Ann Arbor into the year 2030.

Recent layoffs associated with economic trends have the potential to affect population growth for the area. The purchase of the former Pfizer facility by the University of Michigan may have a positive economic impact with the expansion of the life sciences research facilities.

C. Existing Facilities

Discussion of the existing municipal sewage conveyance, treatment, and disposal facilities are not applicable to the proposed NPS stormwater improvement projects.

D. Need for the Project

Extensive review of the Huron River and its many contributing waterways by the MDEQ has led to the establishment of several TMDLs within the Ann Arbor area. The measures were taken to put limits on pollutant discharge to the watershed thereby improving water, habitat, and biotic quality. The following locations and established TMDLs are directly impacted by stormwater improvements within the Study Area:

- Ford and Belleville Lakes – Phosphorous
- Geddes Pond – *E. coli*
- Mallett's Creek – Biota
- Swift Run Creek – Biota

The City of Ann Arbor, Washtenaw County, and other local parties have engaged in a multi-year effort to achieve the requirements of the established TMDLs via the Watershed Management Plan of the Huron River in the Ann Arbor – Ypsilanti Area (WMP), (Huron River Watershed Council, 2008), Millers Creek Watershed Improvement Plan (MIP), (Ayers, Lewis, Norris, & May and others, 2004), the Mallett's Creek Restoration Project (MRP), (2000), and the Allen Creek Greenway Task Force Plan (2007). Associated volume reductions will improve hydrologic conditions throughout the basin and limit downstream hydraulic impacts. These initiatives rely on a variety of NPS reduction goals outlined as part of the 319 approved WMP:

- Reduce non-point sources of pollution,
- Reduce flow variability,
- Increase the public's understanding of their role in protecting and enhancing the Huron watershed and its contributing waterways,
- Protecting and mitigating loss of natural features and open spaces in the watershed,
- Reduce flooding attributed to stormwater runoff, and
- Improve hydrologic conditions within the basin and stabilize hydraulic conditions instream.

All creeksheds included in this Project Plan are upstream of Ford and Belleville Lakes. Therefore, all nonpoint source projects proposed with the intention of reducing phosphorus loads will work towards achieving the TMDL goal associated with Ford and Belleville Lake.

Similarly, Allen Creek, Mallett's Creek, Swift Run, Traver, Fleming and Millers Creek are all tributaries to Geddes Pond and contribute to the *E. Coli* loads of the water body. Projects that focus on total suspended solids (TSS) reduction and infiltration will be beneficial to working toward the existing *E. Coli* TMDL.

The MDEQ does not issue TMDLs for TSS. However, TSS is a surrogate for the biota TMDL. Mallett's Creek has a biota TMDL. Projects within this creekshed that reduces TSS will help achieve compliance with this TMDL.

Since 1994, over $20 million has been spent within the City on various projects and initiatives to help achieve TMDL compliance from non-point sources. Recent projects include the 255,000 cubic foot underground detention basin at Pioneer High School, the stormwater improvements along Stadium Boulevard and Sylvan Avenue, as well as at West Park within the Allen Creek watershed. Additionally, the improvements within Mary Beth Doyle Park and Wetland Preserve have an anticipated 25% reduction in phosphorous to Mallett's Creek. In addition, over 2,000 tree plantings have been completed in the last 2 years.

The need for these locations has come from several sources. Most of the improvement locations have been identified within the WMP, MIP, or MRP or as part of the City's Capital Improvement Process (CIP). These documents have received public input and support for their respective proposed improvements. The remainder of the sites are planned capital improvements locations where system evaluation such as paving needs, other utility needs, or flooding concerns is ongoing. In addition, the County's new storm water regulations dictates improvements. All of the alternative locations holistically would be working toward the common goal of NPS pollutant removal while attempting to meet the requirements of the local TMDLs.

1. Compliance Status

a. Point Source

Discussion of the status of the compliance with an existing point source or groundwater discharge permit is not considered applicable for NPS stormwater improvement projects.

b. NPDES Permit

Most stormwater outfalls into the Huron River and contributing waterways within the City are permitted Municipal Separate Storm Sewer Systems (MS4) under the jurisdiction of Washtenaw County, the City of Ann Arbor, Ann Arbor Public Schools, or the University of Michigan. The County's and City's permits are watershed based, while the others are jurisdictional. Regardless of the type, the permits have six minimum requirements that must be maintained for compliance. The projects presented in this Project Plan are an additional effort over and above that of the six minimum control measures.

Therefore, these activities go beyond what is required as part of the MS4 permit. A copy of the current NPDES stormwater permit for the City is included in Appendix D along with the application for the City's next Phase I permit.

c. Discharge Data

The discharge data form is not applicable for NPS stormwater improvement projects.

2. Orders

The City of Ann Arbor has recently completed projects under an Administrative Consent Order (ACO) toward the elimination of sanitary sewer overflows. The ACO required that the City to perform the following tasks:

- Footing Drain Disconnection Project
- Offset Mitigation Project
- Swift Run Trunk Project

These projects are not applicable to the work proposed in this Project Plan and the City is no longer under the Consent Order.

3. Water Quality Problems

a. Point and Non Point Sources of Pollution

The priorities of the HRGIDD, with the support of the City and the WCWRC, are to improve stormwater quality, increase onsite infiltration, and strive to meet the goals set forth in the WMP, MIP, and MRP which include the following:

- Reduce non-point sources of pollution,
- Reduce flow variability,
- Increase the public's understanding of their role in protecting and enhancing the Huron watershed and its contributing waterways,
- Protecting and mitigating loss of natural features and open spaces in the watershed,
- Reduce flooding attributed to stormwater runoff, and
- Improve hydrologic conditions within the basin and stabilize hydraulic conditions instream.

Implementation of the stormwater management practices proposed in this Plan will help achieve those goals identified for the Huron River. The proposed projects incorporate natural feature enhancements, including the use of vegetation to increase infiltration and stabilization, provide buffers, and reduce the amount of untreated impervious runoff. The reduction of direct stormwater runoff will decrease the amount of pollution and flow variability to the Huron River and connected waterways, thereby helping to restore the natural flow regime by reducing peak wet weather flows. The proposed flow attenuation practices via BMPs will help mitigate streambank erosion while helping to ensure the success of the future/proposed stabilization projects.

Public involvement will be an integral part of the project implementation. Involving the public in the Project Plan development process, and increasing the public awareness of the improvements that result from the project will elevate public understanding of their role in protecting and enhancing watershed resources.

The target pollutants associated with material suspended within stormwater runoff to be reduced as a result of the proposed projects identified in this Plan are total phosphorous (TP) and total suspended solids (TSS), and *E. Coli*.

Phosphorous is a nutrient commonly found in water affected by eroded soils, and attributed to lawn fertilizers, animal waste, and plant debris. Sediments and nutrients are introduced from landscape runoff and are transported to waterways by heavy rains. This condition is especially problematic in highly impervious urban landscapes such as the City. All of these pollutants can be washed over land into storm drains, ultimately contributing to the Huron River and the connected waterways.

Total Suspended Solids are caused by sedimentation into streams from development and streambank erosion. An overabundance of TSS often leads to Biota TMDLs as the habitat becomes impaired. This is apparent by the established TMDL for Mallett's Creek and Swift Run Creek. The primary culprit in impairing aquatic life is TSS. Reduction of TSS will allow for the native plant and animal species in the associated watersheds to flourish. For additional information, see Appendix E for the Mallett's Creek and Swift Run Creek biota TMDLs.

E. coli, a bacterium that can enter the watershed from animal waste, is also a significant pollutant in the Huron River. This is evident by the established TMDL (2000) for Geddes Pond. The sources have been attributed to stormwater runoff caused by urban development. For additional details, see Appendix E regarding the Geddes Pond E. coli TMDL.

The proposed improvement projects within this Plan are intended to promote treatment, detention, and onsite stormwater infiltration or increase stabilization. These practices will filter many of the pollutants and mitigate the potential for erosion. Increasing onsite infiltration will also reduce and delay the volume of direct runoff entering streams, which will help reduce any impacts on the natural flow regime of the Huron River and improve base flows.

b. Unsewered Areas

The entire City of Ann Arbor is serviced by a municipal sanitary sewer system. Therefore, actions taken upon private systems are not applicable to this Plan.

c. Septage Disposal

There are no identified septage disposal problems near the proposed improvement project locations.

4. Future Project Needs for the Next 20 Years

a. Nonpoint Source Needs

The HRGIDD has identified possible NPS stormwater treatment projects that will be needed within the 20-yr planning period in addition to those described in this plan. They are the following:

- 415 W. Washington
- Bach School
- Slauson School
- U of M Properties
- Fingerle Lumber
- Miller Road – Newport to Chapin

b. Future Sanitary Flows

Documentation and projection future sanitary flows are not considered applicable for NPS stormwater improvement projects.

5. Future Environment without the Proposed Project

If the proposed work within this Plan is not undertaken, there is the likelihood that the environmental conditions will not improve and only worsen in the Huron River and along the connecting waterways. The reductions in sediment, nutrient, and bacteria inputs are a must to achieve the established TMDLs or risk the consequences they will continue to have on the environment.

Failure to substantially reduce *E. coli* colonies will likely result in continued Beneficial Use Impairments (BUI) for recreational activities downstream of the area. Without the proposed improvements, the existing problems associated with the lack of adequate stormwater management practices will continue to worsen. High frequency and large volume peak flows will increase, continually leading to more problems from nutrient loading, flooding, downstream thermal changes, and loss of aquatic habitat associated with sedimentation. As a result, recreational opportunities provided by the Huron River will continue to diminish and property owners will experience increased flooding conditions. The City and the WCWRC are being proactive in implementing highly visible BMPs on their properties. The City and WCWRC are setting an example and encouraging developers and property owners to incorporate BMPs into their plans for development and redevelopment.

E. Population Data

1. Existing and Projected Study Area Population

The following table provides the actual population from the 2010 Census, along with future projects provided by SEMCOG:

Table II-3: Existing and Projected Population in the City of Ann Arbor

Year	Population
2010 (actual Census)	113,934
2015	*115,382*
2020	*116,827*
2025	*117,929*
2030	*119,030*
2035	*121,408*
2040	*123,786*

Source: Source: 2010 Census Data for Southeast Michigan, SEMCOG website, accessed December 26, 2012. 2035 Forecast for Ann Arbor, SEMCOG website, accessed December 26, 2012

2. Current population served by existing facilities

Discussion of this item is not applicable for a NPS Project Plan.

3. Current and future population served by the proposed improvements

Discussion of this item is not applicable for a NPS Project Plan.

F. Status of Previously Noted NPS Projects

WCWRC and the City of Ann Arbor have been working to complete previously proposed projects. Since, 2005, the City has prepared five (5) Project Plans and Project Plan amendments, which included many projects. These projects are outlined on the following table:

Table II-4: Status of NPS Projects

Project	Status
2005 Project Plan:	
Doyle Park	Completed
2008 Project Plan:	
Pioneer High School	Completed
Miller Road	Under Construction
Farmer's Market	Included in 2013 Plan
Dexter Avenue – Maple to Fairview	Constructed (No SRF)
Dexter Avenue – Fairview to Huron	Constructed (No SRF)
Stadium Blvd – Pauline to Seventh	Completed
Stadium Blvd – Seventh to Main	Included in 2013 Plan
Stadium Blvd – Main to White	Kipke to White – Completed
	Main to Kipke – Included in 2013 Plan
2009 Project Plan:	
Stadium – Suffolk to Seventh	Completed
Stadium – Seventh to Kipke	Included in 2013 Plan
West Park	Completed
Madison – Seventh to Main	2013 4th Quarter Closing
Miller – Chapin to Main	Constructed (Mill and Fill, no SRF)

Veteran's Memorial Park	Not completed and no longer in planning stages
Sylvan Avenue	Completed
2010 Project Plan:	
Esch Avenue	On hold
Platt Road	On hold
Mallett's/Ellsworth Basin	On hold (unlikely to proceed)
Stone School Road Retrofits	2014 2nd Quarter Closing
South State Street	On hold (MDOT)
Swift Run MDOT Improvements	On hold (MDOT)
Burns Park Alley	Completed
Millers Creek Projects	On hold – Easements
Mallett's Creek – Chalmers to Huron Parkway	Completed
Mallett's Creek – S. Huron Parkway	Completed
Mallett's Creek – Platt/Manchester	Completed
Mallett's Creek – Packard to Outfall	Removed from List
Mallett's Creek – E/W Research Drive	Included in 2013 Plan
Mallett's Creek – Boardwalk/South State	Removed from List
Mallett's Creek – Eisenhower to Oakbrook	Included in 2013 Plan
Traver Creek – Barton Drive	Completed
Millers Creek Drainage District Establishment	Future (with project)
Tree Plantings	Underway
Cistern Installations and Downspout Disconnections	Underway
Lans Basin	Included in 2013 Plan
2011 Project Plan:	
Miller Road – Maple to Newport	Under construction
Willard Street	Completed
Stadium Road Bridges	Completed
Fourth Avenue – Huron to Liberty	2013 4th Quarter Closing
Stone School Road – Packard to I-94	Future Project
Seventh – Pauline to Madison	Completed (Mill and Fill, No SRF)
South Forest – Hill Street to University	2013 4th Quarter Closing
Springwater Subdivision	2014 2nd Quarter Closing
Detention Basin Retrofits	Briarwood – 2013 Plan
Compost Center	Not Needed
Dexter Ann Arbor Road – N. Maple to Revena	Completed
Madison – Seventh to Main	2013 4th Quarter Closing
Stadium – Hutchins to Kipke	Included in 2013 Plan
Leslie Park	Completed
Leslie Science Nature Center	Future Project

G. Environmental Setting

1. Cultural Resources

The City is committed to preserving and protecting historical sites. The historic preservation coordinator is qualified to assess historic properties and any adverse impacts relative to historic properties. This is especially important along Detroit Street which is located in a Historic District. WCWRC and the City will work closely with the City's Historic Society to preserve the nature of this area.

2. The Natural Environment

a. Climate

The climate will not be affected by the improvements recommended in this Plan

b. Air Quality

There are no major factors affecting air quality by the improvements recommended in this Plan.

c. Wetlands

There are wetlands within the Study Area and at several of the project locations according to the National Wetland Inventory and observations during field visits. Impacts may be necessary as part of the stormwater improvements. However, any proposed impacts will be compensated and/or reestablished. A MDEQ Joint Permit and City of Ann Arbor wetland permit will be submitted for all improvement projects fulfilling the requirements as identified in the regulations.

d. Coastal Zone

There are no coastal zones within the Study Area.

e. Floodplains

There are designated FEMA floodplains and floodways at several of the proposed improvement project locations. Any work within the 100-year floodplains and floodways will be performed in accordance with applicable regulations and per any specific conditions of the MDEQ Joint Permit. Compensatory site modifications will be components of all the improvement projects where a mapped floodplain/floodway is present.

f. Natural or Scenic Rivers

There are no natural or wild scenic rivers in the Study Area.

g. Major Surface Waters

There are several named watercourses, including Mallett's and Millers Creek, and the Huron River and numerous connecting drains where proposed improvements will be on or within close proximity. The proposed streambank stabilization improvements will all be within the existing channel. All the proposed improvements have the intention of improving water quality, and will be performed in accordance with applicable regulations and per any specific conditions of the MDEQ Joint Permit. No modifications will have an adverse effect on water quality or impede flow.

h. Recreational Facilities

There are numerous parks and open spaces located throughout the Study Area. One of the project locations is within Huron Hills Golf Course, which is owned by the City.

i. Topography

The topography varies throughout the Study Area from gentle and flat to fairly steep along some of the river courses. None of the proposed improvements will be affected by the topography. However, access to some of the streambank stabilization sites will require additional review during the design phase in order to protect the surrounding property due to the steep slopes.

j. Geology

The geology of the Study Area will not affect the choice of alternatives. The surficial geology of Washtenaw County is associated with deglaciation and deposition within the proglacial lake environment during the Wisconsinan Stage of the Pleistocene Series glacial episode. Subsurface glacial drift materials are expected to consist primarily of sands, gravels, and silts underlain by unsorted clayey till. Groundwater within the glacial drift reportedly occurs under unconfined conditions at shallow depths and under confined conditions at greater depths.

k. Soils

The soils within the Study Area vary significantly but can generally be classified as well-drained loamy texture glacial till, which exhibits moderate to moderately slow permeability. Prior to any formal design and construction, there must be soil samples taken at each site were infiltration BMPs are proposed.

l. Agricultural Resources

No agricultural resources are currently situated within the Study Area.

m. Fauna and Flora

Work within the Study Area will be limited to publicly owned land or easements, land within the public right-of-way or utility easements. There are no known impacts that will be occurring to any biotic species. In areas where improvements will be located within wetland or stream habitat, the project will incorporate reestablishment of the native species. Prior to any formal design and construction, there will be a field investigation at each site to ensure there is no impact on the existing biota.

n. Unique Features

There are no unique features identified within the Study Area that will be impacted by the proposed improvement project activities.

o. Existing Plant and Animal Communities:

The existing plant and animal species are typical to urbanized areas. No habitat for animals of economic or sport value is within the area. A review of protected species was also made in April 2013, using the U.S. Fish and Wildlife Service's website for Endangered Species Section 7(a)(2) Consultation Process (www.fws.gov/midwest/endangered/section7sppranges//index.html.) Endangered species listed as having a presence in Washtenaw County include the Indiana bat, Snuffbox mussel, Mitchell's satyr butterfly. Candidate species include the Eastern massasauga snake and Poweshiek skipperling butterfly. Threatened species includes the Eastern prairie fringed orchid plant.

The office of the Michigan Natural Features Inventory (MNFI), operated by the Michigan State University Extension, was also contacted and provided a list of Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features that may exist within 1.5 miles of any of the proposed project sites.

HRC reviewed this information and found that the proposed projects would have no long-term, negative impacts to any species. Since the proposed projects are designed to improve water quality and reduce impervious surfaces, the long-term impacts should result in improved habitat for any species present. Refer to the correspondence included in Appendix F for additional information.

Section III - Analysis of Alternatives

The BMP alternatives presented in this Plan were reviewed on a qualitative and quantitative basis. When applicable, the projects were compared against water quality benefits, infiltration capacity, land availability, compatibility with surrounding land uses, capital and OM&R costs, ease of implementation, and public educational opportunities. BMP load and removal efficiencies were calculated as the cost associated with removal of each pound or cubic foot of runoff of volume reduction over the lifespan of the BMP. Projects were based on opportunities previously outlined in local management plans or originally planned as City capital improvements, such as pending street reconstruction. Removal efficiencies were quantified for TSS, TP, *E. coli*, and stormwater volume.

During the site evaluation analysis, each location was considered for stormwater infiltration where feasible. This type of mitigation, when conditions are suitable, is extremely successful at removing TSS, TP, and *E. coli*. Each BMP location was evaluated against the NRCS soil data. The NRCS has categorized each soil class based on its capacity to infiltrate water as a function of the hydrologic and physical properties of the material. The classes are noted as Type A, B, C, or D, where the properties range from loose unconsolidated sands and gravels to heavy dense clay. Sites with Type A and B soils are most favorable for infiltration BMPs, where locations with Type C and D soils may be less favorable for infiltration. Additional design and engineering must be considered for proper BMP functionality and success when Type C and D soils are present. In addition, soil borings were taken at most project locations where infiltration could be considered. It was found that many locations in the Project Plan do not have soils which are conducive for infiltration.

A. General Alternatives Considered

Each of the sites, depending on the opportunities, was analyzed for water quality improvement alternatives, optimization of existing facilities, or no action. No regional alternatives were identified for the sites. This Plan evaluates possible alternatives to improve runoff and stormwater quality for specific locations within the Study Area. Therefore, all alternatives are site-specific and regional solutions are not applicable. Conceptual figures of the proposed BMPs are included in this section. Refer to Appendix G for the existing conditions site photos. Currently, there are four established TMDLs within the Study Area, all with the goal of improving water quality by reducing volume, sediment, nutrient, and bacteria inputs. The water quality issues have been explained to the public and they have spoken through the planning process with the WMP, MIP, and MRP. Within each document are action items to address the water quality concerns. This Plan is intended to serve as a conduit to help achieve those goals via the use of low interest funding, ultimately working to improve the health of the Huron River and its connecting waterways. This section has been broken down based on individual projects, with a project description, alternatives considered per project, pollutant removal, and a cost analysis. The basis of the cost analysis is included following the project descriptions.

1. Alternative 1 – No Action

If the City is to take no action and does not implement innovative stormwater improvements, then the existing water quality problems will not improve. Therefore, this is not a Principal Alternative.

2. Alternative 2a – Water Quality BMPs

As an alternative to "No action", water quality improvements as described below can be made on the various projects sites. This includes Water Quality BMPs, Optimization of Existing Facilities, and Streambank Stabilization. Water quality BMPs are being proposed at 12 locations within the Study Area. All of these sites provide an opportunity for retrofits to improve stormwater quality. Each site is listed with specific details on each of the BMPs. The BMPs considered in this Plan are:

a. Porous Pavement

Porous pavement is an infiltration technique that combines stormwater infiltration, storage, and structural pavement consisting of a permeable surface underlain by a storage reservoir. Porous pavement helps reduce the amount of impervious land area within the watershed, which is critical to infiltrating storm water runoff, therefore improving water quality, and reducing stream flow variability. Porous pavement has been considered in areas with existing impervious surfaces where soil conditions are conducive to infiltration.

b. Bioinfiltration/Infiltration Swales

Bioinfiltration areas are shallow surface depressions planted with specially selected native vegetation to capture and treat stormwater runoff. These areas allow the runoff to be infiltrated and filtered through the vegetation. Native vegetation is commonly used in these areas because it requires less maintenance and generally has deeper roots, which is more effective in facilitating infiltration and filtering pollutants. Bioinfiltration typically manages small drainage areas and are generally used in conjunction with other BMPs. Grassed infiltration swales are depressions in which stormwater runoff is collected following a rain or snow event. In this Plan, swales are proposed in the road right-of-way to collect and dispose of stormwater runoff, and to remove pollutants from stormwater through infiltration. Stormwater enters swales through cuts in the curb and infiltrates through the grass and soil.

c. Underground Pollutant Separation Structures

Pollutant separation structures are storm water management devices used to reduce NPS pollution. They are designed as flow-through structures with a settling or separation unit to remove sediment and other pollutants from the storm flow before moving downstream to the outfall. Periodic maintenance is needed to remove accumulated sediment.

d. HMA Pavement with Subsurface Stone Reservoir

For road projects, a typical HMA section will be used for the pavement surface. However, a stone reservoir will be used that will connect to a sand seam in order to store and filter runoff for treatment and possible infiltration. Open bottom catch basins will be used to convey the flows to the stone reservoir.

e. Infiltration Sewers

Infiltration sewers are perforated storm sewers that allow for infiltration. Manholes located on the infiltration sewers are fitted with a weir plate to allow time for the stormwater to infiltrate into the surrounding soils. All catch basins and manholes along the infiltration storm sewer will have sumps to capture accumulated sediment.

f. Oversized Storm Sewer/First Flush Storm Sewers

Oversized storm sewers are identical to infiltration sewers except that they are not perforated. These sewers are utilized in areas with soils not conducive to infiltration.

g. Tree Planting

Strategically placed, healthy trees can effectively reduce the amount of runoff and pollutant loading in receiving waters. Trees protect water quality by substantially reducing runoff during small rainfall events, which are responsible for the first flush runoff. According to the International Society of Arboriculture, a typical tree will intercept approximately 3,000 gallons of stormwater per year.

Water Quality BMP Installation Proposed for the Following Sites:

- Geddes Avenue (Arlington to Huron Parkway – Figures 11a and 11b) – This section of Geddes Avenue is in poor condition and is slated for complete reconstruction in 2015 in the City's CIP. This section of the roadway drains directly into the Huron River and has limited stormwater conveyance or treatment at this time. As part of the project, improvements will be made to allow for storm water treatment.

  A "first-flush storm sewer" could be sized to capture and detain the stormwater runoff (5,200 cf) from the first 0.5-in of rainfall (Figure 11a). All catch basins and manholes along this storm sewer will be designed to have sumps to capture accumulated sediment. Due to the limited ROW, the "first-flush storm sewer" will be placed underneath the roadway and it is likely that the roadway associated with this storm sewer will need to be replaced.

  As an alternative to the first flush storm sewer, the City could install a subsurface stone reservoir for stormwater storage, filtering, and treatment (Figure 11b), The stone reservoir would be sized appropriately for the first flush volume and storage would be in the voids prior going to the storm sewer system. This option would need to be reviewed during final design with respect to utility locations.

  Due to the steep grades along the road way, a stepped detention system will be required, regardless of the method used, with weirs provided to surcharge the system and provide storage in oversized pipes. There is a high point in the roadway located at approximately 300 lft west of Heatherway Street. The slopes to the west are 2.6% and there is approximately 1000' from this high point to Arlington Drive. Due to the existing grades, limited space, and lack of a viable outlet, it is unlikely that any storm sewer outlet treatment can be completed at this end. To the east, the slopes are in excess of 7% in some areas. Two alternatives were reviewed, one to connect to the existing storm sewer system and one to construct a new outlet to the river. While the connection to the existing storm sewer would be preferred, this may not be feasible due to grades. Therefore, the selected alternative may require a new outfall to the river. Easements and permits may be necessary to construct this outlet.

  Detention of the first flush and a small portion of the bankfull volume will help improve watershed hydrology and downstream conditions by reducing peak flows, particularly those that result in streambank erosion. The proposed improvement would mitigate stormwater runoff from approximately 1.8-ac of contributing area. This is a Principal Alternative.

  Other alternatives, such as bioinfiltration or porous pavement, have been considered. However, due to the narrow right-of-way, private property issues, traffic volumes, and steep slopes along the road corridor, they are not viable alternatives for NPS pollution management.

Total Preliminary Costs	$2,720,000
Present Worth of Analysis	$2,050,000

  Direct, Indirect, and Irreversible Impacts

  This proposed project will provide stormwater management retrofits as part of a road reconstruction project. Adverse environmental impacts are expected to be minimal. All construction activities will take place within the Geddes Road right-of-way. This project site is no located in or near known floodways, floodplains, or wetlands. The project is

located within a wooded area. However, all improvements are proposed within the current footprint of the roadway.

There is limited anticipated tree removal and no anticipated adverse effects on endangered species or historical, cultural resources.

Based on the final design, an outlet to the river may need to be constructed for this area. If this is the case, all necessary easements and permits will be secured.

Due to the limited right-of-way, there will be traffic disruptions and inconveniences for people living in the area during construction. These disruptions will be temporary during construction and will be communicated through project signage.

Figure 11a

Proposed Stormwater Improvements

Geddes Road - First Flush
Storm Sewer

HRGIDD 2013 Project Plan

Restoration Activities

- Pollutant Seperator
- Storm Manhole
- Storm Sewer
- First Flush Storm Sewer
- Parcels

N E S W

1 inch = 150 feet

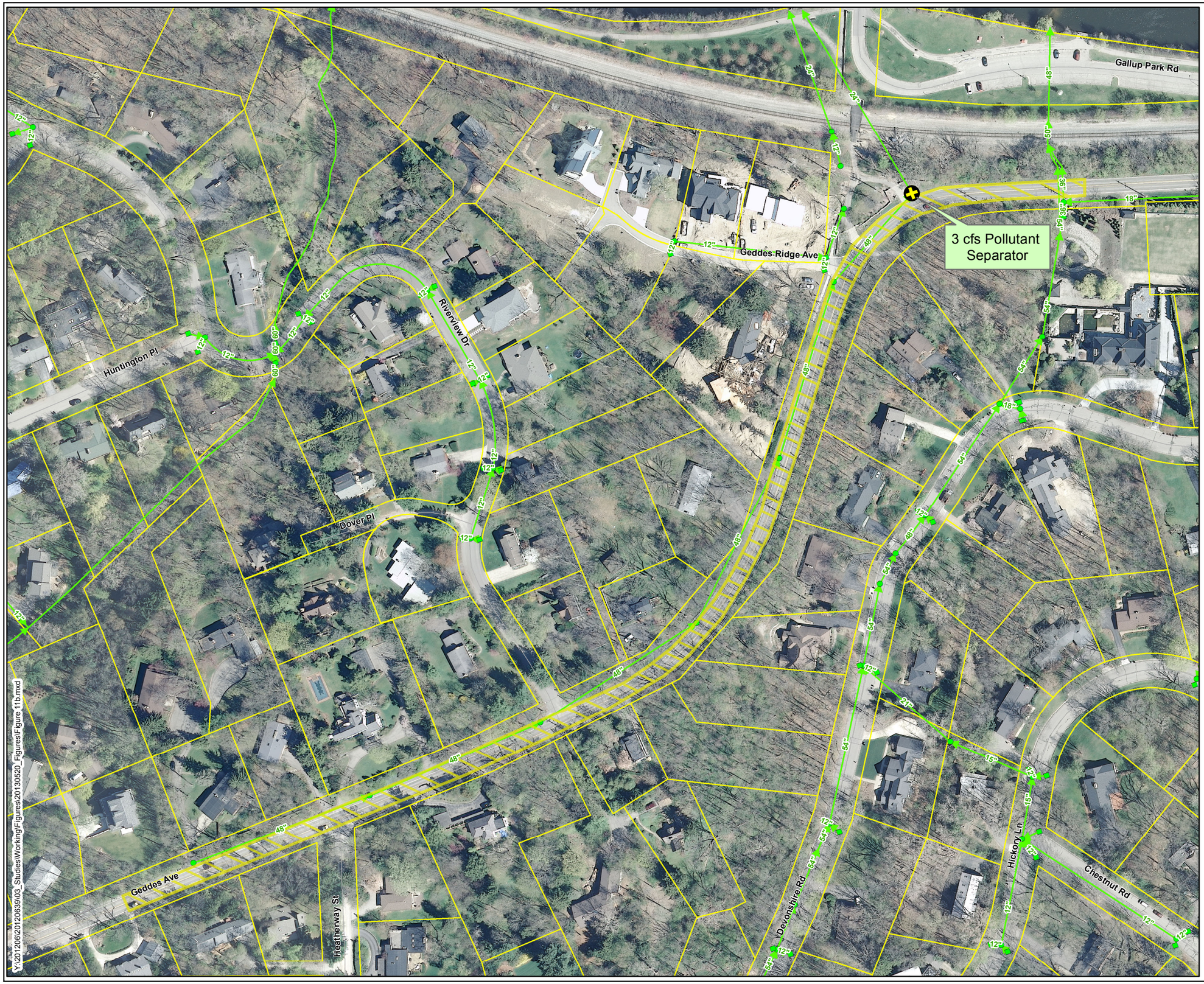
HRC

Figure 11b

Proposed Stormwater Improvements

Geddes Road - Subsurface Stone Reservoir

HRGIDD 2013 Project Plan



Restoration Activities

- Pollutant Seperator
- HMA Section with Subsurface Stone Reservoir
- Storm Manhole
- Storm Sewer
- Parcels

N W E S

1 inch = 150 feet

HRC

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- Detroit Street (Catherine to Division, Figures 12a and 12b) – Detroit Street is an older, brick street that is in deteriorating condition located within the Allen Creek subwatershed with a portion that outlets directly to the Huron River. The road needs to be replaced at this time. However, due to its location in a Historic District, replacement of the roads is a sensitive subject and must keep with the historic feel of the area. The roadway will be replaced with bricks that keep with the historic nature of the street. This project is located within the Old Fourth Ward Historic District in the City. The City will work with members of the Historical Society to assure that the final project design is acceptable.

  Based on the soil boring information in the area, the soils are not ideal for infiltration. While the boring at the north end of the street showed some sandy gravel, the boring was not able to be completed and the sandy gravel was at a shallow depth. The boring at the south end of the street indicated that the soil is primarily clay which is not a viable option for infiltration. Based on the soils, traffic loads, and need to maintain the historic feel of the area, porous pavement was not considered at this location. Furthermore, due to the limited right-of-way, other stormwater BMPs such as rain gardens or bioswales could not be considered.

  The existing storm sewer for this roadway outlets to the existing storm pipe at the intersection of Detroit and High Street. A two (2') diameter first flush storm sewer, with a pollutant separator at the downstream end, can be constructed to capture the stormwater runoff (2,715 cf) from the first 0.5-in of rainfall (See Figure 12a). This is the largest storm sewer that can be designed in this area, and while it can handle slightly more than the first flush volume, bank full volume cannot be accommodated. HRC evaluated this alternative and determined that to handle the bankfull volume, larger storm sewer would be required. Based on the depth of this outletting storm sewer and the cross section for the roadway, in order to provide appropriate cover, this alternative is not feasible. The proposed storm sewer will only pick up stormwater from the project site and will not handle any upstream flow.

  As an alternative, the City may consider a brick paver section with a stone reservoir for stormwater storage, filtering, and treatment (see Figure 12b). The stone reservoir would be sized appropriately for the first flush volume and storage would be in the voids prior to discharging to the storm sewer system. If site conditions find sand below the depth discussed above, infiltration will be used.

  Detention of the first flush will help improve watershed hydrology and downstream conditions by reducing peak flows, particularly those that result in streambank erosion. The proposed improvement would mitigate stormwater runoff from approximately 1.27-ac of contributing area. This is a Principal Alternative.

  Other alternatives, such as bioinfiltration or porous pavement, have been reviewed. However, due to the soil conditions, infiltration is not an ideal alternative. In addition, the porous brick paver options may not meet the historic criteria necessary in the area. Therefore, these are not viable alternatives for NPS pollution management.

Total Preliminary Costs	$1,090,000
Present Worth of Analysis	$824,000

Direct, Indirect, and Irreversible Impacts

The proposed retrofits along Detroit Street to improve the road surface and incorporate stormwater managements BMPs will be incorporated into the overall road reconstruction project. Adverse environmental impacts are expected to be minimal. All construction activities will take place in the Detroit Road right-of-way. This project site is not located in or near known floodways, floodplains, or wetlands.

There is no anticipated tree removal or adverse effects on endangered species. The street is located within the Old Fourth Ward Historic District of the City of Ann Arbor. The brick roadway will be replaced with an appropriate brick to match the historic characteristics of the area. The City will work with the historic district in order to assure that this is acceptable.

There will be traffic disruptions, detours, and limits to the on-street parking during construction and may be impacts to pedestrian facilities. These disruptions will be temporary and will be communicated through project signage, website updates and stakeholder e-mails.

Figure 12a

Proposed Stormwater Improvements

Detroit Street - First Flush Storm Sewer

HRGIDD 2013 Project Plan

2 cfs Pollutant Separator

Remove and Replace Brick Pavers

First Flush Storm Sewer

Remove and Replace Brick Pavers

804.96
799.3

Restoration Activities

- Pollutant Separator
- Storm Catch Basin
- Storm Manhole
- Storm Sewer
- Proposed 24" Storm Sewer
- Remove and replace brick pavers
- Parcels

N W E S

1 inch = 125 feet

HRC

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Figure 12b

Proposed Stormwater Improvements

Detroit Street - Subsurface Stone Reservoir

HRGIDD 2013 Project Plan

2 cfs Pollutant Separator

Remove and Replace Brick Pavers

Remove and Replace Brick Pavers

804.96
799.3

Restoration Activities

- Pollutant Separator
- Storm Catch Basin
- Storm Manhole
- Storm Sewer
- Remove and replace brick pavers with Subsurface Stone Reservoir
- Parcels

N
W
E
S

1 inch = 125 feet

HRC

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- Farmers Market Parking Lot (Figures 13a and 13b) – The Farmers Market Parking Lot is in poor condition and needs replacement. This project is located within the Allen Creek subwatershed in downtown Ann Arbor. The area is currently asphalt with no stormwater storage or treatment. Based on the current site conditions, there is limited space for water quality improvements.

  The existing storm sewer for this site outlets to the existing storm pipe along N. Fourth Avenue. A "first-flush storm sewer" (Figure 13a) would be sized to capture and detain the stormwater runoff (3,000 cf) from the first 0.5-in of rainfall. All catch basins and manholes associated with this storm sewer would have sumps to capture accumulated sediment. A pollutant separator will be installed at the outlet. While the proposed storm sewer is sized slightly greater than the first flush volume, this is the largest size that is feasible while still matching the downstream invert and providing appropriate cover. As an alternative, the City may consider a standard HMA section with a stone reservoir for stormwater storage, filtering and treatment (See Figure 13b). The stone reservoir would be sized appropriately for the first flush volume and storage would be in the voids prior going to the storm sewer system. Preliminary soil borings showed a small sand seam that may be able to be tied into for infiltration opportunities. The other utilities in the area would need to be reviewed prior selecting one of these alternatives.

  Detention of the first flush through either a first flush storm sewer or underground stone storage reservoir will help improve watershed hydrology and downstream conditions by reducing peak flows, particularly those that result in streambank erosion. The proposed improvement would mitigate stormwater runoff from approximately 1.72-ac of contributing area. Storage of the first flush in either a storm sewer or stone reservoir is a Principal Alternative.

  Other alternatives, such as porous pavement, could have been considered. However, due to the heavy truck traffic and less than ideal soil conditions, this is not a viable alternative for NPS pollution management.

Total Preliminary Costs	$700,000
Present Worth of Analysis	$530,000

  Direct, Indirect, and Irreversible Impacts

  The proposed retrofits to the Farmers Market Parking lot are to improve the parking lot surface, increase the parking area, and incorporate stormwater managements BMPs. Adverse environmental impacts are expected to be minimal. All construction activities will take place within the current Farmers Market area. This project site is not located in or near known floodways, floodplains, or wetlands.

  There is no anticipated tree removal or adverse effects on endangered species. The street is located within the Old Fourth Ward Historic District of the City of Ann Arbor. WCWRC will work with the Ann Arbor Historic District Commission to maintain the historic nature of this project. During construction, the Farmer's Market (which operates year round) will be impacted and will likely have to be temporarily moved to another site.

  There will be traffic disruptions and limits to the parking during construction and there may also be impacts to pedestrian facilities. These disruptions will be temporary and will be communicated through project signage. There will also be disruptions to the Farmers Market operations during the construction project. WCWRC and the City of Ann Arbor will work with the Public Market Advisory Commission to develop a construction schedule, likely including night work, to minimize disruptions.

- Street Tree Planting (Throughout the City) – As stated above, tree planting can be used to reduce runoff and pollutant loading. As part of the City's extensive tree replacement and enhancement program, the HRGIDD seeks to supplement that program with the installation of approximately 750 trees annually for 5 years. The trees will be planted along road corridors and on public property to enhance stormwater interception, infiltration, and transpiration. Structural soil will be incorporated as needed for healthy tree growth. These tree plantings will take place in all subwatersheds located within the City. Some areas where trees are dead or diseased will be replanted with new trees. The costs below include the costs for removal of stumps and/or trees. This is a Principal Alternative.

  Healthy trees can reduce the amount of runoff and pollutant loading in receiving waters. Trees protect water quality by substantially reducing run off during small rainfall events, which are responsible for the first flush runoff. The amount of rainfall that trees intercept depend on the species, age of tree, rainfall patterns, and the climate. According to the International Society of Aboriculture, a typical tree will remove approximately 3,000 gallons of storm water per year.

Total Preliminary Costs	$2,070,000
Present Worth of Analysis	$1,725,000

  Direct, Indirect, and Irreversible Impacts

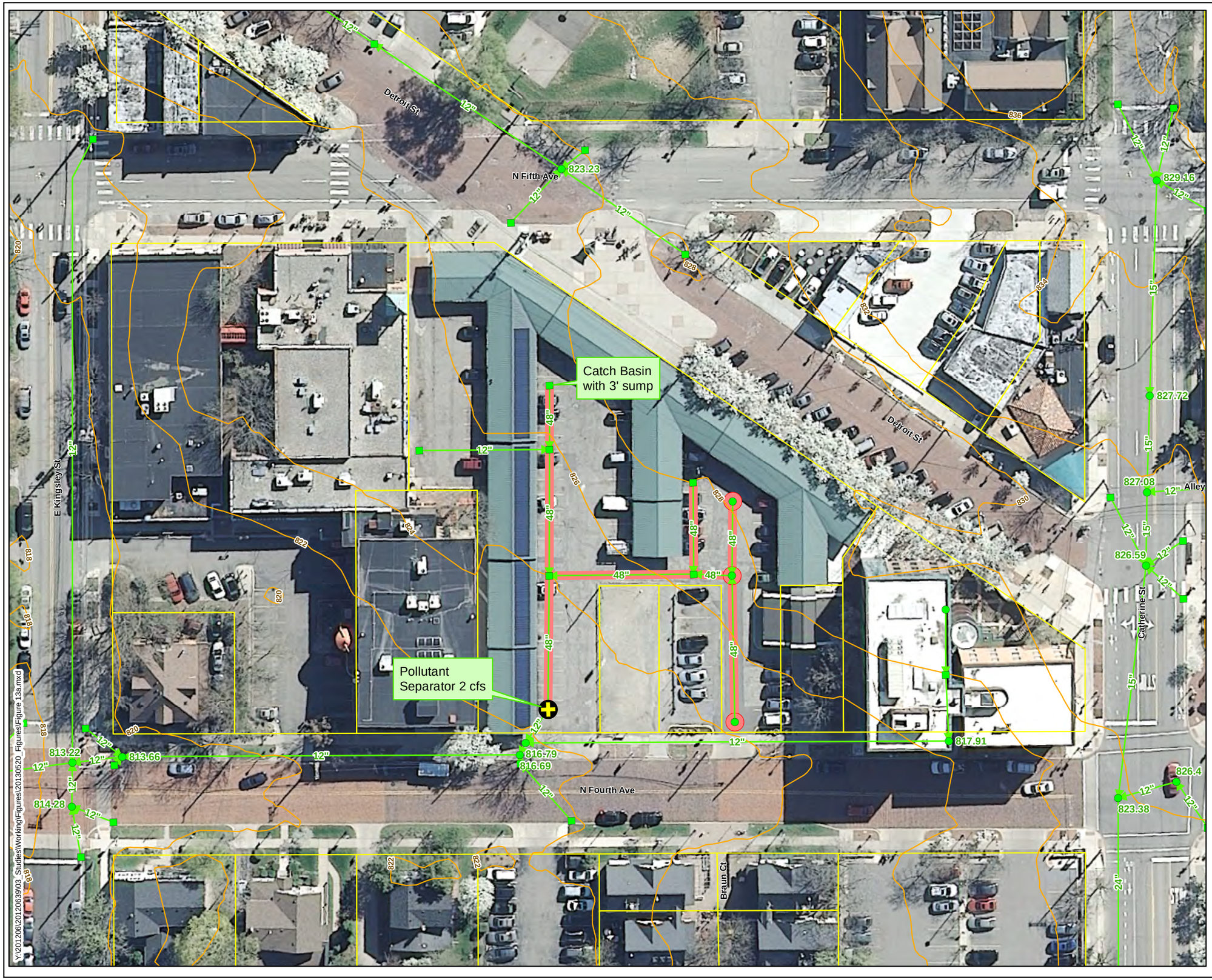
  This project involves planting new trees along road corridors and on public property. There is no anticipated construction work. Therefore, no environmental impacts are expected.

Figure 13a

Proposed Stormwater Improvements

Farmers Market - First Flush
Storm Sewer

HRGIDD 2013 Project Plan



Legend

- Storm Catch Basin
- Storm Sewer MH w/ invert elevation
- Existing Storm Sewer w/ Diameter
- Pollutant Separation w/ First Flush
- Proposed Storm MH
- Proposed 48" Storm Sewer
- Parcels

N E S W

1 inch = 50 feet

HRC

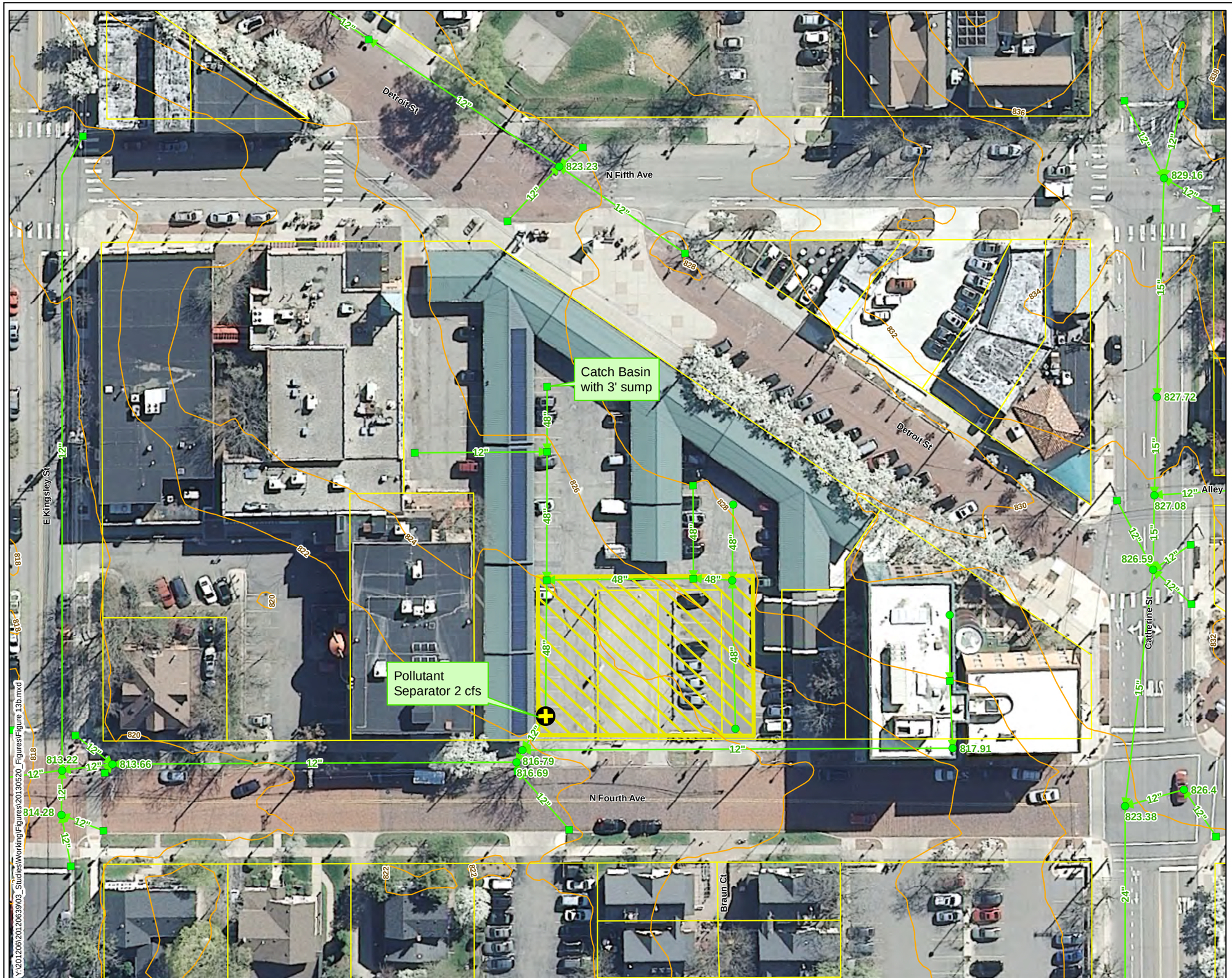


Figure 13b

Proposed Stormwater Improvements

Farmers Market - Subsurface Stone Reservoir

HRGIDD 2013 Project Plan

Legend

- Storm Catch Basin
- Storm Sewer MH w/ invert elevation
- Existing Storm Sewer w/ Diameter
- Pollutant Separation w/ First Flush
- Subsurface Stone Reservoir with HMA
- Parcels

N E S W

1 inch = 50 feet

HRC

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- State Street (Eisenhower to south of I-94 – Figure 14) – The location is directly off of I-94 in an area where many visitors first enter Ann Arbor. The City wishes to make this area a more attractive and inviting "gateway" into the City. In addition, the road surface is past its useful lifespan and is in need of repair. The project is located within the Mallett's Creek subwatershed and is currently scheduled for construction in 2015.

  The existing concrete islands which separate northbound and southbound traffic will be replaced with infiltration swales. The construction will include excavation to the existing sand seam (approximately 4.5-6.5' below the surface) and connecting the swales to this seam in order to encourage infiltration. Depending on the soils encountered, a subsurface stone reservoir may be constructed to facilitate storage of stormwater. The swales will be connected to the sand seam via a system of infiltration catch basins. This system will be designed to handle the "first-flush" storm volume from the roadway. In addition, any catch basins and manholes necessary will have sumps to capture accumulated sediment. These infiltration beds will be designed to handle approximately 21,200 cf from the first 0.5-in of runoff. By placing these basins, approximately 157,900 sf of impervious areas will be removed as the concrete islands will be replaced with pervious improvements. In additional, tree plantings with structural soil will be used in these areas. No pavement replacement will be required as part of this work due to the work taking place within island areas.

  Detention of the first flush will help improve watershed hydrology and downstream conditions by reducing peak flows, particularly those that result in streambank erosion. The proposed improvement would mitigate stormwater runoff from approximately 12.2-ac of contributing area roadway. In addition, 3.6-ac of currently impervious area would removed and restored to a greenbelt area. This project is considered a Principal Alternative.

  Other alternates such as porous pavement were not considered due to the heavy traffic and maintenance concerns. A full width subsurface stone reservoir was not considered due to the likelihood of utilities in the area.

Total Preliminary Costs	$1,060,000
Present Worth of Analysis	$801,000

  Direct, Indirect, and Irreversible Impacts

  The proposed retrofits along State Street to improve the road surface and incorporate stormwater managements BMPs will be incorporated into the overall road reconstruction project. Adverse environmental impacts are expected to be minimal. All construction activities will take place in the State Street right-of-way. There are several areas where the Mallett's Creek crosses State Street in the project area. Appropriate permits for the floodplains associated with these crossings will be procured during the design process.

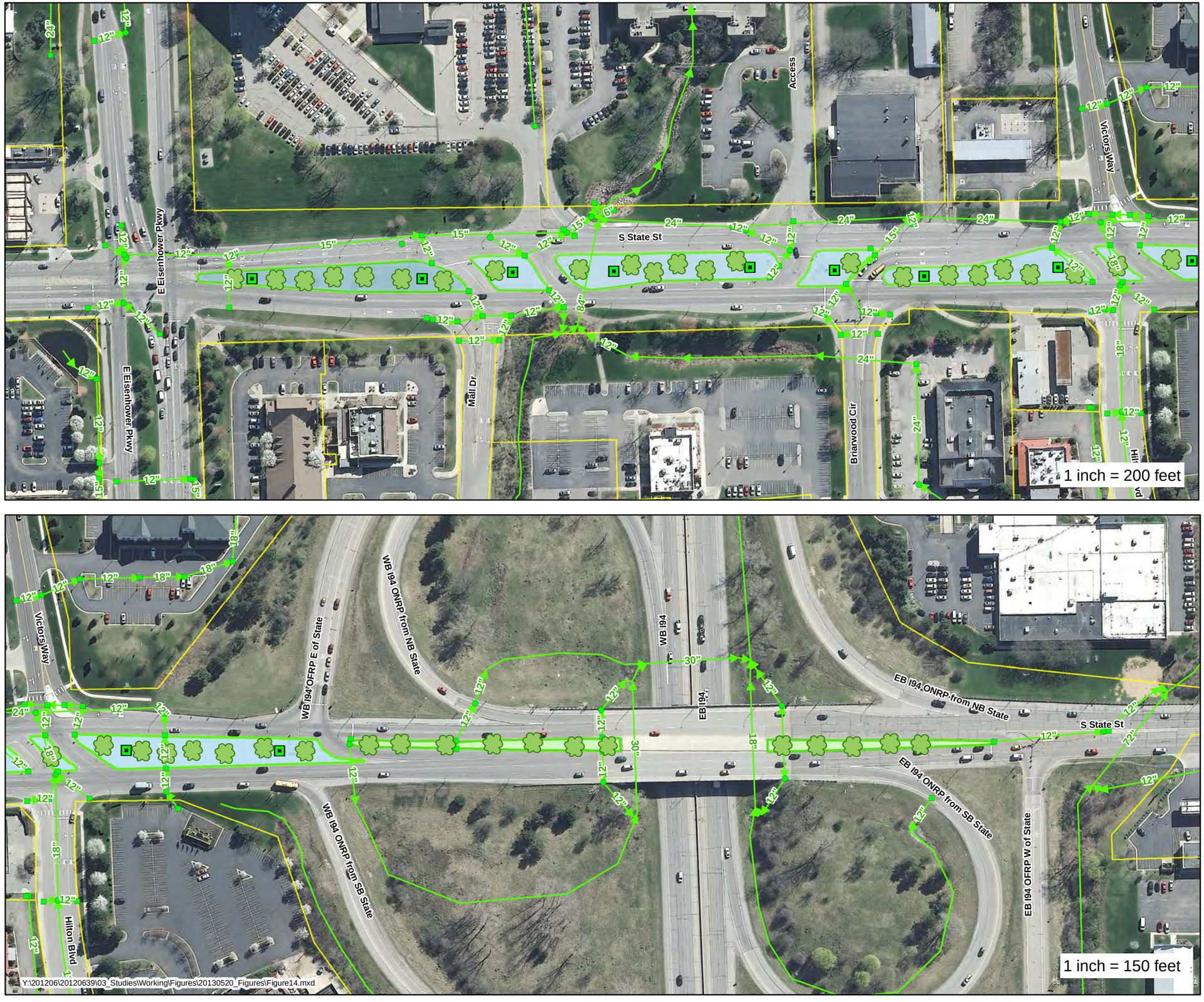
  There is no anticipated tree removal or adverse effects on endangered species. There will be traffic disruptions and limits to the pedestrian facilities during construction. These disruptions will be temporary and will be communicated through project signage, website updates, and stakeholder e-mails.

Figure 14

Proposed Stormwater Improvements

South State Street

HRGIDD 2013 Project Plan



Restoration Activities

- Trees with Structural Soil
- 96" Infiltration CB w/ 4-6' Sump
- Storm_Catchbasin
- Storm Manhole
- Storm Sewer
- Restore to Greenbelt
- Restore to Greenbelt w/ 1-2' deep swales
- Parcels

N E S W

HRC

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- Scio Church (Main Street to east of Seventh Street – Figure 15) – This location is bordered by Ann Arbor public schools property and residential areas. It is located within the Mallett's Creek subwatershed. The road surface is past its useful lifespan and is need of repair. Currently, this project is scheduled for 2015 construction. The area has poor soils which will limit the ability for infiltration projects.

  A "first-flush storm sewer" and would be sized to handle the first 0.5 inches of rain from the site. In addition the storm sewer will be designed to detain a portion of the bankfull volume. However, due to poor soil conditions and the lack of ability to infiltrate, the storm sewer would need to be quite large to detain the entire bankfull volume. The size of the storm sewer that can be installed is dictated by the existing inverts of the downstream storm sewers. Pollutant separators will be used at the outlets to the treat the stormwater prior to outletting into the existing storm sewer.

  Detention of the first flush will help improve watershed hydrology and downstream conditions by reducing peak flows, particularly those that result in streambank erosion. The proposed improvement would mitigate stormwater runoff from approximately 7.25-ac of contributing area roadway. Due to the location of the storm sewer down the center of the roadway, the entire road will likely need to be replaced. This project is considered a Principal Alternative.

  Other alternates such as porous pavement were not considered due to the heavy traffic and maintenance concerns. Infiltration type projects were not considered due to the soil conditions. The City also considered a standard HMA section with a subsurface stone reservoir as called out in other projects herein. However, due to the groundwater conditions, this was not considered a viable alternative.

Total Preliminary Costs	$3,860,000
Present Worth of Analysis	$2,908,000

  Direct, Indirect, and Irreversible Impacts

  This proposed project will provide stormwater management retrofits as part of a road reconstruction project. Adverse environmental impacts are expected to be minimal. All construction activities will take place within the Scio Church Road right-of-way. This project site is no located in or near known floodways, floodplains, or wetlands.

  There is no anticipated tree removal or adverse effects on endangered species or historical, cultural resources.

  There will be traffic disruptions and inconveniences for people living in the area during construction. It is likely that pedestrian traffic will be impacted during construction. This will be routed around the site for safety. These disruptions will be temporary during construction and will be communicated through project signage.

Figure 15

Proposed Stormwater Improvements

Scio Church Road

HRGIDD 2013 Project Plan

Restoration Activities

- Pollutant Separator
- Storm Catch Basin
- Storm Manhole
- Storm Sewer
- First Flush Sewer
- Parcels

N
W E
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1 inch = 200 feet

HRC

- Stadium (Hutchins to Kipke – Figures 16a and 16b) – This project was included in the 2011 Project Plan amendment. The project is similar to the previously proposed project. The location is bordered by U-M campus, residential property, and Ann Arbor public schools property. It is located within the Allen Creek and Mallett's Creek subwatersheds. The road surface is past its useful lifespan and is in need of repair. Currently, this project is scheduled for 2015 construction.

  Porous pavement was considered for this site. Soil conditions in the area are less conducive to infiltration. However, by filtering the stormwater through the porous pavement section, additional storm water quality benefits can be realized prior to connecting to the storm sewer system. Furthermore, storage time in the storage reservoir can help to decrease peak flows from the area. A three (3') deep stone reservoir will be used for storage and will provide approximately 27,000 cft of storage. As an alternative, the City may consider a standard HMA section with a stone reservoir for stormwater storage, filtering and treatment. The stone reservoir would be sized appropriately for the first flush and bankfull volume storage in the voids before going to the storm sewer system. Figure 16a shows the options of porous pavement and/or a subsurface stone reservoir for storage.

  As an alternative to this, a "first-flush storm sewer" could be sized and constructed to capture and detain the stormwater runoff (3,300 cf) from the first 0.5-in of rainfall. All catch basins and manholes along this storm sewer would have sumps to capture accumulated sediment. This is shown on Figure 16b.

  Detention of the first flush through either a first flush storm sewer or a porous pavement/subsurface stone reservoir will help improve watershed hydrology and downstream conditions by reducing peak flows, particularly those that result in streambank erosion. It is likely that due to the utilities in the road right-of-way, the first flush storm sewer will be the preferred solution. However, this will be verified during final design. The proposed improvement would mitigate stormwater runoff from approximately 2-ac of contributing area. In addition, trees with structural soil would be planted along the Pioneer High School property, which would also reduce the amount of runoff. This is a Principal Alternative.

  Other alternatives, such as bioinfiltration, could have been considered. However, due to the narrow right-of-way, private property issues, traffic volumes, and steep slopes along the road corridor, they are not viable alternatives for NPS pollution management.

  Alternate B – First Flush Storm Sewer

Total Preliminary Costs	$1,640,000
Present Worth of Analysis	$1,242,000

  Direct, Indirect, and Irreversible Impacts

  The proposed retrofits along Stadium Boulevard are to incorporate BMPs (first flush storm sewer and tree planting or porous/HMA pavement with stone reservoir) into a road reconstruction project. Adverse environmental impacts are expected to be minimal. All construction activities will take place within the Stadium Boulevard right-of-way. The site is not located in or near known floodways, floodplains, wetlands or other sensitive features.

  There is no anticipated tree removal or adverse effects on the endangered species or historical cultural resources.

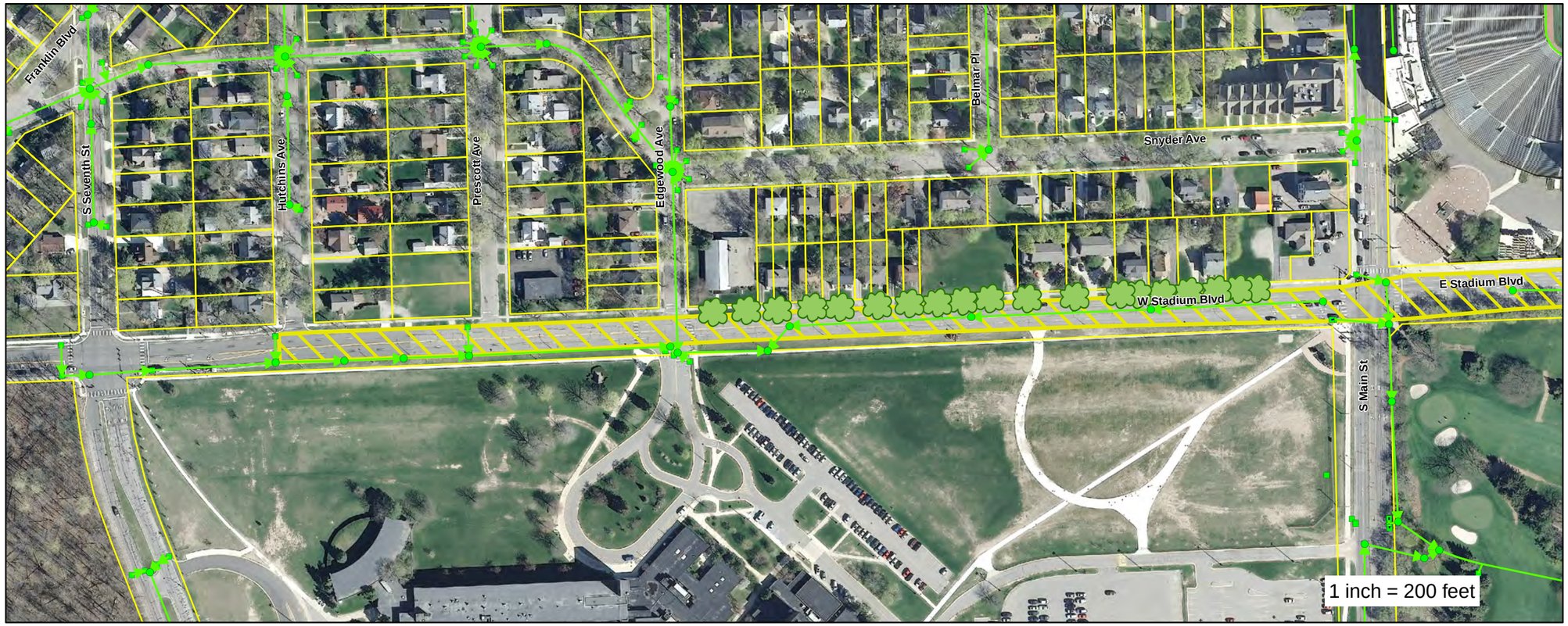
There may be disruptions to road traffic or limits on parking usage during construction. Additionally, this project is near the University of Michigan campus and Pioneer High School. Pedestrian traffic may be temporarily routed around the site for safety. These disruptions will be temporary and will be communicated through project signage.

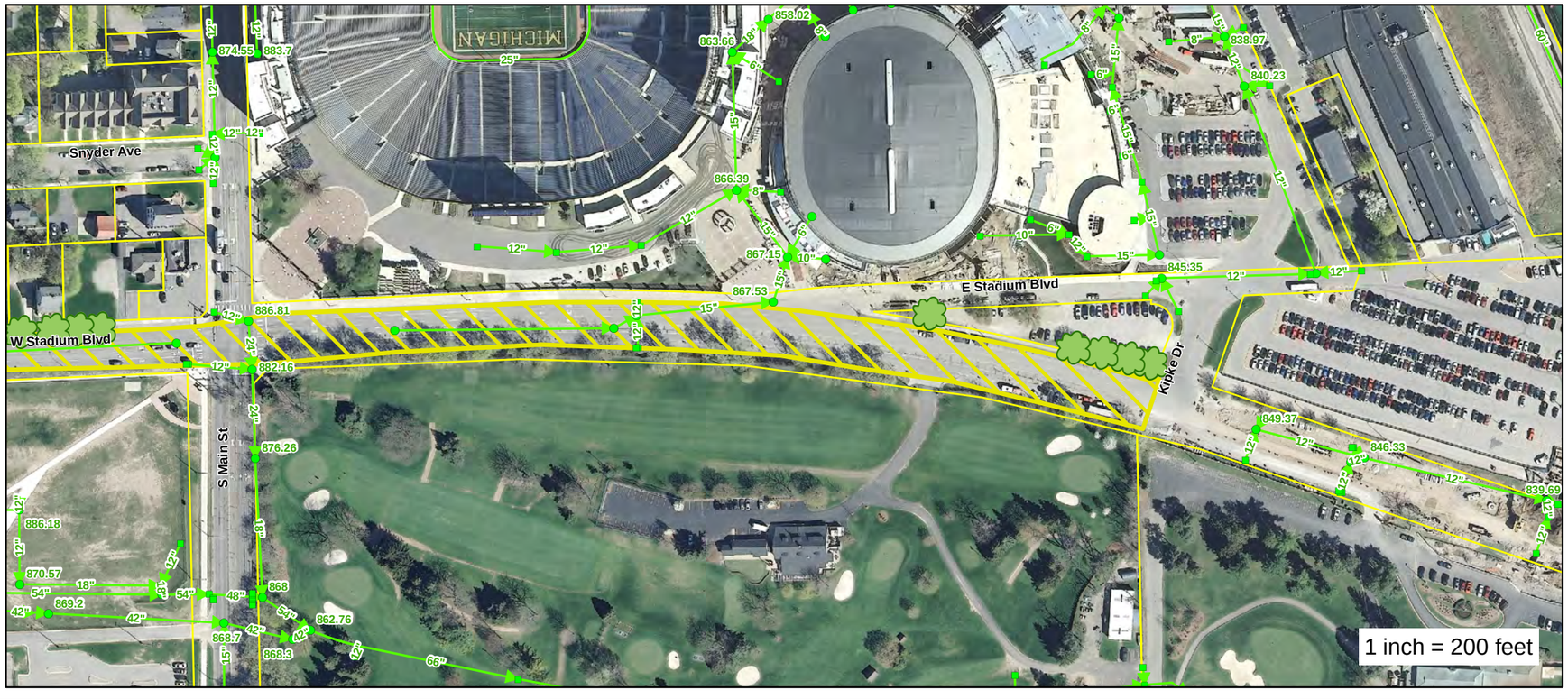
Figure 16a

Proposed Stormwater Improvements

Stadium Blvd. (Hutchins to Kipke)
Alternate A - Porous Pavement and/or Subsurface Stone Reservoir

HRGIDD 2013 Project Plan





Restoration Activities

- Trees with Structural Soil
- Storm_Catchbasin
- Storm Manhole
- Storm Sewer
- Porous Asphalt / HMA Section with Stone Reservoir
- Parcels

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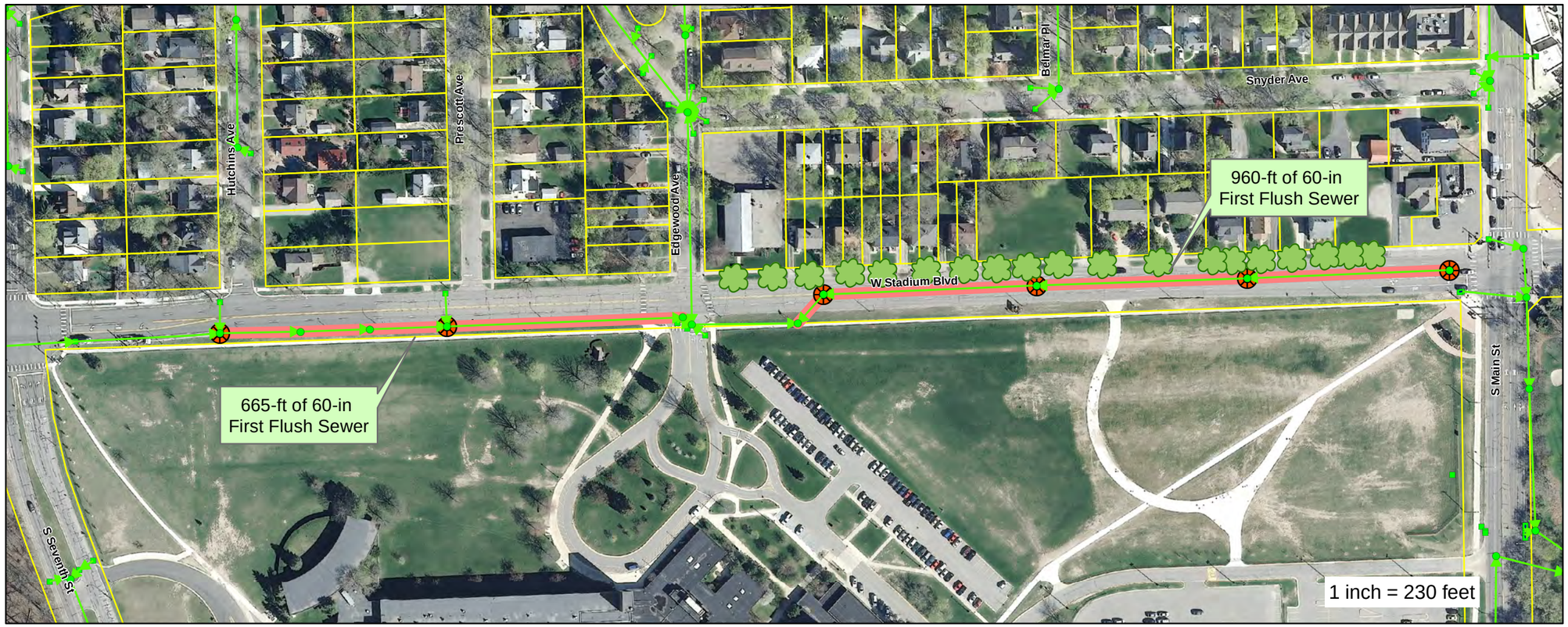
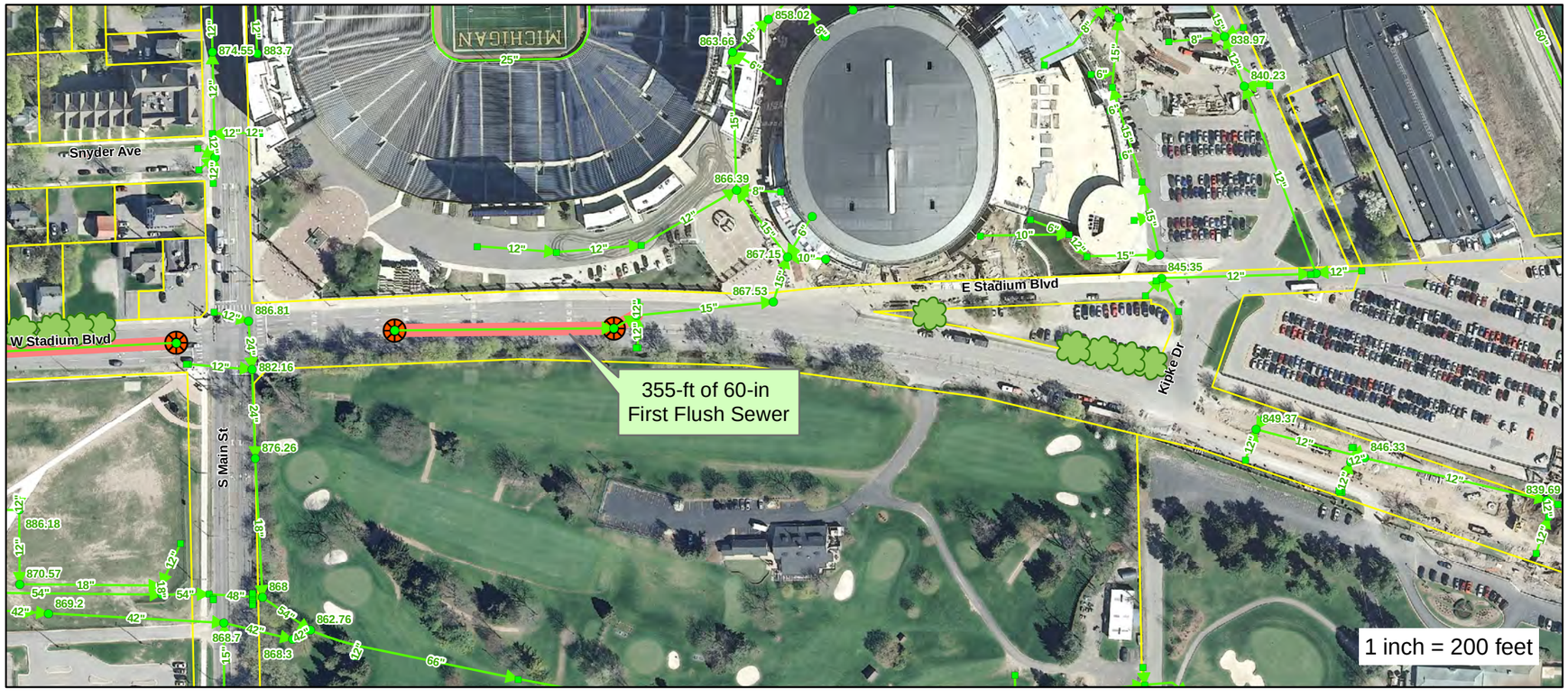
Figure 16b

Proposed Stormwater Improvements

Stadium Blvd. (Hutchins to Kipke)
Alternate B - First Flush Storm Sewer

HRGIDD 2013 Project Plan





Restoration Activities

- Trees with Structural Soil
- Storm_Catchbasin
- Storm Manhole
- Storm Sewer
- First Flush Structure w/ Infiltration Sump
- First Flush Sewer
- Parcels

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- 721 N. Main (Figure 17) – 721 N. Main Street is the former site of the City's DPW site. The site is still owned by the City and the building on site is still used for storage. The site is located within the Allen Creek subwatershed, and an enclosed portion of Allen Creek runs underneath the site. The entire site is located in the floodplain, with a large portion located within the floodway. The City previously received a Hazard Mitigation Grant from the Federal Emergency Management Agency (FEMA) to remove several of the ancillary buildings that were located in the floodway. The current site is completely paved. Improvements to the site in order to provide flood protection and storm water quality improvements are proposed, including the construction of a stormwater wetland near the center of the site with planting beds and other stormwater quality improvements.

  The proposed project will remove approximately 2.5 acres of impervious area and create a wetland area for the treatment of stormwater. This wetland will remove sediment and provide treatment for the removal of other nutrients from upstream areas.

  Furthermore, this property is located within the floodplain and a portion of this is located within the floodway. This project will remove structures and parking from the floodway and floodplain, and create a park area with walking trails and native plantings

Total Preliminary Costs	$1,760,000
Present Worth of Analysis	$1,228,000

  Direct, Indirect, and Irreversible Impacts

  This proposed project will provide stormwater management retrofits on a site located within the within the floodplain. This will include reduction the amount of pavement. Adverse environmental impacts are expected to be minimal. All construction activities will take place within the City owned property and no easements are necessary.

  As discussed above, the entire site is located within the regulated floodplain, with a large portion located within the floodway. All required MDEQ permits will be procured prior to the start of work on the site.

  There is no anticipated tree removal or adverse effects on endangered species or historical, cultural resources.

  There may be traffic disruptions on Main Street and inconveniences for people living in the area during construction. However, because this work is anticipated to take place primarily on the site, these disruptions will be minimal. These disruptions will be temporary during construction and will be communicated through project signage. City operations at the site may be limited during construction.

Figure 17 - 721 N. Main Street

- S. Seventh Street (Scio Church to Greenview – Figures 18a and 18b) – This project includes reworking the right-of-way of S. Seventh Street in the area described. This project is located within the Mallett's Creek subwatershed and is a residential street. Currently the street is overly wide for a residential right-of-way as it was originally meant to be an arterial street. By narrowing the roadway (road diet) approximately 10' over the 875' length, 8,750 square feet of pavement can be removed and turned back into a greenbelt area. The soil borings in this area identify primarily clay soils which do not lend themselves well to infiltration type projects.

  As this is a residential street, porous pavement was considered. Soil conditions in the area are less conducive to infiltration. However, by filtering the stormwater through the porous pavement section, additional storm water quality benefits can be realized prior to connecting to the storm sewer system. Furthermore, storage time in the storage reservoir can help to decrease peak flows from the area. A three (3') deep stone reservoir will be used for storage and will provide approximately 15,750 cft of storage. As an alternative, the City may consider a standard HMA section with a stone reservoir for stormwater storage, filtering and treatment. The stone reservoir would be sized appropriately for the first flush and bankfull volume storage in the voids before going to the storm sewer system. Figure 18a shows the options of porous pavement and/or a subsurface stone reservoir for storage.

  As a second alternative, as shown on Figure 18b, a "first-flush storm sewer" could be sized to capture and detain the stormwater runoff (~3,300 cf) from the first 0.5-in of rainfall. All catch basins and manholes along this storm sewer would have sumps to capture accumulated sediment. In addition hydronomic separation would be used at the outlet to the existing storm sewer system. Due to the constraints of the elevation of the existing outlet, the storm sewer cannot be upsized to include additional storage.

  Detention of the first flush and additional flow through the installation of porous pavement will help improve watershed hydrology and downstream conditions by reducing peak flows, particularly those that result in streambank erosion. The proposed improvement would mitigate stormwater runoff from approximately 1.9-ac of contributing area roadway. In addition, 0.2-ac of currently impervious area would removed and restored to a greenbelt area. Porous pavement and/or a subsurface stone reservoir on this project is considered a Principal Alternative.

  Other alternatives, such as bioinfiltration, could have been considered. However, due to the maintenance concerns along of the City, and the aesthetics of the residential street, they are not viable alternatives for NPS pollution management. In addition, consideration was given to converting the road into a boulevard section. However, the capital costs long term maintenance costs associated with this option made it more expensive that the road diet proposed herein.

  Alternate A – Porous Pavement and/or Subsurface Stone Reservoir

Total Preliminary Costs	$840,000
Present Worth of Analysis	$645,000

  Direct, Indirect, and Irreversible Impacts

  This proposed project will provide stormwater management retrofits as part of a road reconstruction project. This will also include reducing the amount of pavement as the street is overly wide. Adverse environmental impacts are expected to be minimal. All

construction activities will take place within the Seventh Street right-of-way. This project site is not located in or near known floodways, floodplains, or wetlands.

There is no anticipated tree removal or adverse effects on endangered species or historical, cultural resources.

There will be traffic disruptions and inconveniences for people living in the area during construction. These disruptions will be temporary during construction and will be communicated through project signage. By narrowing the roadway, some on street parking may be lost.

Figure 18a

Proposed Stormwater Improvements

South Seventh Street - Alternate A
Porous Pavement / Storm Reservoir

HRGIDD 2013 Project Plan

Narrow Roadway by 10 Feet.

3 cfs Pollutant Separator

Scio Church Rd

Scio Church Rd

Greenview Dr

S Seventh St

Braeside Pl

Wembley Ct

Lans Way

Restoration Activities

- Pollutant Seperator
- Porous Asphalt / Section with stone reservoir
- Storm Catch Basin
- Storm Manhole
- Storm Sewer

N
W E
S

1 inch = 150 feet

Y:\2012\06\20120639\03_Studies\Working\Figures\20130520_Figures\Figure 18a.mxd

HRC

Figure 18b

Proposed Stormwater Improvements

South Seventh Street - Alternate B
First Flush Storm Sewer

HRGIDD 2013 Project Plan

Restoration Activities

- Pollutant Seperator
- Storm Catch Basin
- Storm Manhole
- Storm Sewer
- Proposed 36" Storm Sewer

N
W E
S

1 inch = 150 feet

HRC

- Maple Village (Figure 19) – Maple Village is an existing shopping center that is located at the southeast corner of Dexter and Maple Roads. It is located within the Allen Creek watershed. This parcel is currently in the process of being redeveloped and receives runoff from the adjacent shopping center, the freeway, and a small portion of the adjacent neighborhood. In accordance with WCWRC's new design standards, storage is being required for the full 100 year storm. Soil borings in the area show the site is primarily sand, which will provide options for infiltration.

  Three options were investigated for the redevelopment of this property. The project site is approximately 28-acres. Based on WCWRC detention calculations, the amount of storage required for a 100 year storm even for a site of this size is approximately 235,000 cubic feet.

  Alternative A - Below ground detention/infiltration for the site (100 yr. event) with standard HMA pavement.

  Alternative B - Below ground detention/infiltration for the site (100 yr. event) with porous asphalt. Due to the sandy soil conditions, underdrain would not be required for the porous pavement section.

  Alternative C - Below ground detention/infiltration for the basin (100 yr. or bankfull event) with standard HMA pavement.

  Based on the amount of storage needed for the site based on a design commercial use and a large amount of impervious area, Alternative B is the more cost effective project. The used of porous pavement will reduce the amount of storage necessary as a portion of the storage can be addressed in the stone reservoir. Therefore, the footprint of the basin and associated easement can be shrunk. Furthermore, the site is primarily sand, which will allow for infiltration.

Total Preliminary Costs	$2,420,000
Present Worth of Analysis	$1,836,000

  Direct, Indirect, and Irreversible Impacts

  This proposed project will provide stormwater management retrofits as part of a site redevelopment project. Adverse environmental impacts are expected to be minimal. All construction activities will take place on a currently built out commercial site. This project site is not located in or near known floodways, floodplains, or wetlands.

  There is no anticipated tree removal or adverse effects on endangered species or historical, cultural resources.

  There will be traffic disruptions and inconveniences for people living in the area during construction. These disruptions will be temporary during construction and will be communicated through project signage.

Figure 19

Proposed Stormwater Improvements

Maple Village

HRGIDD 2013 Project Plan

Restoration Activities

- Proposed Underground Storage Basin
- Porous Asphalt Section
- Storm Catch Basin
- Storm Manhole
- Storm Sewer
- Proposed 36" Storm Sewer

N
W E
S

1 inch = 300 feet

HRC

- Lawton Park (Figure 20) – The City has recently undertaken a significant review of the stormwater management in the Upper Mallett's Creek section of the City (located south of Scio Church Road, northeast of I-94 and west of Ann Arbor-Saline Road. Based on the results of this study, it was found that there are several areas where stormwater detention would be beneficial for the hydraulics and hydrology of the area.

  The first of these areas is a large, underground storage basin to be located at Lawton Park. Other alternatives, such as open storage, were considered at this site. However, due to the grades, limited space, and activities at the park which need to be maintained, it was determined that the underground basin would be the least disruptive alternative.

  The project will consist of the construction of an 825,000 cu ft underground storage tank which will slowly outlet into Mallett's Creek. Depending on the final soil, the basin may be able to be connected to a sand seam, which may allow for some infiltration.

  By improving the storage in the area, the Drainage District will be improved. Additional storage to the volumes originally identified will increase the storage time and infiltration and decrease the excess flow to Mallett's Creek. The increase in storage time will thus increase sedimentation in areas where it is easier to remove and therefore reduce the amount of TSS into Mallett's Creek.

Total Preliminary Costs	$13,520,000
Present Worth of Analysis	$10,513,000

  Direct, Indirect, and Irreversible Impacts

  This proposed project will provide stormwater management retrofits and additional storage in a portion of the Mallett's Creek subwatershed. Adverse environmental impacts are expected to be minimal. All construction activities will take place on City-owned Park property. This project site is not located in or near known floodways or floodplains, or wetlands.

  There may be limited tree removal associated with the project. There are no known adverse effects on endangered species or historical, cultural resources.

  There will be traffic disruptions and inconveniences for people living in the area during construction. These disruptions will be temporary during construction and will be communicated through project signage.

  As the project site is an active City-owned Park, there will be interruptions in the services offered at the Park (such as soccer and baseball) during the construction of the project. However, because the project will consist of an underground storage basin, once the construction is complete, activities on the Park will be able to resume. During scheduled maintenance, City crews will need to access the Park to perform the necessary cleanout.

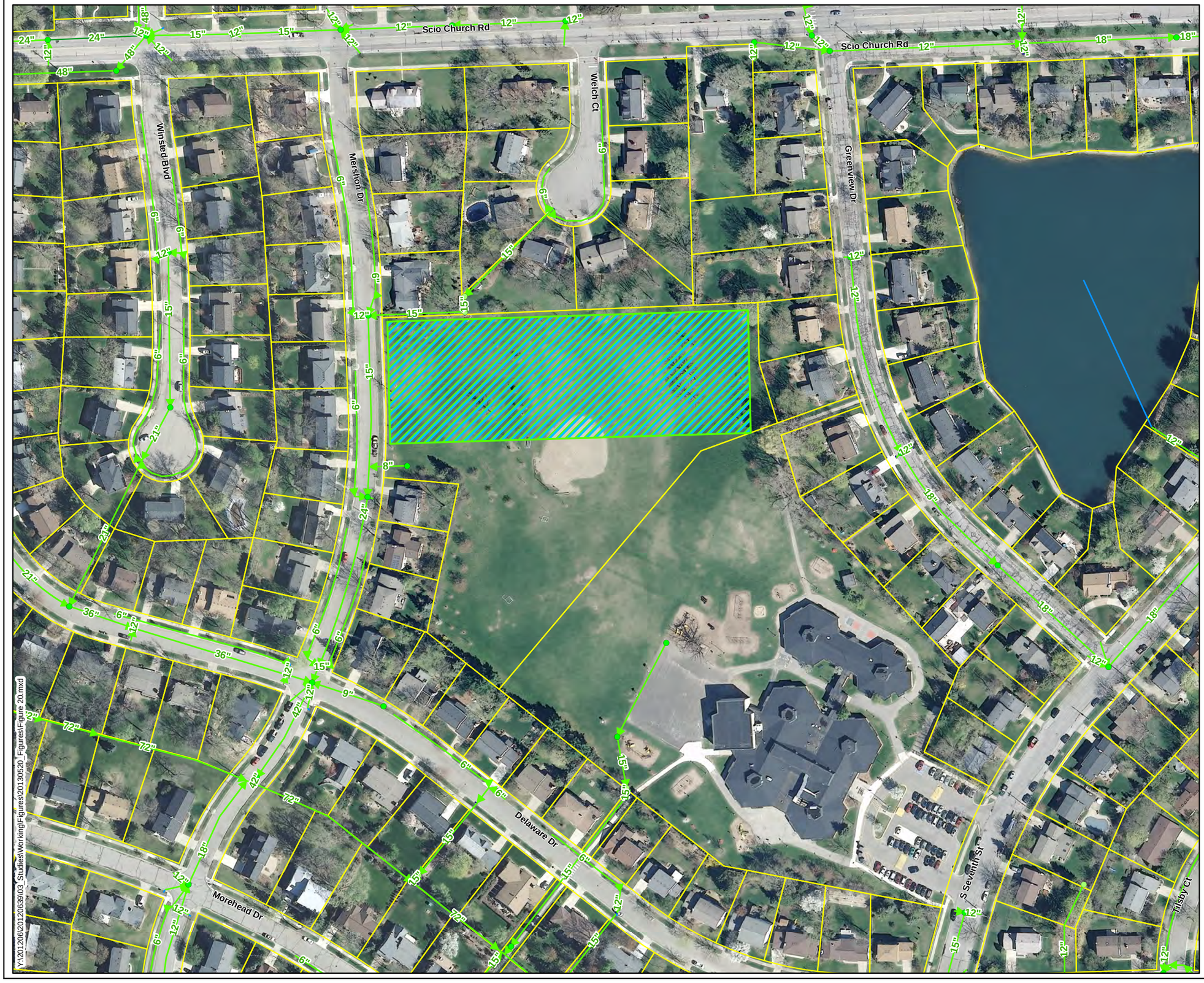


Figure 20

Proposed Stormwater Improvements

Lawton Park

HRGIDD 2013 Project Plan

Restoration Activities

Proposed Underground Storage Basin

(825,000) cft

N

W E

S

1 inch = 200 feet

HRC

- Churchill Downs Park (Figure 21) – A second area that was identified in the review of the Upper Mallett's Creek area was Churchill Downs Park. This area is located at the convergence of two branches of the Mallett's Creek and offers and ideal location for storage and stormwater quality improvements.

  A 425,000 cu ft above ground storage basin will be constructed on this site. Other alternatives such as underground storage was not considered for this site, as the grades on the site are not conducive to a gravity release and pumping the stormwater would add significant capital,operations, and maintenance costs.

  By improving the storage in the area, the Drainage District will be improved. Additional storage to the volumes originally identified will increase the storage time and infiltration and decrease the excess flow to Mallett's Creek. The increase in storage time will thus increase sedimentation in areas where it is easier to remove and therefore reduce the amount of TSS into Mallett's Creek.

Total Preliminary Costs	$3,810,000
Present Worth of Analysis	$2,990,000

  Direct, Indirect, and Irreversible Impacts

  This proposed project will provide stormwater management retrofits and additional storage in a portion of the Mallett's Creek subwatershed. Adverse environmental impacts are expected to be minimal. All construction activities will take place on City-owned Park property. This project site is not located in or near known floodways or floodplains, or wetlands.

  There may be limited tree removal associated with the project. There are no known adverse effects on endangered species or historical, cultural resources.

  There will be traffic disruptions and inconveniences for people living in the area during construction. These disruptions will be temporary during construction and will be communicated through project signage.

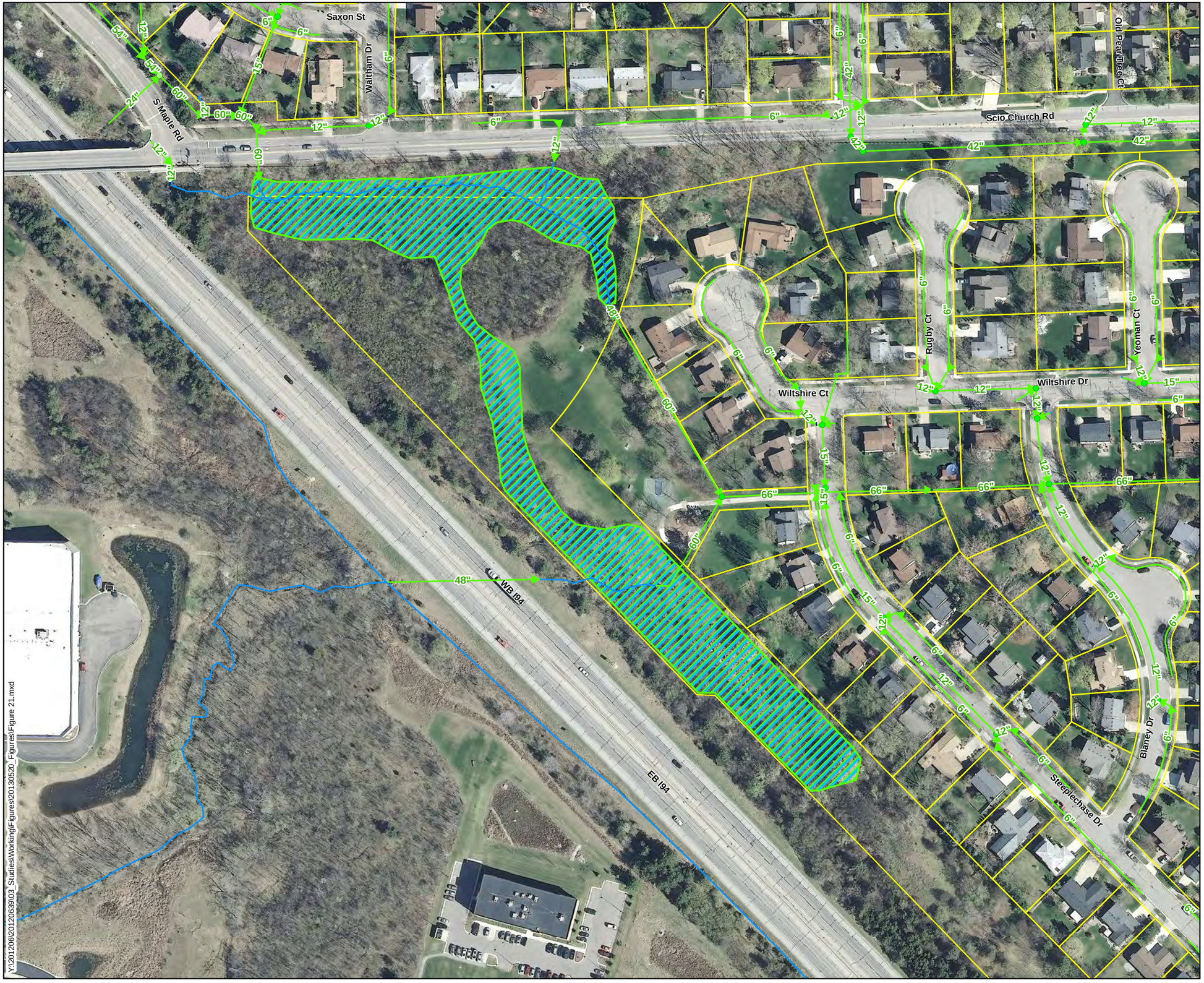
  As the project site is an active City-owned Park, there will be interruptions in the services offered at the Park (such as soccer and baseball) during the construction of the project. There are many areas of the Park that are currently unable to be accessed. The basin will be constructed primarily in these areas. The existing playscape and sports courts will not be impacted. During scheduled maintenance, City crews will need to access the Park to perform the necessary cleanout.

Figure 21

Proposed Stormwater Improvements

Churchill Downs Park

HRGIDD 2013 Project Plan



Restoration Activities

Proposed Open Detention Area

(630,000) cft

N

W E

S

1 inch = 200 feet

HRC

Y:\2012\06\20120639\03_Studies\Working\Figures\20130520_Figures\Figure 21.mxd

3. Alternative 2b – Optimization of Existing Facilities

Optimization of existing facilities is being proposed for four projects (6 locations total). These projects focus on improving existing controls using the latest design methods to achieve additional pollutant removal and meet stormwater quality goals.

- Lans Basin (See Figure 22) – As discussed in previous sections, the Upper Mallett's Creek section has been extensively reviewed. One of the proposed projects is the modification of the existing Lans Basin which is located in rear yards south of Delaware Street between Seventh Street and Ann Arbor-Saline Road. This project consists of the modification of the basin to provide an additional 200,000 cubic feet of storage by dredging out existing pond and removing or altering the existing weirs. This will help to offset some of the flashiness of the stream in the area which leads to downstream water quality issues such as erosion. Furthermore, additional storage will help to allow for increased infiltration and evaporation rather than moving the water downstream as quickly as possible. The increase in storage time will also allow for additional sedimentation to take place in the ponds, where there will be easier access for maintenance, which will reduce the amount of TSS downstream in Mallett's Creek.

Total Preliminary Costs	$1,410,000
Present Worth of Analysis	$1,136,000

Direct, Indirect, and Irreversible Impacts

This proposed project will provide stormwater management retrofits and additional storage in a portion of the Mallett's Creek subwatershed. Adverse environmental impacts are expected to be minimal. All construction activities will take place within easements. This project site is located near the regulated floodplain associated with Mallett's Creek. Any impacts to the floodplain will be properly modeled and permitted. The existing ponds to be modified may include regulated wetlands. However, the proposed projects will be permitted and all improvements will increase the quality of the wetlands.

The existing weirs and ponds are owned (and exclusively reserved for access to) by a small Homeowners Association (HOA). The ability to execute this project is subject to the ability to reach agreement with the HOA on their current financial responsibility for weir and sediment removal, along with construction access/easement, long term maintenance responsibility and access. While a number has been included in the project costs for easement acquisition, this is an estimate which may vary upon negotiations with the HOA.

This project is also subject to a final evaluation of the physical feasibility of performing construction in a challenging location while maintaining an acceptable cost-benefit ratio, with similar final evaluation needed to determine the feasibility of allowing for cost-effective long-term maintenance.

This project has been included on the assumption that there could be benefit to upstream property owners by virtue of providing nonpoint source treatment and additional storage to the neighborhood if upstream system constraints are alleviated improving conveyance to this vicinity.

There may be limited tree removal associated with the project. There are no known adverse effects on endangered species or historical, cultural resources.

There will be traffic disruptions and inconveniences for people living in the area during construction. These disruptions will be temporary during construction and will be communicated through project signage. As this project is located in rear yards, access to the site would likely impact the residents.

Figure 22

Proposed Stormwater Improvements

Churchill Downs Park

HRGIDD 2013 Project Plan

Proposed Detention Retrofits

Dredge Upper Pond Approximately 8' Deep

Reconstruct Existing Dam Lower 2'

Remove Existing Dam

Construct New Dam

Reconstruct Channel

Remove Existing Dam

S Seventh St

Tilsby Ct

Delaware Dr

Worthington Pl

Lans Way

Ascot Rd

Chaucer Ct

Morehead Ct

Northbrook Dr

Glenbrook Ct

Ann Arbor Saline Rd

N

W E

S

1 inch = 200 feet

X:\2012\06\2012060390\03_Studies\Working\Figures\20130520_Figures\Figure 22.mxd

HRC

- Village Oaks (See Figure 23) – The area near Village Oaks and Chaucer Court has experienced storm water issues for the past several years. This area is in the Mallett's Creek subwatershed. In 2012, the City of Ann Arbor completed a review of the storm water management in this area. Several different alternatives were studied by the City as outlined in the Village Oaks report provided in Appendix I. Based on the findings of this report, the existing detention basin is undersized and the hydraulics in the area cause the basin to fill more quickly then designed and then flow downstream into Mallett's Creek prematurely. This flooding of Mallett's Creek downstream leads to water quality issues due to the flashiness of the stream during rain events. This then leads to the streambank washing out, and issues with downstream capacity. The results of the study indicated that in order to restore the hydraulics and hydrology in the area, improvements are necessary. These improvements include implementing infiltration and extended storage techniques.

  By improving the storage in the area, the Drainage District will be improved. Additional storage to the volumes originally identified will increase the storage time and infiltration and decrease the excess flow to Mallett's Creek. The increase in storage time will thus increase sedimentation in areas where it is easier to remove and therefore reduce the amount of TSS into Mallett's Creek.

  The cost analysis includes the review of two separate scenarios. Alternate A (Figure 23) is to provide additional storage in several basins throughout the project area. Alternate B is to provide a larger regional basin. Based on the cost analysis, Alternate A is the more cost effective option.

Total Preliminary Costs	$1,291,000
Present Worth of Analysis	$860,000

  Direct, Indirect, and Irreversible Impacts

  This proposed project will provide stormwater management retrofits and additional storage in a portion of the Mallett's Creek subwatershed. Adverse environmental impacts are expected to be minimal. All construction activities will take place within easements. This project site is not located in or near known floodways or floodplains. The existing ponds to be modified may include regulated wetlands. However, the proposed projects will be permitted and all improvements will increase the quality of the wetlands.

  There may be limited tree removal associated with the project. There are no known adverse effects on endangered species or historical, cultural resources.

  There will be traffic disruptions and inconveniences for people living in the area during construction. These disruptions will be temporary during construction and will be communicated through project signage.

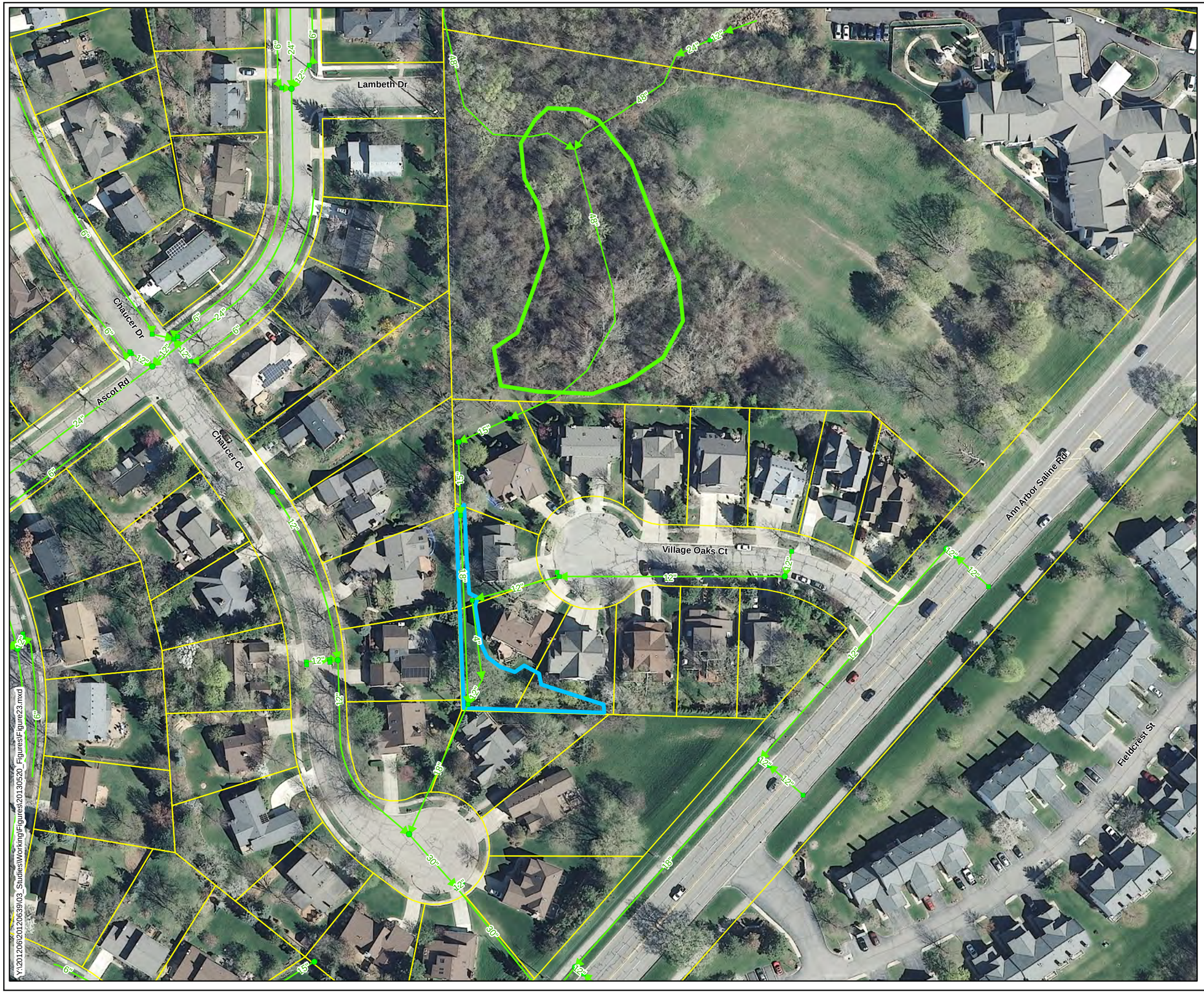
  Additional easement acquisition will be required to complete this project, which is a large portion of the project cost.

Figure 23

Proposed Stormwater Improvements

Village Oaks

HRGIDD 2013 Project Plan



Restoration Activities

- Storm_Catchbasin
- Storm Manhole
- Storm Sewer
- Regional Storage Area
- Rear Yard Storage
- Parcels

N
W E
S

1 inch = 100 feet

HRC

- Research Park Wetland Detention (See Figure 24) – Mallett's Creek passes through a vacant parcel of land inside the Research Park Drive loop at the south end of the City. This area is ideal for the construction of a wetland detention area to provide storm water treatment. In addition, the area between Research Park Drive and the RR Tracks has been identified as having severely eroded conditions which leads to high volumes of sediment being deposited downstream. This has led to habitat degradation and the establishment of a biota TMDL on Mallett's Creek.

  The existing drain is channelized, laterally-confined, and moderately incised due to clear water discharge (lack of bedload) from storm sewers. The downstream crossing of Research Park Drive is perched.

  The proposed project includes floodplain excavation along the north side to reduce bank heights, increase flood capacity, encourage floodplain deposition, and dissipate energy. The invasive vegetation along the south bank will be cut and treated, and the mature trees and shrubs will be protected to provide shading.

  An alternative for this project was examined in the 2010 Project Plan. However, this plan only called for streambank stabilization of Mallett's Creek between E. Research Park Drive and W. Research Park Drive. This project did not address the severe erosion issue between E. Research Park Drive and the RR tracks. Furthermore, upon additional review of the overall Mallett's Creek system, it was determined that this is a good location to provide a treatment wetland and storage area in order to buffer high flows.

Total Preliminary Costs	$920,000
Present Worth of Analysis	$695,000

  Direct, Indirect, and Irreversible Impacts

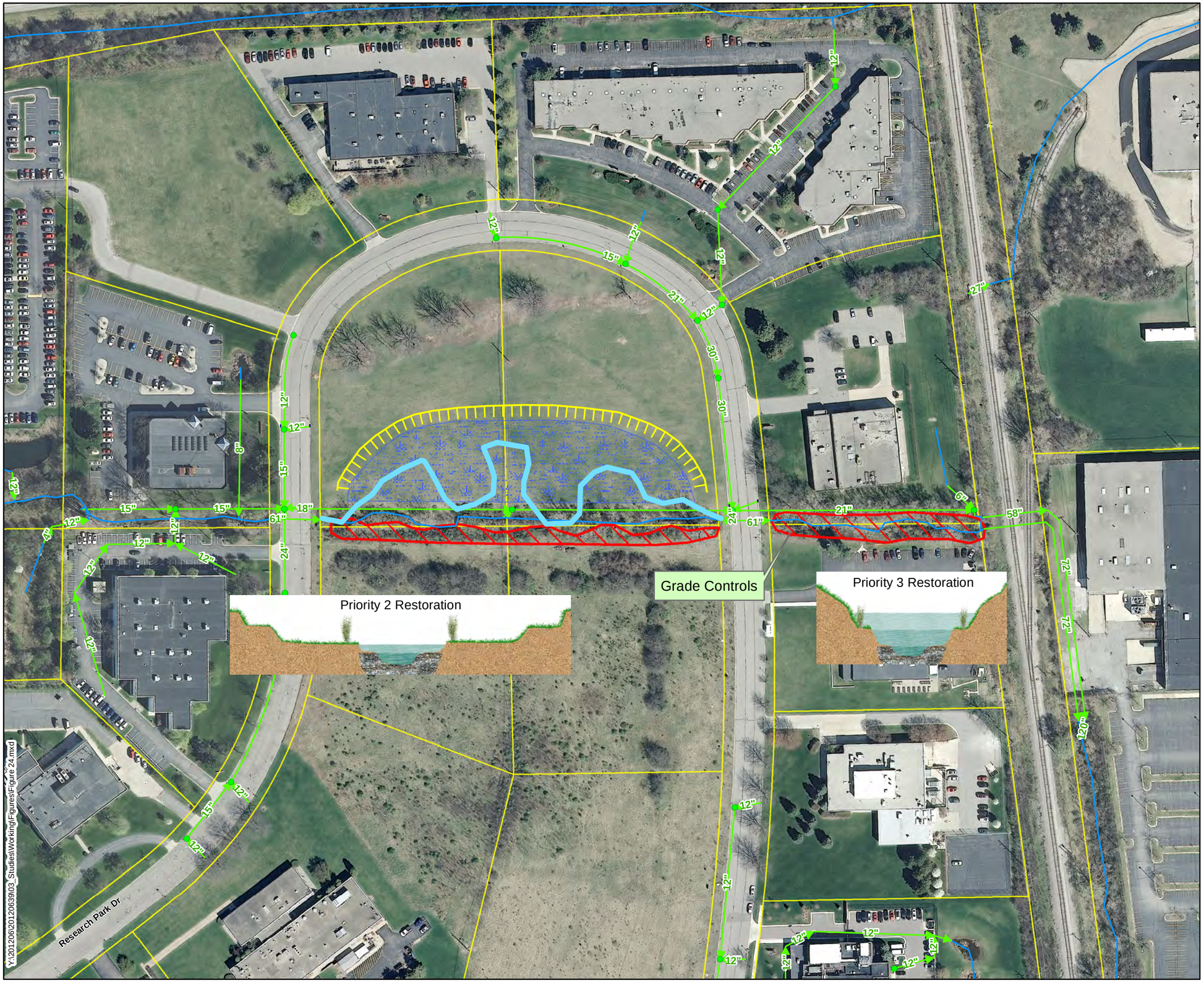
  This project includes creation of wetland area as well as streambank stabilization along Mallett's Creek. While there are floodplains associated with these sites, the improvements are not expected to impact floodways, floodplains, wetlands, or any other sensitive features. Limited tree removal may be necessary in order to install the stabilization measures. Adverse impacts on endangered species or historical resources are not anticipated. During design, all necessary permits will be secured prior to beginning construction. There are several areas where easements will be required. These will be secured prior to construction.

Figure 24

Proposed Stormwater Improvements

Research Park

HRGIDD 2013 Project Plan



Restoration Activities

- Channel Re-Meandering
- Back Slope
- Off-Line Wetland
- Vegetation Management

N
W E
S

1 inch = 200 feet

HRC

- Briarwood Mall Ponds Retrofit Project (see Figure 25) – There are three existing basins on the Briarwood Mall project along branches of Mallett's Creek. These three ponds will be retrofitted to provide for stormwater quality in this area as follows:
    - Plaza Drive Pond – This pond is an inline pond located on the north side of the mall property. The pond currently is full of sediment. The project will consist of removal of the sediment from the pond and the installation of an access point for future maintenance of the pond, along with the installation of a sediment forebay.
    - Von Maur Pond – This is also an inline pond, located on the south side of the mall property. The project will consist of improvements to the outlet structure in order to provide for a dry pond for sediment storage.
    - Holiday Inn Express Pond – This is an inline pond, located downstream of the Von Maur Pond on the south side of the mall property. The project will consist of improvements to the outlet structure in order to provide for a dry pond for sediment storage.

  These projects are considered a Principal Alternative. No other alternatives were considered for these projects.

Total Preliminary Costs	$1,230,000
Present Worth of Analysis	$939,000

Direct, Indirect, and Irreversible Impacts

This project includes retrofits to several inline ponds along Mallett's Creek. Proposed improvements include creation of a sediment forebay, dredging existing structures, outlet improvements, and other water quality measures. This project occurs within the floodway, and a hydraulic analysis will be performed to verify that the improvements will not impact the 100-year flood elevation and base flood elevation. During design, all necessary permits will be secured prior to beginning construction. There is a potential for limited tree removal. Easements will be required. These will be secured prior to construction. Adverse impacts on any historic resources are not anticipated.

There is a potential for tree removal during construction on all basins. There may also be disruptions to traffic or parking on the mall property during construction. These disruptions will be temporary and will be communicated through proper signage.

Figure 25

Proposed Stormwater Improvements

Briarwood Mall Ponds

HRGIDD 2013 Project Plan

Restoration Activities

- Storm_Catchbasin
- Storm Manhole
- Storm Sewer
- Rock Weir
- Parcels

N
W E
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1 inch = 350 feet

HRC

4. Alternative 2c – Streambank Stabilization

Several sites within the Study Area have been identified as having opportunities for streambank stabilization. All of these locations are exhibiting signs of moderately to severely eroded conditions. Significant amounts of erosion leads to high volumes of sediment being removed and deposited downstream. Evidence of significant habitat degradation due to sedimentation has led to the establishment of biota TMDLs on the Mallett's Creek. Furthermore, sedimentation on the Millers Creek has led to severe sedimentation issues at the mouth of the creek that are undermining Geddes Road.

The MIP, MRP, and WMP reports identify administrative and physical improvements necessary to protect from further stream degradation. Administrative and policy improvements, including development standards and permitting requirements, are underway. However, physical improvements are still needed. As part of the final design, site specific hydrology will be studied in further detail in order to finalize the appropriate measures. A preliminary review of the sites has been completed.

Streambank stabilization is being proposed in 3 subwatersheds (6 locations total). These projects achieve stormwater goals by preventing sediment removal and deposition downstream of eroded streambanks. All of the streambank stabilization sites are considered Principal Alternatives.

No additional alternatives were considered for the streambank stabilization projects as streambank stabilization is the preferred alternative for addressing these projects as far as environmental, habitat, and cost considerations are concerned.

- Mallett's Creek Streambank Stabilization
    - Chalmers to Huron River (See Figure 26)

The proposed project includes 600 feet of Priority 3 restoration of a log step-pool channel with excavation of a narrow floodprone area along the right bank. The channel is incised with excessive bank erosion along the right bank (facing downstream). Pool filling and embeddedness have been caused by channel over-widening and excessive sedimentation from upstream sources. A backwater wetland has formed upstream of the E Huron River Drive crossing. The work involved clearing the right side of the stream through this section. The step-pool channel reach will transition into 255 feet of Priority 2 restoration upstream of E Huron Drive.

- Oakbrook to Eisenhower (See Figure 27)

The project includes 1,800 feet of stream restoration in order to address streambank erosion and sedimentation for upstream sources. The project will also include the replacement of the 6 culverts that currently cross under Oakbrook Drive with an appropriately sized single span culvert which meets current MDEQ design criteria. The work will involve clearing one side of the bank. This project will also include replacement of the six (6) parallel cross culverts currently located at Oakbrook Drive.

- Cranbrook Park (See Figure 28)

The project includes 2,970 feet of stream restoration in order to address streambank erosion and sedimentation from upstream sources. The work will involve clearing one side of the bank.

Total Preliminary Costs	$2,770,000
Present Worth of Analysis	$2,317,000

Direct, Indirect, and Irreversible Impacts

These projects include streambank stabilization at three sites along Mallet's Creek and its tributaries. While there are floodplains associated with these sites, the improvements are not expected to impact floodways, floodplains, wetlands, or any other sensitive features and will improve stream and habitat quality. Limited tree removal may be necessary in order to install the stabilization measures. Adverse impacts on endangered species or historical resources are not anticipated. During design, all necessary permits will be secured prior to beginning construction. There are several areas where easements will be required. These will be secured prior to construction.

Figure 26

Proposed Stormwater Improvements

Mallett's Creek Mouth

HRGIDD 2013 Project Plan

Legend

Type

- Step-Pool Conveyance Channel
- Lower Bench
- Upper Bench
- Vegetation Management
- Storm Sewer

N

W E

S

1 inch = 100 feet

HRC

Figure 27

Proposed Stormwater Improvements

Oakbrook to Eisenhower

HRGIDD 2013 Project Plan

Restoration Activities

- Step-Pool Conveyance Channel
- Vegetation Management
- Storm Catch Basin
- Storm Manhole
- Storm Sewer
- Parcels

N

W E

S

1 inch = 200 feet

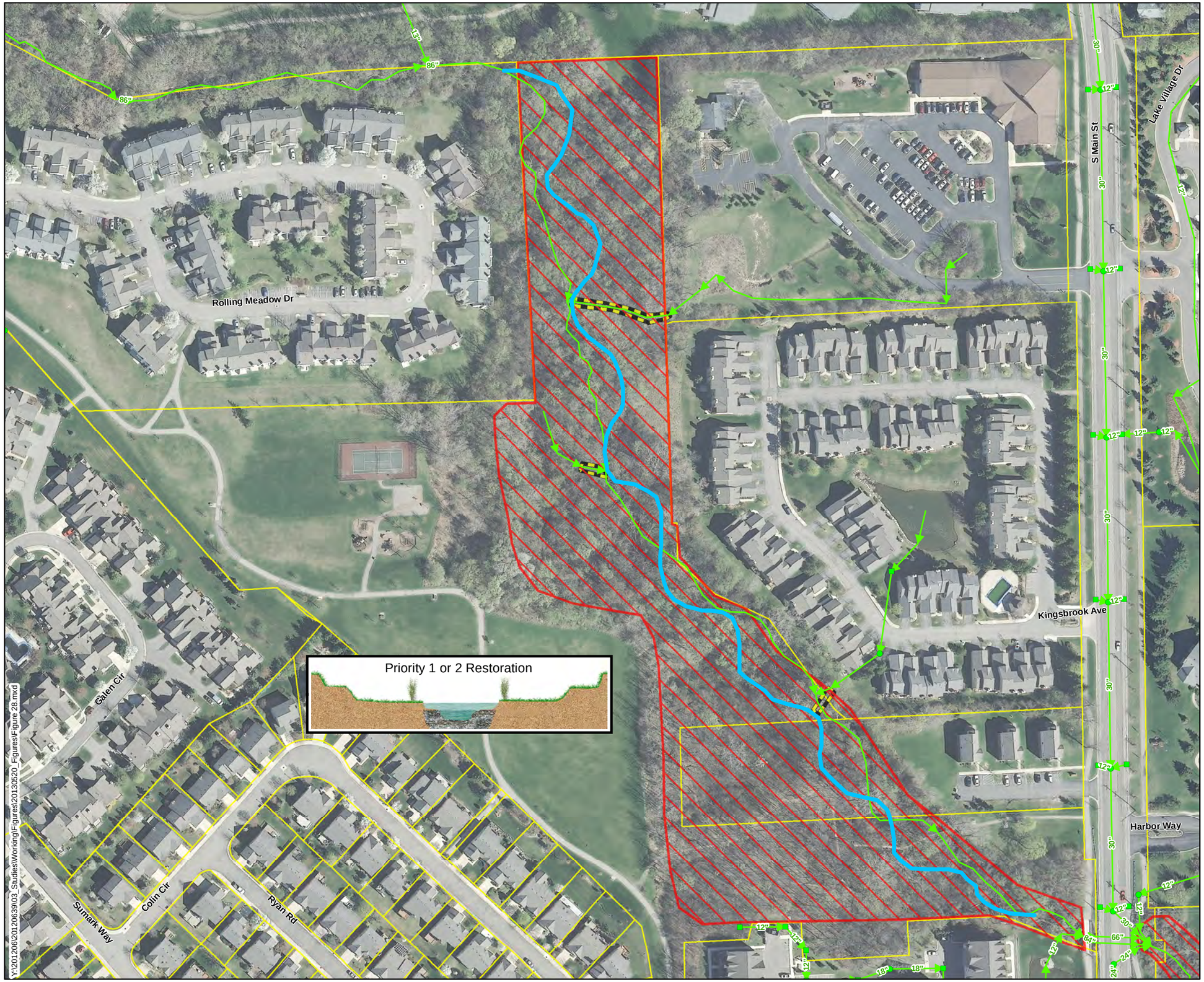
HRC

Figure 28

Proposed Stormwater Improvements

Cranbrook Park

HRGIDD 2013 Project Plan



Restoration Activities

- Channel Re-Meandering
- Storm_Catchbasin
- Storm Manhole
- Storm Sewer
- Step-Pool Conveyance Channel
- Vegetation Management

N
W E
S

1 inch = 200 feet

HRC

- Millers Creek Streambank Stabilization (See Figure 29)

This portion of Millers Creek from Geddes Road to the University properties north of Lakehaven Drive is in poor condition and in need of sediment removal. This area is located downstream of the area previously identified in the 2010 Project Plan. Channel widening is occurring on the existing channel due to excessive sediment deposition from upstream sources. Channel straightening and a lack of floodplain connectivity have increased stream power. Channel restoration (re-meandering and reduction of width-to-depth ratio) is recommended once upstream sediment sources have been controlled. The proposed project calls for 1,250 feet of floodplain restoration, slope stabilization along the west bank, and riparian vegetation management. Management of riparian vegetation includes selective tree thinning using arborist practices, invasive species control, seed of herbaceous groundcover, and supplemental plantings.

Total Preliminary Costs	$650,000
Present Worth of Analysis	$492,000

Direct, Indirect, and Irreversible Impacts

This project includes streambank stabilization along one area of Millers Creek. While there are floodplains associated with these sites, the improvements are not expected to impact floodways, floodplains, wetlands, or any other sensitive features. Limited tree removal may be necessary in order to install the stabilization measures. Adverse impacts on endangered species or historical resources are not anticipated. During design, all necessary permits will be secured prior to beginning construction. Currently, this area is not within an established Drainage District and the watercourse is a water of the State. Appropriate easements will be secured prior to construction.

As this area is not within an established Drainage District, any project that is completed along this stretch of the stream will include establishment of a Drainage District in order to assess for the proposed project.

Figure 29

Proposed Stormwater Improvements

Miller's Creek

HRGIDD 2013 Project Plan

Restoration Activities

- Sediment Trap Cleanout
- Step-Pool Conveyance Channel
- Vegetation Management
- Storm Catch Basin
- Storm Manhole
- Storm Sewer
- Parcels

N E W S

1 inch = 300 feet

HRC

Y:\2012\06\2012063903_StudiesWorking\Figures\20130520_Figures\Figure 29.mxd

- Huron High School Baffle Box (See Figure 30)

Based on the preliminary results of the Millers Creek Sediment Study, there were several alternatives evaluated to reduce the sediment loading in Millers Creek along with providing opportunities for better maintenance. These alternatives include maintenance activities such as periodic sediment removal along specific reaches, multiple Trap-and-Removal facilities, culvert cleanouts, and a regional Trap-and-Removal facility. Due to the private ownership along the drain route and lack of a Drainage District, it was determined that a regional facility located at Huron High School would be the most cost effective method for managing the sediment in this creek. Although an easement would also be required from the High School for access and maintenance, dealing with one property owner is generally simpler than dealing with many.

The proposed project includes the construction of a precast baffle box along the reach of Millers Creek that passes through the Huron High School property. This facility could have the potential to trap and remove 230 tons of sediment annually (63% of the upstream bank load). This project would address the majority of the 2.4 square mile watershed.

Total Preliminary Costs	$200,000
Present Worth of Analysis	$158,000

Direct, Indirect, and Irreversible Impacts

This project will include construction of a baffle box along a stretch of Millers Creek. While there are floodplains associated with this site, the improvements are not expected to impact floodways, floodplains, wetlands, or any other sensitive features. Limited tree removal may be necessary in order to install the stabilization measures. Adverse impacts on endangered species or historical resources are not anticipated. During design, all necessary permits will be secured prior to beginning construction. Currently, this area is not within an established Drainage District and the watercourse is a water of the State. Appropriate easements will be secured prior to construction. This project will need to be maintained by the City in order to assure proper functionality and will be incorporated into the City's maintenance program.

Figure 30

Proposed Stormwater Improvements

Huron High School Baffle Box

HRGIDD 2013 Project Plan

Restoration Activities

- Baffle Box
- Storm_Catchbasin
- Storm Manhole
- Storm Sewer
- Parcels

N W E S

1 inch = 150 feet

HRC

- Huron Hills Golf Course (See Figure 31)

The existing watershed consists of an in-line pond upstream of E Huron Drive which discharges to a small unnamed tributary which flows through the Huron Hills golf course to Gallup Youth Fishing Pond north of the railroad tracks and then to the Huron River. The channel is moderately incised due to a lack of bedload due to the clear-water discharge from the in-line pond. Storm outfalls and under-sized cart crossings have had localized impacts. The channel lacks shading and riparian vegetation. Turf grass is mowed to the top of bank and goose droppings are excessive. Backwater wetlands have formed upstream of the railroad due to a lack of gradient above the fishing pond. This spring-fed headwater creek has the greatest habitat restoration potential of all of the sites, but the pollutant reductions are lower due to the small drainage area and low bank heights.

The proposed project includes a Priority 2 restoration of 1,030 feet of meandering wet meadow stream, including establishment of riparian vegetation with herbaceous understory and low growing shrubs to hold the banks together and deter waterfowl. Floodplain wetlands with off-line vernal pools will be established to provide stormwater treatment prior to outletting. The golf cart crossings will be replaced with floodplain bridges and stormwater treatment will be provided for roadway outfalls.

Total Preliminary Costs	$1,220,000
Present Worth of Analysis	$952,000

Direct, Indirect, and Irreversible Impacts

This project will include construction of streambank improvements through the golf course and construction of a wetland/buffer area upstream of an outlet which flows under railroad tracks. Floodplain enhancement and outlet structure are to be installed. This project occurs within the floodway, and a hydraulic analysis will be performed to verify that the improvements will not impact the 100-year flood elevation and base flood elevation. During design, all necessary permits will be secured prior to beginning construction. There is a potential for limited tree removal. Adverse impacts on any historic resources are not anticipated

Figure 31

Proposed Stormwater Improvements

Huron Hills Golf Course

HRGIDD 2013 Project Plan

Restoration Activities

- Floodplain Bridge
- Proposed Channel
- Native Buffer
- Offline Vernal Pool

N
W E
S

1 inch = 250 feet

HRC

B. Analysis of Principal Alternatives

For each of the project alternatives discussed previously, the Principal Alternatives were selected based on the site analysis, feasibility of conceptual design, and stakeholder input. Technical feasibility, maintenance, and pollutant removal efficiency were the defining factors when selecting the alternatives. The "no action" alternative was not considered a feasible option to improve the conditions of the watershed. It is imperative that the community continue to address the need for improved water quality. Taking a "no action" approach would not address that need. The selected potential alternatives identified for the sites are considered Principal alternatives and will be subject to the following evaluations:

1. The Monetary Evaluation

a. Sunk Costs

Sunk costs area any investment or financial commitments made before or during Planning. There are no sunk costs associated with the projects proposed in this Plan.

b. Present Worth

Present worth calculations for the alternatives have been included in the sections above for each site. Each alternative includes capital costs for construction, engineering, financial, legal, administration, contingency, and annual operations and maintenance performed by the City or County. See Appendix A for the complete present worth analysis for all the alternatives.

c. Salvage Value

There is a salvage value associated with certain equipment and structures. Salvage value was calculated using straight-line depreciation and is included in the monetary evaluation for items that have remaining value at the end of the 20-year planning period. Salvage value considered for the following items: all underground concrete infrastructure and detention basins.

d. Escalation

Energy costs and land value may be escalated, if appropriate. This is most applicable if different alternatives use different fuel supplies or an alternative land application and others do not. For the projects proposed in this Plan, any increase will apply equally at all alternatives. Therefore, costs were not escalated.

e. Interest During Construction

If interest during construction is significant and may influence the choice of alternatives, it may be included in the monetary evaluation. The construction period for the project alternatives will be on the order of months. Any interest during construction of the projects proposed in this Plan is not anticipated to affect the choice of alternatives and therefore was not included in the financial analysis.

f. Mitigation Cost

There will be no mitigation required as a result of the proposed alternatives construction. Therefore, mitigation costs were not included as part of the monetary evaluation. The mitigation costs described herein are part of general construction costs.

g. User Costs

Another aspect of the monetary evaluation is the computation of the total cost of the project to users. Total cost in this context includes capital and financing costs, OM&R costs, and other costs. The alternative analysis includes an evaluation of projects with different capital costs, life expectancies, and annual costs using a present worth analysis, which provides the estimated

annual and quarterly costs of each selected alternative to the users in the Study Area. This information is included in this Plan and will be included in the public participation of the Planning process. A summary of the capital present worth values for all projects is included herein along with the individual values in the write ups above:

Table III – 1: Present Worth Values – All Projects

Site	Proposed Alternative	Present Worth
1	Geddes Avenue	$2,050,000
2	Detroit Street	$824,000
3	Farmers Market	$530,000
4	Briarwood Mall Pond Retrofits	$939,000
5	Tree Planting and Enhancement	$1,725,000
6	Mallett's Creek Streambank Stabilization	$2,317,000
7	Millers Creek Streambank Stabilization	$492,000
8	Huron High School Baffle Box	$158,000
9	State Street - Eisenhower to S. of I-94	$801,000
10	Scio Church - Main Street to east of Seventh	$2,908,000
11	Stadium Blvd (Hutchins Ave to Kipke Dr)	$1,242,000
12	Research Park Wetland Detention - Streambank Stabilization	$695,000
13	Huron Hills Golf Course	$952,000
14	S. Seventh Street - Scio Church to Greenview	$645,000
15	721 N. Main Street	$1,228,000
16	Village Oaks	$860,000
17	Maple Village	$1,836,000
18	Lawton Park	$10,513,000
19	Churchill Downs Park	$2,990,000
20	Lans Basin	$1,136,000

2. Staging Construction

The monetary evaluation was performed using a 20-year planning period. For all alternatives identified in this Plan, the design life is anticipated to be sustainable. There is no growth associated with the individual sites. Therefore, there are no effects on staging construction to consider.

3. Partitioning the Project

Under certain circumstances, partitioning of a project is allowed. A partitioned Project Plan may be prepared when construction of a discrete component of the project must occur prior to the completion of the entire Project Plan in order to remedy a severe public health, water quality, or other environmental concern. For the proposed projects, there are no components that need to be

completed prior to the Project Plan. Therefore, there is no need to partition any of the proposed projects.

4. The Environmental Evaluation

Each of the proposed Principal alternatives provides a positive impact to the environment. In general, the alternatives help reduce NPS pollution by reducing erosive runoff velocities, stabilizing eroded streambanks, providing runoff infiltration, filtering pollutants, facilitating needed maintenance (such as providing access or sedimentation traps for future maintenance), and reducing peak runoff flows.

The proposed projects are intended to address the water quality impairments identified in the four TMDLs in the area (Ford and Belleville Lake – phosphorus, Mallett's and Swift Run – biota and Geddes Pond – *E.coli*) As can be seen in this section, the proposed projects have significant beneficial impacts on water quality.

For this Project Plan, methods developed by the EPA (1983), Schueler (1987), Pitt (1998), the Millers Creek planning team (2004), SEMCOG (2008), Rosgen (1996), and the MDEQ (1999) were utilized to estimate pollutant loading and removal rates for each of the project locations.

For the sites with volumetric BMPs, as noted in the Water Quality BMPs and Optimization of Existing Facilities alternatives, general assumptions were made based on the location, land cover, and upstream contributing area. A summary of the TSS/TP pollutant concentrations, runoff, and loading can be reviewed in Tables III-2 and III-3. The SEMCOG Low Impact Development Manual for Michigan (2008) was utilized to determine BMP pollutant removal efficiencies at the sites.

Urban bacteria loading are a significant impact on the Huron River. The established TMDL at Geddes Pond for a reduction in *E. coli* is evidence that measures must be taken to address the pollutant. It is generally accepted that infiltration BMPs are very efficient mechanisms to help mitigate their impact to the watershed. However, developing baseline estimations for the pollutant contributions to the Study Area is very difficult due to the high variability with the bacteria lifecycle. Pitt (1998) developed an assumed median pollutant load for urbanized *E. coli* contributions to a typical watershed. This value along with the Simple Method was utilized to calculate an annual pollutant load to the Study Area. Refer to Table III-4 for details on the potential *E. coli* contribution to the project locations. Although *E. coli* removal is difficult to quantify, it is known that *E. coli* populations are reduced with infiltration practices. A recent study by the Indiana Geological Survey has also shown that there is also a strong statistical correlation between values of *E. coli* concentrations and the total suspended solids (TSS). Therefore, it is reasonable to assume that *E. coli* will be removed to some degree when infiltration and/or TSS removal is incorporated into BMP projects.

All of the proposed water quality BMPs have a pollutant removal efficiency that each can potentially mitigate based on the first flush event. This is considered the dirtiest runoff associated with the most frequently occurring storm events. A summary of the volume or rate, depending on the type of BMP, can be viewed in Table III-5 as well as the percent treated for the first flush.

For streambank stabilization BMPs, general assumptions were made based on the locations and stream morphology. The analysis was further supported in part by the MIP and MRP findings and documentation. The assumptions for this streambank stabilization site were compiled and sediment erosion and pollutant loads were quantified for each reach. Reach lengths, unless field verified, were estimated from the field observations. A summary of the total bank erosion and pollutant reductions per site can be reviewed in Table III-6.

All of the alternatives provide a sediment, nutrient, and bacteria reduction component either through settling, infiltration, mechanical filtration, or vegetative filtration. Total project cost and the cost per unit of removal were quantified for this site. A summary of the cost of removal can be review in Table III-7.

Table III-2

Calculated Urban Annual TSS Pollutant Load, Removal Efficiency, and Quantity Removed

Site	Location	BMP	Area (ac)	Runoff Coefficient	Annual Runoff (in)[1]	TSS Pollutant Concentration (mg/l)[2,3]	Annual TSS Load (lbs)[2]	TSS Removal Efficiency[4]	% First Flush Treated	TSS Reduction (lb/yr)
			A	R_v	R	C	L			
1	Geddes Drive	First Flush Storage with Pollutant Separation	3.00	0.95	30.22	100	2,049	60%	445%	1,230
2	Detroit Street	First Flush Storage with Pollutant Separation	1.57	0.95	30.22	100	1,072	60%	139%	643
3	Farmers Market Parking Lot	First Flush Storage with Pollutant Separation	1.75	0.95	30.22	100	1,195	60%	127%	717
4	Briarwood Ponds	Pond Retrofits	160.00	0.65	20.68	100	74,778	50%	67%	25,051
5	Street Tree Planting	Tree Planting	Throughout City							
6	Malletts' Creek	Streambank Stabilization	See Table III-6							
7	Miller Creek	Streambank Stabilization	See Table III-6							
8	Huron High Baffle Box	Baffle Box	1500	0.53	16.86	100	571,620	80%	100%	457,296
9	State Street	Infiltration Swales	12.20	0.95	30.22	100	8,333	50%	29%	1,208
		Infiltration Basins	3.60	0.65	20.68	100	1,683	50%	64%	538
10	Scio Church	First Flush Storage with Pollutant Separation	7.25	0.90	28.63	100	4,692	60%	112%	2,815
11	Stadium Blvd (Hutchins to Kipke)	First Flush Storage with Pollutant Separation	2.00	0.90	28.63	100	1,294	75%	100%	971
		Tree Planting	0.00		0.00	100	0			
12	Research Park	Streambank Stabilization	See Table III-6							
		Wetland Storage	350.00	0.45	14.32	100	113,245	50%	11%	6,229
13	Huron Hills	Streambank Stabilization and Wetland Creation	See Table III-6							
14	S. Seventh	Porous Road (Full Width)	1.90	0.95	30.22	100	1,298	60%	100%	779
15	721 N. Main	Stormwater Park	2.50	0.60	19.09	100	1,079	60%	267%	647
15	Village Oaks	Stormwater Retrofits	15.00	0.45	14.32	100	4,853	60%	122%	1,230
16	Maple Village	Stormwater Retrofits	25.00	0.45	14.32	100	35,792	60%	504%	21,475
17	Lawton Park	Stormwater Improvements	100.00	0.45	14.32	100	143,168	60%	979%	85,901
18	Lans Basin	Stormwater Retrofits	100.00	0.45	14.32	100	143,168	60%	245%	85,901
19	Churchill Downs Park	Stormwater Improvments	100.00	0.45	14.32	100	143,168	60%	765%	85,901

[1]Assuming 35.35-in annual rainfall for P and 0.9 for P_j where $R=P*P_j*R_v$

[2]Schueler, *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban Best Management Practices* (Washington D.C.: MWCOG, 1987), L=0.226*R*C*A

[3]USEPA, *Results of the Nationwide Urban Runoff Program* (Washington D.C: USEPA 1983)

Table III-3

Calculated Urban Annual TP Pollutant Load, Removal Efficiency, and Quantity Removed

Site	Location	BMP	Area (ac)	Runoff Coefficient	Annual Runoff (in)[1]	TP Pollutant Concentration (lb/ac/yr)[2]	Annual TP Load (lbs)	TP Removal Efficiency[3]	% First Flush Treated	TP Reduction (lb/yr)
			A	R_v	R	C	L			
1	Geddes Drive	First Flush Storage with Pollutant Separation	3.00	0.95	30.22	0.5	2	30%	445%	0.45
2	Detroit Street	First Flush Storage with Pollutant Separation	1.57	0.95	30.22	0.5	1	30%	139%	0.24
3	Farmers Market Parking Lot	First Flush Storage with Pollutant Separation	1.75	0.95	30.22	0.5	1	30%	127%	0.26
4	Briarwood Ponds	Pond Retrofits	160.00	0.65	20.68	0.5	80	60%	67%	32
5	Street Tree Planting	Tree Planting	Throughout City							
6	Malletts' Creek	Streambank Stabilization	See Table III-6							
7	Miller Creek	Streambank Stabilization	See Table III-6							
8	Huron High Baffle Box	Baffle Box	1500	0.53	16.86	0.5	750	60%	100%	450
9	State Street	Infiltration Swales	12.20	0.95	30.22	0.5	6	60%	29%	1
		Infiltration Basins	3.60	0.65	20.68	0.5	2	60%	64%	1
10	Scio Church	First Flush Storage with Pollutant Separation	7.25	0.90	28.63	0.5	4	30%	112%	1.09
11	Stadium Blvd (Hutchins to Kipke)	First Flush Storage with Pollutant Separation	2.00	0.90	28.63	0.5	1	60%	100%	0.60
		Tree Planting	NA							
12	Research Park	Streambank Stabilization	See Table III-6							
		Storage	350.00	0.45	14.32	0.5	175.00	60%	11%	12
13	Huron Hills	Streambank Stabilization and Wetland Creation	See Table III-6							
14	S. Seventh	Porous Road (Full Width)	1.90	0.95	30.22	0.5	1	30%	481%	0.29
15	721 N. Main	Stormwater Park	2.50	0.60	19.09	0.5	1	60%	267%	1
16	Village Oaks	Stormwater Retrofits	15.00	0.45	14.32	0.5	8	60%	122%	5
17	Maple Village	Stormwater Retrofits	25.00	0.45	14.32	0.5	13	50%	504%	6
18	Lawton Park	Stormwater Improvements	100.00	0.45	14.32	0.5	50	50%	979%	25
19	Lans Basin	Stormwater Retrofits	100.00	0.45	14.32	0.5	50	50%	245%	25
20	Churchill Downs Park	Stormwater Improvments	100.00	0.45	14.32	0.5	50	50%	765%	25

[1] Assuming 35.35-in annual rainfall for P and 0.9 for P_j where $R=P*P_j*R_v$

[2] *Millers Creek Watershed Improvement Plan*

[4]Analysis for this site was performed outside of the Project Plan with a pollutant concentration in mg/L

Table III-4
Calculated Urban *E coli.* Pollutant Load

Site		BMP	Area (ac)	Runoff Coefficient	Annual Runoff (in)[1]	*E coli.* Pollutant Concentration (#/100 ml)[2]	Annual *E coli.* Load (billion colonies)[3]
			A	R_v	R	C	L
1	Geddes Drive	First Flush Storage with Pollutant Separation	3.00	0.95	30.22	20,000	1,868
2	Detroit Street	First Flush Storage with Pollutant Separation	1.57	0.95	30.22	20,000	978
3	Farmers Market Parking Lot	First Flush Storage with Pollutant Separation	1.75	0.00	0.00	20,000	0
4	Briarwood Ponds	Pond Retrofits	160.00	0.45	14.32	20,000	47,188
5	Street Tree Planting	Tree Planting	Throughout City				
6	Mallett's Creek	Streambank Stabilization	NA	NA	NA	NA	NA
7	Miller Creek	Streambank Stabilization	NA	NA	NA	NA	NA
8	Huron High Baffle Box	Baffle Box	NA	NA	NA	NA	NA
9	State Street	Infiltration Swales	12.20	0.95	30.22	20,000	7,596
		Infiltration Basins	3.60	0.60	19.09	20,000	1,416
10	Scio Church	First Flush Storage with Pollutant Separation	7.25	0.95	30.22	20,000	4,514
11	Stadium Blvd (Hutchins to Kipke)	First Flush Storage with Pollutant Separation	2.00	0.95	30.22	20,000	1,245
		Tree Planting	0.00	0.00	0.00	20,000	0
12	Research Park	Streambank and Storage	350	0.43	14.32	20,000	103,224
13	Huron Hills	Streambank Stabilization and Wetland Creation	NA	NA	NA	NA	NA
14	S. Seventh	Porous Road (Full Width)	1.90	0.95	30.22	20,000	1,183
15	721 N. Main	Stormwater Park	1.90	0.60	19.09	20,000	747
16	Village Oaks	Stormwater Retrofits	2.00	0.95	30.22	20,000	1,245
17	Maple Village	Stormwater Retrofits	25.00	0.95	30.22	20,000	15,563
18	Lawton Park	Stormwater Improvements	100.00	0.45	14.32	20,000	29,493
19	Lans Basin	Stormwater Retrofits	100.00	0.45	14.32	20,000	29,493
20	Churchill Downs Park	Stormwater Improvements	100.00	0.45	14.32	20,000	29,493

[1]Assuming 35.35-in annual rainfall for P and 0.9 for P_j where $R=P*P_j*R_v$

[2]USEPA, *Results of the Nationwide Urban Runoff Program* (Washington D.C: USEPA 1983)

Table III-5

First Flush Volume Summary

Site	Site	BMP	First Flush Volume (cf)[1]	Treatment Volume (cf)	First Flush Flow Rate (cfs)	Treatment First Flush Flow Rate (cfs)	% First Flush Treated
1	Geddes Drive	First Flush Storage with Pollutant Separation	3,104	13,823	3	4	445%
2	Detroit Street	First Flush Storage with Pollutant Separation	2,715	3,770	2	2	139%
3	Farmers Market	First Flush Storage with Pollutant Separation	2,969	3,770	2	2	127%
4	Briarwood Ponds	Pond Retrofits	188,760	126,000	NA	NA	67%
5	Street Tree Planting	Tree Planting	NA	NA	NA	NA	NA
6	Malletts Creek	Streambank Stabilization	NA	NA	NA	NA	NA
7	Miller Creek	Streambank Stabilization	NA	NA	NA	NA	NA
8	Huron High School	Baffle Box	NA	NA	NA	NA	NA
9	State Street	Infiltration Swales	21,037	6,000	NA	NA	29%
		Infiltration Basins	6,259	4,021	NA	NA	64%
10	Scio Church	First Flush Storage with Pollutant Separation	12,501	14,019	10	10	112%
11	Stadium Blvd (Hutchins to Kipke)	First Flush Storage with Pollutant Separation	3,321	30,000	NA	NA	903%
		Tree Planting		10	NA	NA	NA
12	Research Park	Basin Improvements	81,650	9,000	NA	NA	11%
13	Huron Hills	Streambank and Storage	NA	NA	NA	NA	NA
14	S. Seventh	Porous Road (Full Width)	3,276	15,750	2	3	481%
15	721 N. Main	Stormwater Park	4,084	10,890	NA	NA	267%
16	Village Oaks	Stormwater Retrofits	12,251	15,000	NA	NA	122%
17	Maple Village	Stormwater Retrofits	20,419	103,000	NA	NA	504%
18	Lawton Park	Stormwater Improvements	81,675	825,000	NA	NA	1010%
19	Lans Basin	Stormwater Retrofits	81,675	200,000	NA	NA	245%
20	Churchill/Eisenhower Park	Stormwater Improvments	81,675	625,000	NA	NA	765%

1 The first flush is 0.5-in of rainfall over the contributing area, determined by with the Rational Method

Table III-6

Streambank Erosion Quantities and Annual Pollutant Reductions

Site	Project Name	Length of Bank (ft)	Existing Bank Erosion Rate (tons/yr)[1]	Post Rehab Bank Erorsion Rate (tons/yr)[2]	Post Rehab TSS Reduction (tons/yr)	Annual P Removal (lb)[3]	Annual N Removal (lb)[2]
	Malletts Creek	**6000**	**1480**	**60**	**1420**	**1207**	**2414**
	Research Park	**1000**	**246**	**10**	**236**	**201**	**401**
	Millers Creek	**1250**	**310**	**10**	**300**	**255**	**510**
	Huron Hills	**1030**	**250**	**10**	**240**	**204**	**408**

[1]Rosgen, *Applied River Morphology* . Wildlife Hydrology (Pagosa Springs, CO: 1996), Existing Bank Erosion Rate = Length of Bank*0.246

[2]Rosgen, *Applied River Morphology* . Wildlife Hydrology (Pagosa Springs, CO: 1996), Post Rehab Bank Erosion Rate = Length of Bank*0.0099

Table III-7

Alternative Cost and Cost per Unit of Storage or Removal

Site	Alternative Type	Site	BMP	Cost	$/cf Storage	$/lb TSS Removed	$/lb P Removed
1	Geddes Avenue		First Flush Storage with Pollutant Separation	$2,720,000	$197	$2,212	$6,044,000
2	Detroit Street		First Flush Storage with Pollutant Separation	$1,090,000	$289	$1,694	$4,628,450
3	Farmers Market		First Flush Storage with Pollutant Separation	$700,000	$186	$1,088	$2,666,667
4	Briarwood Mall Pond Retrofits		Pond Retrofits	$1,230,000	$10	$49.10	$38,246
5	Tree Planting and Enhancement		Tree Planting	$2,070,000	NA	NA	NA
6	Mallett's Creek Streambank Stabilization		Streambank Stabilization	$2,770,000	NA	$0.98	$2,295
7	Millers Creek Streambank Stabilization		Streambank Stabilization	$650,000	NA	$1.08	$2,549
8	Huron High School Baffle Box		Pollutant Removal	$200,000	NA	$0.44	$444
9	State Street - Eisenhower to S. of I-94		Infiltration Swales/Infiltration Basins	$1,060,000	$106	$607	$998,682
10	Scio Church - Main Street to east of Seventh		First Flush Storage with Pollutant Separation	$3,860,000	$97	$1,371	$3,549,425
11	Stadium Blvd (Hutchins Ave to Kipke Dr)		First Flush Storage with Pollutant Separation	$1,640,000	$205	$1,690	$2,733,333
12	Research Park Wetland Detention - Streambank		Streambank Stabilization and Wetland Creation	$920,000	$102	$2	$4,340
13	Huron Hills Golf Course		Streambank Stabilization	$1,220,000	NA	$2.54	$5,980.39
14	S. Seventh Street - Scio Church to Greenview		Porous Road (Full Width)	$840,000	$53	$1,079	$2,947,368
15	721 N. Main Street		Stormwater Park	$1,760,000	$83	$2,720	$2,346,667
16	Village Oaks		Stormwater Retrofits	$1,291,000	$86	$1,050	$286,889
17	Maple Village		Stormwater Retrofits	$2,420,000	$23	$113	$387,200
18	Lawton Park		Stormwater Improvements	$13,520,000	$16	$157	$540,800
19	Lans Basin		Stormwater Retrofits	$1,410,000	$7	$16	$56,400
20	Churchill Downs Park		Stormwater Improvements	$3,810,000	$9	$44	$152,400

5. Implementability and Public Participation

Most of the proposed project locations presented in this Plan are also identified in the City's Capital Improvements Plan, and are supported by the WMP. During the planning process for those plans, the public was involved and had the opportunity to comment and help prioritize the improvements.

The locations of the majority of the projects proposed in this Plan are on City or County-owned and maintained properties. There are several areas where the County is working on easements to perform these improvements as noted herein. These will be procured prior to implementation of these projects. The WCWRC and the City have a strong relationship and are able to coordinate and implement multiple design and construction projects. The overall scale of these proposed projects is well within their abilities to manage.

6. Technical and Other Considerations

The following considerations are outlined in the SRF Project Plan development guidance. The majority of the considerations are related to sanitary analyses and are not applicable to NPS Project Plan development, and are included only to ensure completeness of the Project Plan development process.

a. Infiltration and Inflow (I/I) Removal

I/I removal is an issue related to sanitary sewers and is therefore not applicable to this NPS Project Plan.

b. Sludge and Residuals

Sludge and residuals are related to wastewater treatment processes and are therefore not applicable to this NPS Project Plan.

c. Industrial Pretreatment

This section is not applicable to this NPS Project Plan.

d. Growth Capacity

The land cover of the drainage areas is nearly built-out. Future stormwater increases are not anticipated for the Study Area.

e. Areas Currently without Sewers

There are no onsite sewage disposal systems (OSDS) near the proposed alternatives. Therefore, the proposed BMPs are not considered to adversely affect any OSDS.

f. Reliability

It is anticipated that all the sites will need soil erosion and sedimentation permits. Areas where there is work proposed within or near an inland waterway, wetland, or 100-year floodplain, will require an MDEQ Joint Permit. It is anticipated in order to maintain BMP reliability that all sites will be inspected on a regular frequency. Any of the improvement sites with water quality BMPs, such as pollutant separation or offline first flush storm sewer, will need to be regularly maintained by the City.

g. Alternative Sites and Routings

All BMPs will be constructed onsite. Therefore, no routing considerations are needed.

h. Combined Sewer Overflows

This section is not applicable to this NPS Project Plan.

i. Contamination at the Project Site

There are no known sites of contamination that will affect or be affected by the proposed BMPs.

Section IV - Selected Alternative

A. Description of the Selected Alternative

For each of the proposed project locations, the Principal Alternatives were evaluated as previously described, with emphasis on removal of NPS pollutants from the Study Area. The proposed BMPs were categorized as water quality BMPs, optimizations of existing facilities, or streambank stabilization. When considering the opportunities, each BMP was maximized to mitigate NPS pollutants most-closely associated with first flush components. For the facility optimization and streambank stabilization projects, the options for correction were limited; however, the impact of these projects in reducing NPS pollutants will be significant.

The water quality BMP locations were evaluated as suites, where several options could be implemented on each site to maximize NPS pollutant removal. If for some reason, a specific BMP has to be eliminated from the formal design, there are other options available. In addition, sites that are suitable for utilizing several options allow the greatest TSS, TP, and *E. coli* reduction yield possible. A summary of all the sites and the associated selected alternatives are in Table IV-1.

Table IV-1 – Proposed Projects

Site	Alternative Type	Site
1	Water Quality BMP	Geddes Road -First Flush Storage with pollutant separation
2	Water Quality BMP	Detroit St - First Flush Storage with pollutant separation
3	Water Quality BMP	Farmers Market - First Flush Storage with pollutant separation
4	Optimization of Existing Facilities	Briarwood Mall Pond Retrofits
5	Water Quality BMP	Tree Planting and Enhancement
6	Streambank Stabilization/ Water Quality BMP	Mallett's Creek Streambank Stabilization
7	Streambank Stabilization/ Water Quality BMP	Millers Creek Streambank Stabilization
8	Streambank Stabilization/ Water Quality BMP	Huron High School Baffle Box
9	Water Quality BMP	State Street - Eisenhower to S. of I-94 - Replacement of Concrete Islands with green space and infiltration swales
10	Water Quality BMP	Scio Church - Main Street to east of Seventh - First Flush Storm Sewer
11	Water Quality BMP	Stadium Blvd (Hutchins Ave to Kipke Dr) - First Flush Storage and Tree Planting
12	Water Quality BMP	Research Park Wetland Detention - Streambank Stabilization and Wetland Creation
13	Streambank Stabilization/ Water Quality BMP	Huron Hills Golf Course - Streambank Stabilization and Wetland Creation
14	Water Quality BMP	S. Seventh Street - Scio Church to Greenview - Porous Pavement
15	Water Quality BMP	721 N. Main Street - Removal of Concrete Area and Replacement with Stormwater Park
16	Optimization of Existing Facilities	Village Oaks - Upgraded Detention
17	Water Quality BMP	Maple Village - Porous Pavement, Underground Detention and Infiltration
18	Water Quality BMP	Lawton Park - Underground Storage and Treatment
19	Water Quality BMP	Churchill Downs Park - Surface Storage and Treatment
20	Water Quality BMP	Lans Basin - Detention Basin Retrofits

1. Relevant Design Parameters

a. The major process features are outlined in Table IV-1. Each sites pollutant loads and BMP reductions are outlined in the previous tables.

b. The unit processes and sizes as related to service area needs.

The BMP sizing was performed at a conceptual for each site. Greater emphasis will be placed on the calculation during the design phase of the projects. The graphical elements are shown on the Figures in Section 3.

c. A schematic flow diagram of the treatment process

This is not applicable for stormwater treatment projects.

d. The design criteria (detention times, overflow rates, process loadings, and design flows).

In all cases where BMPs were considered, the site improvements were maximized in an attempt to mitigate the first flush rainfall. The first flush is the portion of a storm that washes the majority of the pollutants from a site and is considered to be the first 0.5-in of rain. Events of this size account for the majority of the total rain events total rain events in a year, approximately 85%. All water quality BMPs, in accordance with the WCWRC design standard, will be constructed to dewater within 24-48 hours. Soil amendments and underdraining will be considered for the bioinfiltration, bioswale, and porous surface BMPs.

The porous surfaces will be designed at a depth necessary to mitigate the entire first flush runoff volume. This area accounts for the porous surface material with a layer of open graded aggregate subbase. Underdrain, if needed, will be placed below the aggregate subbase to capture any additional water that is beyond the capacity of the soil and the BMP. Any necessary underdrains will discharge to a nearby storm sewer. The porous surface is anticipated to maintain a 40% void space for stormwater infiltration and detention. However, a 30% design void space has been used for the stormwater calculations as a safety factor based on the WCWRC design standards.

Several pollutant separators are being proposed throughout the Study Area. Each unit is sized for the first flush flow based on the upstream land cover, time of concentration and contributing area.

The bioinfiltration/infiltration swales will be designed to drain within 24 to 48 hours. While some preliminary soil borings have been taken, additional testing will be taken during the design phase. An overflow system will be considered for all proposed BMPs as a means for emergency conveyance during large storm events.

Streambank stabilization will be designed on a site by site basis. However, a combination of regrading, toe protection, flow dissipation, and naturalization with native species will be incorporated. The improvements will be subject to high velocities and will need to reflect the final design.

The tree installation and enhancement program will be focused on placing new hardwood vegetation along City corridors. The specific species and locations will be guided by the City's forester to enhance water quality through interception, infiltration, and transpiration.

e. Residuals Management

It is anticipated that frequent vactoring and/or dredging of sediment and debris from the hydrodynamic separators and first flush storm sewers will be necessary for proper BMP function. It is recommended that the City initially perform maintenance twice annually. All sediment and debris that is removed will be transported and disposed of at a licensed disposal facility.

f. Sewer Length and Sizes

The sewers that are proposed for this Project Plan are associated with the first flush or larger storm sewer upgrades, unless otherwise noted. All improvement will be performed as an enhancement and upsize to the existing infrastructure to mitigate the flow and volume associated with the first flush. Final sizing and length of the storm sewer will be determined as part of the project design.

For the bioinfiltration basins, infiltration swales, and porous road surfaces, it may be necessary for an underdrain below the BMPs if the in-situ soils are poorly drained. This will be determined as part of the design phase.

g. Pump stations types and sizes, including provisions for standby power and odor control

There are no pump stations to be constructed as part of this Project Plan.

h. The proposed schedule for design and construction.

From submittal of the Project Plan to project closeout, it is anticipated that the entire timeline will occur from July 2013 – July 2019. There are six major tasks identified for the selected alternatives completion. These tasks include:

- Submittal of the Project Plan to MDEQ – July 1, 2013
- Project Plan review and approval – The MDEQ will have the opportunity to review the plan. Approval will be needed prior to the design and construction of the selected alternatives.
- Plan development and design – Design of the selected alternatives will be performed and plan for construction will be developed.
- Permits and easements – All required permits will be obtained. All easement acquisition will be handled prior to the project.
- Project construction – The selected alternatives will be constructed per each project milestone schedule.
- Administration and closeout – Administration of the improvements will be necessary throughout the length of the project. Closeout will be performed at the end of the project.

2. Controlling Factors

The typical controlling factors listed in SRF Project Plan development guideline are not applicable to this NPS Project Plan. These include items such as service area population; characteristics of influent wastewater and treatment residuals; discharge permit requirements; stipulations in court orders, federal or state enforcement orders, or administrative consent orders; proposed effluent limits; local health department findings and directives; and mitigation of environmental impacts with regard to collection and transport via sewers or force mains.

However, additional controlling factors applicable to this NPS Project Plan include:

a. Pedestrian or Traffic Impact

Placing BMPs in highly visible or accessible locations can be great for exposure; however, detrimental to foot and vehicular traffic. Bioinfiltration areas adjacent to high foot traffic zones will be marked with signs to educate the public on their purpose and need for protection. All underground BMPs within the right-of-way may pose a traffic hazard during maintenance procedures. City staff will utilize proper traffic signage and signaling during maintenance activities. The sites potentially affected by this control are primarily Detroit Street, the Farmers Market Parking Lot, and Stadium Street.

b. Maintenance

Proper BMP maintenance is crucial for long term success. Street sweeping on the porous surfaces, vactoring pollutant separation units, and first flush storm sewers, as well as biannual freshening of the bioinfiltration and bioswale planted beds will help sustain their storm runoff mitigation capacity. Furthermore, cleaning out oversized pipes and sumps on an annual basis will help maintain stormwater treatment capacity. The sites potentially affected by this control are Detroit Street, the Farmers Market Parking Lot, Geddes Road, Scio Church Road, Stadium Drive, S. Seventh Street, State Street, Research Park, and 721 N. Main.

c. Topographic Constraints

Steep topography can limit the accessibility for construction and maintenance of the proposed BMPs. The slopes along Geddes Road (Site 1) are very steep and will require additional analysis during design and construction.

d. Accessibility

Several BMP locations are located along highway corridors or at remote locations on drain reaches. These areas are all within designated public right-of-ways and/or drainage easements. However, temporary signage and markers will be necessary along the highways as well as possibly temporary construction easements for equipment to access the sites. The sites potentially affected by this control are Mallett's Creek and Millers Creek Improvements.

3. Project Maps

The categories identified in the guidance document were not applicable to this Project Plan. However, maps have been created to illustrate the proposed projects and convey the proposed improvements. These figures illustrate aerial views of the sites, existing storm sewer, and the locations or footprints of the proposed BMPs. These are all shown on Figures included in the previous section.

4. Sensitive Features

Sensitive features, such as agricultural lands, archeological sites, or threatened and endangered species habitat, will not be impacted by the proposed projects. Figure 5 provides the location of the existing wetlands that are near several of proposed projects.

Established FEMA floodplain/floodways are present at numerous locations and mitigation may be necessary due to the nature of the proposed improvements. All work within regulatory floodplains will be permitted through MDEQ Joint Permit Application process. See Figure 10 for locations of the Floodways and Floodplains in the City of Ann Arbor.

5. Mitigation of Environmental Impacts

All proposed improvements that may impact existing wetlands and/or floodplains will be performed in accordance with all regulations and any specific conditions of the MDEQ Joint

Permits. The improvements are intended to improve habitat quality while enhancing its functionality as a stormwater quality feature. At no point is it the intention of this Project Plan to destroy, remove, or impact a sensitive habitat/feature without proper mitigation. Such measures would be counterintuitive to enhancing water quality within the Study Area.

6. Schedule for Design and Construction

The Schedule is tentative pending the approval of the SRF Project Plan. Below is a tentative proposed schedule.

Advertise Public Hearing ..... May 23, 2013

Draft Project Plan on Display ..... May 23, 2013

Public Hearing ..... June 24, 2013

Adoption of Project Plan by the Statutory Drain Board ..... June 26, 2013

Final Project Plan Submittal to the MDEQ ..... July 1, 2013

Table IV-2 below outlines the proposed requested loan closing date (year and quarter) of the proposed improvement projects for each site. For projects beyond 2015, no quarters are provided.

Table IV-2 – Proposed Project Schedule

Site	Project	Year	Quarter
1	Geddes Road -First Flush Storm Sewer with pollutant separation	2015	
2	Detroit St - First Flush Storm Sewer with pollutant separation	2018	
3	Farmers Market - First Flush Storm Sewer	2016	
4	Briarwood Mall Pond Retrofits	2018	
5	Tree Planting and Enhancement	2015-2018	
6	Malletts Creek Streambank Stabilization	2015	
7	Millers Creek Streambank Stabilization	2017	
8	Huron High School Baffle Box	2017	
9	State Street - Eisenhower to S. of I-94 - Replacement of Concrete Islands with green space and infiltration swales	2018	
10	Scio Church - Main Street to east of Seventh - First Flush Storm Sewer	2016	
11	Stadium Blvd (Hutchins Ave to Kipke Dr) - First Flush Storm Sewer	2016	
12	Research Park Wetland Detention - Streambank Stabilization	2018	
13	Huron Hills Golf Course - Streambank Stabilization and Wetland Area	2018	
14	S. Seventh Street - Scio Church to Greenview - HMA/Storm	2016	
15	721 N. Main Street - Removal of Concrete Area and Replacement with Stormwater Park	2014	Q4 2014
16	Village Oaks - Additional Detention	2014	Q4 2014
17	Maple Village - Underground Detention and Infiltration	2018	
18	Lawton Park	2016	
19	Lans Basin	2016	
20	Churchill Downs Park	2016	

7. Cost Summary

The cost summary provided in Table IV-3 is the total cost for all of the selected alternatives, including engineering, construction, and contingency fees. As the summary indicates, the total cost for all of the selected alternatives is approximately $45,180,000. See Appendix A for a detailed cost breakdown of each site.

Table IV-3 – Total Project Costs

Site	Proposed Alternative	Cost
1	Geddes Avenue	$2,720,000
2	Detroit Street	$1,090,000
3	Farmers Market	$700,000
4	Briarwood Mall Pond Retrofits	$1,230,000
5	Tree Planting and Enhancement	$2,070,000
6	Mallett's Creek Streambank Stabilization	$2,770,000
7	Millers Creek Streambank Stabilization	$650,000
8	Huron High School Baffle Box	$200,000
9	State Street - Eisenhower to S. of I-94	$1,060,000
10	Scio Church - Main Street to east of Seventh	$3,860,000
11	Stadium Blvd (Hutchins Ave to Kipke Dr)	$1,640,000
12	Research Park Wetland Detention - Streambank Stabilization	$920,000
13	Huron Hills Golf Course	$1,220,000
14	S. Seventh Street - Scio Church to Greenview	$840,000
15	721 N. Main Street	$1,760,000
16	Village Oaks	$1,291,000
17	Maple Village	$2,420,000
18	Lawton Park	$13,520,000
19	Churchill Downs Park	$3,810,000
20	Lans Basin	$1,410,000

B. Authority to Implement the Selected Alternative

The Huron River Green Infrastructure Drainage District (HRGIDD) is a legally established Chapter 20 Drainage District under PA 40 of 1956. The Washtenaw County Water Resources Commissioner is chair of the Statutory Drain Board which oversees all activities within the District. The HRGIDD includes all land located within individual districts where activity is proposed: Allen, Traver, Mallett's, Swift Run, and the prospective Miller Creek Drainage District. Planning will take place under the authority of the HRGIDD; project implementation will take place under the authority of the individual districts. Financing will be backed with the Full Faith and Credit of Washtenaw County. All site locations are within the City of Ann Arbor and are either publically owned, or within a public ROW or easement. The tree planting project, which takes place throughout the City, will be implemented and under the authority of the HRGIDD.

C. Users Costs

The HRGIDD Study Area is made up of several entities based on jurisdictional authority. Each entity will be assessed the cost of the loan repayment based on the selected project and the following apportionments.

Malletts Creek	
City of Ann Arbor	74.54%
County	0.99%
State	5.62%
Pittsfield Twp	18.85%

Swift Run Creek	
City of Ann Arbor	59.61%
County	1.43%
State	7.65%
Pittsfield Twp	31.31%

Traver Creek	
City of Ann Arbor	93.48%
County	2.24%
State	4.28%

Allen Creek	
City of Ann Arbor	95.40%
County	3.90%
State	0.70%

The proposed projects ,su be initiated by a petition and reviewed by the Statutory Drain Board with comments taken from the County.

The City resident apportionment will be paid through the existing stormwater utility fee. There are currently 25,171 users connected to the system. The 20 project sites have a combined estimated construction cost of $45,180,000. This equates to $27.90 per residential equivalent unit on a quarterly basis. These projects will be programmed into the City's Capital Improvement plan, therefore will not require any fee increase.

Section V - Evaluation of Environmental Impacts

A. General

The anticipated environmental impacts resulting from the construction of the selected plan include beneficial and adverse, short term and long term, and irreversible and irretrievable impacts. The following is a discussion of the environmental impacts of the selected plan.

1. Beneficial and Adverse Impacts

Construction activities associated with this Project Plan will take place primarily in existing road rights-of-way or existing easements. Construction and equipment manufacturing related jobs would be generated, and local contractors would have an equal opportunity to bid on the construction contracts.

Implementation of the Project Plan would create temporary disruption due to required construction. This includes noise and dust generated by the work, and possible erosion of spoils from open excavation. The assessment of alternate solutions and sites for the proposed project included identification of any important resources of either historic or environmental value which are protected by law and should be avoided.

2. Short and Long-Term Impacts

The short-term adverse impacts associated with construction activities would be minimal, and mitigated, in comparison to the resulting long-term beneficial impacts. Short-term impacts include traffic disruption, dust, noise, and inconveniences for the adjacent properties. No long-term negative impacts are anticipated. The long-term positive impacts include improved water quality within the watershed.

3. Irreversible Impacts

The investment in non-recoverable resources committed to the Project Plan would be traded off for the improved performance of the facilities during the life of the system. The commitment of resources includes public capital, energy, labor, and unsalvageable materials. These non-recoverable resources would be foregone for the provision of the proposed improvements.

Construction accidents associated with this project may cause irreversible bodily injuries or death. Accidents may also cause damage to or destruction of equipment and other resources.

B. Analysis of Impacts

1. Direct Impacts

Direct impacts for each of the individual projects are included in Section 3 under the project descriptions and costs. Overall, the direct impacts are in regards to inconveniences due to traffic and pedestrian disruptions, and temporary closures or blockages for people living in the area of construction. However, these direct impacts are expected to be minimal compared to the benefit received from completing these projects.

2. Indirect Impacts

No indirect impacts such as increased development, changes in land use, impacts on air quality, etc. are expected as a result of the proposed projects.

3. Cumulative Impacts

By reducing the volume of runoff and providing water quality benefits, the cumulative impacts to the environment as a result of these projects are expected to be positive.

Section VI - Mitigation

A. Short-Term, Construction-Related Mitigation

Traffic control will be necessary for the work proposed along or near cross roads of project sites. Proper signage, barricades, and lighting will be placed for the duration of the construction projects in accordance with Federal, State, and Local requirements. Soil erosion and sedimentation control measures as well as local permits will be required and followed during all construction activities. An MDEQ /Army Corps Joint Permit will be required for all work within, adjacent to, or nearby an inland lake or stream, wetland, or floodplain/floodway.

B. Mitigation of Long Term and Indirect Impacts

No adverse or long-term impacts are expected with this Project Plan. Where work may be within a regulated sensitive habitat, such as a wetland, stream, or floodplain, there will be mitigation as part of the design and permit process per the requirements of Act 451 of 1994, as amended.

C. Mitigation of Indirect Impacts

No adverse indirect impacts are expected with this Project Plan.

Section VII - Public Participation

A. Public Meetings on Project Alternatives

The project alternatives were developed from recommendations presented in the WMP, MIP, MRP, and CIP. All three plans involved the public and went through traditional means to receive input at public meeting and workshops. The findings, directives, and recommendations outlined within each plan were utilized to develop this SRF Project Plan.

Additional project locations, not specifically identified within another plan, were added by the City and WCWRC for NPS stormwater improvements. They are in areas significantly affected by stormwater runoff or are a source of NPS pollutants. The proposed improvements take into consideration the objectives of the WMP and will be helping the community achieve a reduction in pollutants as directed in the local TMDLs.

B. The Formal Public Hearing

A formal public hearing was held on June 24, 2013. It was advertised for at least 30 days prior to the meeting. A formal copy of the affidavit of notification is included in Appendix B. The Project Plan was made available for review by interested parties at Ann Arbor City Hall and the WCWRC office for the full 30 days. A verbatim transcript from the meeting as well as the power point presentation is also provided in Appendix B. The questions and public comment were received and responded to during the meeting. One resident asked questions regarding the City's CIP process. While the City and WCWRC tried to answer the question during the meeting, after the meeting, the resident was verbally provided a contact person at the City to contact about the specific process. Several emails were received and have been added to Appendix B, along with the responses.

C. Adoption of the Project Plan

The final Project Plan, including the selected alternative for improvement, was adopted by the Statutory Drain Board at a meeting on June 26, 2013. A copy of the resolution is included in Appendix C.

Section VIII - References

Ayers, Lewis, Norris, & May, Inc., Huron River Watershed Council, and Tilton and Associates, Inc. 2004. *Millers Creek Watershed Improvement Plan*.

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HURON RIVER 2013 SRF PROJECT PLAN

PREPARED FOR

Huron River Green Infrastructure Drainage District

APPENDIX A
COST AND BMP ANALYSIS

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Geddes Avenue - Arlington to Huron Parkway - Alternate A - First Flush Storm Sewer
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$75,000	$75,000
2	Traffic Control	**LS**	1	$15,000	$15,000
3	Erosion Control	**LS**	1	$15,000	$15,000
4	First Flush Storm Sewer (48")	**FT**	2,300	$75	$172,500
5	Storm Structure	**EACH**	7	$2,500	$17,500
6	Storm Sewer Outlet	**LFT**	500	$100	$50,000
7	3 cfs Pollutant Separator (First Flush: 3 cfs)	**EACH**	1	$20,000	$20,000
8	Road Reconstruction	**SFT**	84,375	$15	$1,265,625
9	Pavement Removal	**SYD**	9,375	$5	$46,875
10	Restoration	**LS**	1	$30,000	$30,000
	SUBTOTAL				$1,707,500
	Construction Contingency (20%)				$341,500
	TOTAL CONSTRUCTION COST				$2,049,000
	Engineering and Construction Services (25%)				$512,300
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction				$20,000
	Financial and Legal (5%)				$102,500
	ALLOWANCES				
	Easement acquisition costs, if required				$10,000
	Major utility relocation				$7,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$2,720,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Geddes Avenue - Arlington to Huron Parkway - Alternate A - First Flush Storm Sewer
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Detroit Street Improvements	$ 2,720,000.00	50	$ 1,993,000.00
TOTAL CAPITAL COST	**$ 2,720,000.00**		$ 1,993,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 54,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 2,050,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 153,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Geddes Avenue - Arlington to Huron Parkway - Alternate B - Subsurface Stone Reservoir
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$75,000	$75,000
2	Traffic Control	**LS**	1	$15,000	$15,000
3	Erosion Control	**LS**	1	$15,000	$15,000
4	Subsurface Stone Reservoir	**CYD**	2,500	$75	$187,500
5	Storm Structure	**EACH**	7	$2,500	$17,500
6	Storm Sewer Outlet	**LFT**	500	$100	$50,000
7	3 cfs Pollutant Separator (First Flush: 3 cfs)	**EACH**	1	$20,000	$20,000
8	Road Reconstruction	**SFT**	84,375	$15	$1,265,625
9	Pavement Removal	**SYD**	9,375	$5	$46,875
10	Restoration	**LS**	1	$30,000	$30,000
	SUBTOTAL				$1,722,500
	Construction Contingency (20%)				$344,500
	TOTAL CONSTRUCTION COST				$2,067,000
	Engineering and Construction Services (25%)				$516,800
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction				$20,000
	Financial and Legal (5%)				$103,400
	ALLOWANCES				
	Easement acquisition costs, if required				$10,000
	Major utility relocation				$7,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$2,740,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Geddes Avenue - Arlington to Huron Parkway - Alternate B - Subsurface Stone Reservoir
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Detroit Street Improvements	$ 2,740,000.00	50	$ 2,008,000.00
TOTAL CAPITAL COST	**$ 2,740,000.00**		$ 2,008,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 55,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 2,066,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 154,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Detroit Street - Catherine to Division - Alternate A - First Flush Storm Sewer
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$30,000	$30,000
2	Traffic Control	**LS**	1	$25,000	$25,000
3	Erosion Control	**LS**	1	$5,000	$5,000
4	Storm Sewer, 24" RCP	**FT**	1,200	$50	$60,000
5	2 cfs Pollutant Separator (First Flush: 1.6 cfs)	**EACH**	1	$10,000	$10,000
6	Brick Paver Remove and Replace	**SFT**	68,600	$8	$514,500
7	Restoration	**LS**	1	$20,000	$20,000
	SUBTOTAL				$664,500
	Construction Contingency (20%)				$132,900
	TOTAL CONSTRUCTION COST				$797,400
	Engineering and Construction Services (25%)				$199,400
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction				$20,000
	Financial and Legal (5%)				$39,900
	ALLOWANCES				
	Easement acquisition costs, if required				$10,000
	Major utility relocation				$7,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$1,090,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Detroit Street - Catherine to Division - Alternate A - First Flush Storm Sewer
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Detroit Street Improvements	$ 1,090,000.00	50	$ 799,000.00
TOTAL CAPITAL COST	**$ 1,090,000.00**		$ 799,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 22,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 824,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 61,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Detroit Street - Catherine to Division - Alternate B - Subsurface Stone Reservoir
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$30,000	$30,000
2	Traffic Control	**LS**	1	$25,000	$25,000
3	Erosion Control	**LS**	1	$5,000	$5,000
4	2 cfs Pollutant Separator (First Flush: 1.6 cfs)	**EACH**	1	$10,000	$10,000
5	Brick Paver Remove and Replace with Stone Reservoir	**SFT**	68,600	$15	$1,029,000
6	Restoration	**LS**	1	$20,000	$20,000
	SUBTOTAL				$1,119,000
	Construction Contingency (20%)				$223,800
	TOTAL CONSTRUCTION COST				$1,342,800
	Engineering and Construction Services (25%)				$335,700
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction				$20,000
	Financial and Legal (5%)				$67,100
	ALLOWANCES				
	Easement acquisition costs, if required				$10,000
	Major utility relocation				$7,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$1,800,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Detroit Street - Catherine to Division - Alternate B - Subsurface Stone Reservoir
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Detroit Street Improvements	$ 1,800,000.00	50	$ 1,319,000.00
TOTAL CAPITAL COST	**$ 1,800,000.00**		$ 1,319,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 36,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 1,358,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 101,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Farmers Market Parking Lot - First Flush Storm Sewer
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$20,000	$20,000
2	Traffic Control	**LS**	1	$5,000	$5,000
3	Erosion Control	**LS**	1	$5,000	$5,000
4	First Flush Storm Sewer (48" Diam)	**FT**	600	$60	$36,000
5	Storm Structure Adjustment	**EACH**	6	$250	$1,500
6	2 cfs Pollutant Separator (First Flush: 2 cfs)	**EACH**	1	$10,000	$10,000
7	Pavement Remove and Replace	**SYD**	8,400	$40	$336,000
8	Restoration	**LS**	1	$1,000	$1,000
	SUBTOTAL				$414,500
	Construction Contingency (20%)				$82,900
	TOTAL CONSTRUCTION COST				$497,400
	Engineering and Construction Services (25%)				$124,400
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction				$20,000
	Financial and Legal (5%)				$24,900
	ALLOWANCES				
	Easement acquisition costs, if required				$10,000
	Major utility relocation				$6,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$700,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Farmers Market Parking Lot - First Flush Storm Sewer
Present Worth Calculations

CAPITAL COST	CAPITAL COST[(1)]	SERVICE LIFE (YEARS)	PRESENT WORTH[(2)]
Farmers Market Improvements	$ 700,000.00	50	$ 513,000.00
TOTAL CAPITAL COST	**$ 700,000.00**		$ 513,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 14,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 530,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 39,000.00**

Notes:

(1) June 2013 ENR 20 Cities CCI = 9542

(2) Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Farmers Market Parking Lot - Stone Reservoir
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$20,000	$20,000
2	Traffic Control	**LS**	1	$5,000	$5,000
3	Erosion Control	**LS**	1	$5,000	$5,000
4	HMA Pavement Subsurface Stone Reservoir	**SYD**	8,400	$50	$420,000
5	Storm Sewer Upgrades	**LS**	1	$1,000	$1,000
6	2 cfs Pollutant Separator (First Flush: 2 cfs)	**EACH**	1	$10,000	$10,000
7	Pavement Removal	**SYD**	8,400	$2	$16,800
8	Restoration	**LS**	1	$1,000	$1,000
	SUBTOTAL				$478,800
	Construction Contingency (20%)				$95,800
	TOTAL CONSTRUCTION COST				$574,600
	Engineering and Construction Services (25%)				$143,700
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction				$20,000
	Financial and Legal (5%)				$28,700
	ALLOWANCES				
	Easement acquisition costs, if required				$10,000
	Major utility relocation				$6,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$800,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Farmers Market Parking Lot - Stone Reservoir
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Farmers Market Improvements	$ 800,000.00	50	$ 586,000.00
TOTAL CAPITAL COST	**$ 800,000.00**		$ 586,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 16,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 605,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 45,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Briarwood Ponds - Retrofits
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$25,000	$25,000
2	Traffic Control	**LS**	1	$10,000	$10,000
3	Erosion Control	**LS**	1	$10,000	$10,000
4	Weir Adjustments	**EACH**	2	$15,000	$30,000
5	Basin Dredging	**CYD**	10,000	$25	$250,000
6	Disposal	**CYD**	10,000	$20	$200,000
7	Berm Construction - in water	**CYD**	1,200	$30	$36,000
8	Naturalize Berms	**SYD**	1,200	$5	$6,000
9	Naturalize Basin Perimeter	**SYD**	2,500	$5	$12,500
10	Surface Restoration	**SYD**	15,000	$3	$45,000
11	Aggregate Surface	**SYD**	1,500	$10	$15,000
12	Easement Acquisition	**LS**	1	$75,000	$75,000
13	Restoration	**LS**	1	$40,000	$40,000
	SUBTOTAL				$754,500
	Construction Contingency (20%)				$150,900
	TOTAL CONSTRUCTION COST				$905,400
	Engineering and Construction Services (25%)				$226,400
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction				$20,000
	Financial and Legal (5%)				$45,300
	ALLOWANCES				
	Easement acquisition costs, if required				$10,000
	Major utility relocation				$6,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$1,230,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Briarwood Ponds - Retrofits
Present Worth Calculations

CAPITAL COST	CAPITAL COST[(1)]	SERVICE LIFE (YEARS)	PRESENT WORTH[(2)]
Briarwood Ponds - Retrofits	$ 1,230,000.00	50	$ 901,000.00
TOTAL CAPITAL COST	**$ 1,230,000.00**		$ 901,000.00
INTEREST DURING CONSTRUCTION Assumes 1 year interest at 2%			$ 25,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 1,000.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 13,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 939,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 70,000.00**

Notes:

(1) June 2013 ENR 20 Cities CCI = 9542

(2) Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Street Tree Planting
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$5,000	$5,000
2	Traffic Control	**LS**	1	$1,000	$1,000
3	Erosion Control	**LS**	1	$1,000	$1,000
4	Street Tree Planting (750/Year over 5 Years)	**EACH**	3,750	$500	$1,875,000
	SUBTOTAL				$1,882,000
	Construction Contingency (10%)				$188,000
	TOTAL CONSTRUCTION COST				$2,070,000
	TOTAL COST				$2,070,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Street Tree Planting
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Tree Planting	$ 2,070,000.00	50	$ 1,517,000.00
TOTAL CAPITAL COST	**$ 2,070,000.00**		$ 1,517,000.00
INTEREST DURING CONSTRUCTION Assumes 5 years interest at 2%			$ 205,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 1,725,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 128,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%. Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Mallett's Creek Streambank Restoration
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$50,000	$50,000
2	Traffic Control	**LS**	1	$10,000	$10,000
3	Erosion Control	**LS**	1	$20,000	$20,000
4	Replacement of 6 Culverts - Oakbrook Drive	**LS**	1	$500,000	$500,000
5	Streambank Stabilization	**LFT**	5,600	$200	$1,120,000
	SUBTOTAL				$1,700,000
	Construction Contingency (20%)				$340,000
	TOTAL CONSTRUCTION COST				$2,040,000
	Engineering and Construction Services (25%)				$510,000
	Geotechnical Investigation				$10,000
	Geotechnical Services During Construction				$40,000
	Financial and Legal (5%)				$102,000
	ALLOWANCES				
	Easement acquisition costs, if required				$25,000
	Major utility relocation				$24,000
	Permit fees, bonds and inspection fees from permitting agencies.				$15,000
	TOTAL COST				$2,770,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Mallett's Creek Streambank Stabilization
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Malletts Creek Streambank Stabilization	$ 2,770,000.00	50	$ 2,029,000.00
TOTAL CAPITAL COST	**$ 2,770,000.00**		$ 2,029,000.00
INTEREST DURING CONSTRUCTION Assumes 5 years interest at 2%			$ 275,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 1,000.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 13,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 2,317,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 172,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Millers Creek Streambank Restoration
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$15,000	$15,000
2	Traffic Control	**LS**	1	$20,000	$20,000
3	Erosion Control	**LS**	1	$20,000	$20,000
4	Vegetation Management	**LS**	1	$20,000	$20,000
5	Streambank Stabilization	**LFT**	1,250	$200	$250,000
	SUBTOTAL				$325,000
	Construction Contingency (20%)				$65,000
	TOTAL CONSTRUCTION COST				$390,000
	Engineering and Construction Services (25%)				$97,500
	Geotechnical Investigation				$10,000
	Geotechnical Services During Construction				$40,000
	Financial and Legal (5%)				$19,500
	ALLOWANCES				
	Easement acquisition costs, if required				$25,000
	Major utility relocation				$24,000
	Permit fees, bonds and inspection fees from permitting agencies.				$15,000
	Establishment of Drainage District				$20,000
	TOTAL COST				$650,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Millers Creek Streambank Restoration
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Millers Creek Streambank Restoration	$ 650,000.00	50	$ 476,000.00
TOTAL CAPITAL COST	**$ 650,000.00**		$ 476,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 13,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 492,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 37,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Huron High School Baffle Box
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$10,000	$10,000
2	Traffic Control	**LS**	1	$2,500	$2,500
3	Erosion Control	**LS**	1	$2,500	$2,500
4	Baffle Box	**EACH**	1	$75,000	$75,000
#REF!	Restoration	**LS**	1	$5,000	$5,000
	SUBTOTAL				$95,000
	Construction Contingency (20%)				$19,000
	TOTAL CONSTRUCTION COST				$114,000
	Engineering and Construction Services (25%)				$28,500
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction				$5,000
	Financial and Legal (5%)				$5,700
	ALLOWANCES				
	Easement acquisition costs, if required				$10,000
	Major utility relocation				$10,000
	Permit fees, bonds and inspection fees from permitting agencies.				$20,000
	TOTAL COST				$200,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Huron High School Baffle Box
Present Worth Calculations

CAPITAL COST	CAPITAL COST[(1)]	SERVICE LIFE (YEARS)	PRESENT WORTH[(2)]
Baffle Box	$ 200,000.00	50	$ 147,000.00
TOTAL CAPITAL COST	**$ 200,000.00**		$ 147,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 4,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 500.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 7,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 158,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 12,000.00**

Notes:

(1) June 2013 ENR 20 Cities CCI = 9542

(2) Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

State Street - Eisenhower to I-94
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$30,000	$30,000
2	Traffic Control	**LS**	1	$25,000	$25,000
3	Erosion Control	**LS**	1	$10,000	$10,000
4	Infiltration Swales	**CYD**	23,400	$10	$234,000
5	Infiltration Catch Basin, 96" Dia with 6' Sump	**EACH**	10	$10,000	$100,000
6	Tree Planting	**EACH**	400	$500	$200,000
7	Restoration	**LS**	1	$15,000	$15,000
	SUBTOTAL				$614,000
	Construction Contingency (20%)				$122,800
	TOTAL CONSTRUCTION COST				$736,800
	Engineering and Construction Services (25%)				$184,200
	Geotechnical Investigation				$10,000
	Geotechnical Services During Construction				$20,000
	Financial and Legal (5%)				$36,800
	ALLOWANCES				
	Easement acquisition costs, if required				$10,000
	Major utility relocation				$30,000
	Permit fees, bonds and inspection fees from permitting agencies.				$25,000
	TOTAL COST				$1,060,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

State Street - Eisenhower to I-94
Present Worth Calculations

CAPITAL COST	CAPITAL COST[(1)]	SERVICE LIFE (YEARS)	PRESENT WORTH[(2)]
Tree Planting	$ 1,060,000.00	50	$ 777,000.00
TOTAL CAPITAL COST	**$ 1,060,000.00**		$ 777,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 21,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 801,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 60,000.00**

Notes:

(1) June 2013 ENR 20 Cities CCI = 9542

(2) Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Scio Church - Main Street to Greenview
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$35,000	$35,000
2	Traffic Control	**LS**	1	$50,000	$50,000
3	Erosion Control	**LS**	1	$8,000	$8,000
5	72" First Flush Storm Sewer	**LFT**	1,100	$150	$165,000
6	60" First Flush Storm Sewer	**LFT**	1,300	$100	$130,000
7	36" First Flush Storm Sewer	**LFT**	1,100	$50	$55,000
8	5 cfs Pollutant Separator (First Flush: 4 cfs)	**EACH**	1	$50,000	$50,000
9	5 cfs Pollutant Separator (First Flush: 4 cfs)	**EACH**	1	$50,000	$50,000
10	2 cfs Pollutant Separator (First Flush: 2 cfs)	**EACH**	1	$10,000	$10,000
11	Pavement Remove and Replace	**SYD**	43,000	$40	$1,720,000
12	Restoration	**LS**	1	$70,000	$70,000
	SUBTOTAL				$2,343,000
	Construction Contingency (20%)				$468,600
	TOTAL CONSTRUCTION COST				$2,811,600
	Engineering and Construction Services (25%)				$702,900
	Geotechnical Investigation				$15,000
	Geotechnical Services During Construction				$60,000
	Financial and Legal (5%)				$140,600
	ALLOWANCES				
	Easement acquisition costs, if required				$60,000
	Major utility relocation				$42,000
	Permit fees, bonds and inspection fees from permitting agencies.				$20,000
	TOTAL COST				$3,860,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Scio Church - Main Street to Greenview
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Scio Church Improvements	$ 3,860,000.00	50	$ 2,828,000.00
TOTAL CAPITAL COST	**$ 3,860,000.00**		$ 2,828,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 77,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 2,908,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 216,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Stadium Blvd between Hutchins Ave. and Kipke Dr - Alternative A - Porous/HMA with Stone Reservoir
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	**LS**	1	$30,000	$30,000
2	Traffic Control	**LS**	1	$50,000	$50,000
3	Erosion Control	**LS**	1	$10,000	$10,000
4	Storm Sewer Improvements	**LS**	1	$50,000	$50,000
5	Tree with Structural Soil	**EACH**	58	$1,000	$58,000
6	Pavement Removal and Replacement - Porous/HMA	**SYD**	8,000	$90	$720,000
7	Restoration	**LS**	1	$60,000	$60,000
	SUBTOTAL				$978,000
	Construction Contingency (20%)				$195,600
	TOTAL CONSTRUCTION COST				$1,173,600
	Engineering and Construction Services (25%)				$293,400
	Geotechnical Investigation				$10,000
	Geotechnical Services During Construction				$40,000
	Financial and Legal (5%)				$58,700
	ALLOWANCES				
	Easement acquisition costs, if required				$20,000
	Major utility relocation				$35,000
	Permit fees, bonds and inspection fees from permitting agencies.				$15,000
	TOTAL COST				$1,650,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Stadium Blvd between Hutchins Ave. and Kipke Dr - Alternative A - Porous/HMA with Stone Reservoir
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Tree Planting	$ 1,650,000.00	50	$ 1,209,000.00
TOTAL CAPITAL COST	**$ 1,650,000.00**		$ 1,209,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 33,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 1,245,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 93,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Stadium Blvd between Hutchins Ave. and Kipke Dr - Alternative B - First Flush Storm Sewer
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$30,000	$30,000
2	Traffic Control	**LS**	1	$50,000	$50,000
3	Erosion Control	**LS**	1	$10,000	$10,000
4	First Flush Sewer, 60" RCP	**FT**	1,980	$200	$396,000
5	First Flush Manhole, 72" DIA with infiltration sump	**EACH**	8	$7,500	$60,000
6	Tree with Structural Soil	**EACH**	33	$1,600	$52,800
7	Pavement Remove and Replace	**SYD**	8,000	$40	$320,000
8	Restoration	**LS**	1	$60,000	$60,000
	SUBTOTAL				$978,800
	Construction Contingency (20%)				$195,800
	TOTAL CONSTRUCTION COST				$1,174,600
	Engineering and Construction Services (25%)				$293,700
	Geotechnical Investigation				$10,000
	Geotechnical Services During Construction				$40,000
	Financial and Legal (5%)				$58,700
	ALLOWANCES				
	Easement acquisition costs, if required				$20,000
	Major utility relocation				$25,000
	Permit fees, bonds and inspection fees from permitting agencies.				$15,000
	TOTAL COST				$1,640,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Stadium Blvd between Hutchins Ave. and Kipke Dr - Alternative B - First Flush Storm Sewer
Present Worth Calculations

CAPITAL COST	CAPITAL COST[(1)]	SERVICE LIFE (YEARS)	PRESENT WORTH[(2)]
Stadium Blvd Improvements	$ 1,640,000.00	50	$ 1,202,000.00
TOTAL CAPITAL COST	**$ 1,640,000.00**		$ 1,202,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 33,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 500.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 7,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 1,242,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 92,000.00**

Notes:

(1) June 2013 ENR 20 Cities CCI = 9542

(2) Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Research Park Wetlands Detention and Streambank Stabilization
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	**LS**	1	$30,000	$30,000
2	Erosion Control	**LS**	1	$20,000	$20,000
3	Construction Access Road and Restoration	**LS**	1	$10,000	$10,000
4	Streambank Stablization	**LS**	1,000	$200	$200,000
6	Earth Excavation	**CYD**	1,000	$100	$100,000
7	Disposal	**CYD**	1,000	$50	$50,000
8	Naturalize Stream Corridor	**EACH**	1	$10,000	$10,000
9	Flow Velocity Reduction Inline Wetland	**EACH**	1	$50,000	$50,000
10	Restoration	**LS**	1	$10,000	$10,000
	SUBTOTAL				$480,000
	Construction Contingency (20%)				$96,000
	TOTAL CONSTRUCTION COST				$576,000
	Engineering and Construction Services (25%)				$144,000
	Geotechnical Investigation				$10,000
	Geotechnical Services During Construction				$40,000
	Financial and Legal (5%)				$28,800
	ALLOWANCES				
	Easement acquisition costs, if required				$100,000
	Major utility relocation				$5,000
	Permit fees, bonds and inspection fees from permitting agencies.				$15,000
	TOTAL COST				$920,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Research Park Wetlands Detention and Streambank Stabilization
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Research Park Wetlands Detention and Streambank Stabilization	$ 920,000.00	50	$ 674,000.00
TOTAL CAPITAL COST	**$ 920,000.00**		$ 674,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 18,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 250.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 3,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 695,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 52,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Huron Hills Golf Course
Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	**LS**	1	$100,000	$100,000
2	Erosion Control	**LS**	1	$20,000	$20,000
3	Construction Access Road and Restoration	**LS**	1	$15,000	$15,000
4	Streambank Stablization/Naturalize Stream Corridor	**LFT**	1,030	$350	$360,500
5	Earth Excavation	**CYD**	3,000	$10	$30,000
6	Cart Path Reconstruction	**EA**	3	$10,000	$30,000
7	Weir Structure	**EA**	1	$10,000	$10,000
8	Outlet Control Structure	**EA**	1	$10,000	$10,000
9	Flow Velocity Reduction Inline Wetland	**LS**	1	$100,000	$100,000
10	Restoration	**LS**	1	$50,000	$50,000
	SUBTOTAL				$725,500
	Construction Contingency (20%)				$145,100
	TOTAL CONSTRUCTION COST				$870,600
	Engineering and Construction Services (25%)				$218,000
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction				$20,000
	Financial and Legal (5%)				$43,500
	Hydrologic/Hydraulic Study				$25,000
	ALLOWANCES				
	Easement acquisition costs, if required				$10,000
	Major utility relocation				$10,000
	Permit fees, bonds and inspection fees from permitting agencies.				$15,000
	TOTAL COST				$1,220,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Huron Hills Golf Course
Present Worth Calculations

CAPITAL COST Huron Hills Golf Course	CAPITAL COST[(1)]	SERVICE LIFE (YEARS)	PRESENT WORTH[(2)]
Tree Planting	$ 1,220,000.00	50	$ 894,000.00
TOTAL CAPITAL COST	**$ 1,220,000.00**		$ 894,000.00
INTEREST DURING CONSTRUCTION Assumes 1 years interest at 2%			$ 24,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 2,500.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 34,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 952,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 71,000.00**

Notes:

(1) June 2013 ENR 20 Cities CCI = 9542

(2) Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

S. Seventh Street - Greenview to Scio Church - Alternate A - First Flush Storm Sewer

Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$25,000	$25,000
2	Traffic Control	**LS**	1	$20,000	$20,000
3	Erosion Control	**LS**	1	$2,000	$2,000
4	First Flush Sewer, 36" RCP	**FT**	875	$50	$43,750
5	First Flush Manhole, 72" DIA	**EACH**	5	$10,000	$50,000
6	3 cfs Pollutant Separator (First Flush: 3 cfs)	**EACH**	1	$30,000	$30,000
7	Pavement Removal	**SYD**	3,500	$10	$35,000
8	Pavement Replacement	**SYD**	2,500	$60	$150,000
9	Restoration	**LS**	1	$50,000	$50,000
	SUBTOTAL				$405,800
	Construction Contingency (20%)				$81,200
	TOTAL CONSTRUCTION COST				$487,000
	Engineering and Construction Services (25%)				$121,800
	Geotechnical Investigation				$20,000
	Geotechnical Services During Construction				$80,000
	Financial and Legal (5%)				$24,400
	ALLOWANCES				
	Easement acquisition costs, if required				$5,000
	Major utility relocation				$90,000
	Permit fees, bonds and inspection fees from permitting agencies.				$20,000
	TOTAL COST				$850,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

S. Seventh Street - Greenview to Scio Church - Alternate A - First Flush Storm Sewer
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
S. Seventh Street Improvements	$ 850,000.00	50	$ 623,000.00
TOTAL CAPITAL COST	**$ 850,000.00**		$ 623,000.00
INTEREST DURING CONSTRUCTION Assumes 1 year interest at 2%			$ 17,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 1,000.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 13,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 653,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 49,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

S. Seventh Street - Greenview to Scio Church - Alternate B - Porous Pavement

Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$25,000	$25,000
2	Traffic Control	**LS**	1	$10,000	$10,000
3	Erosion Control	**LS**	1	$2,000	$2,000
4	Storm Sewer Upgrades	**FT**	875	$30	$26,250
5	Manholes	**EACH**	5	$5,000	$25,000
6	Pavement Removal	**SYD**	3,500	$10	$35,000
7	Pavement Replacement (Porous Pavement)	**SYD**	2,500	$90	$225,000
8	Restoration	**LS**	1	$50,000	$50,000
	SUBTOTAL				$398,300
	Construction Contingency (20%)				$79,700
	TOTAL CONSTRUCTION COST				$478,000
	Engineering and Construction Services (25%)				$119,500
	Geotechnical Investigation				$20,000
	Geotechnical Services During Construction				$80,000
	Financial and Legal (5%)				$23,900
	ALLOWANCES				
	Easement acquisition costs, if required				$5,000
	Major utility relocation				$90,000
	Permit fees, bonds and inspection fees from permitting agencies.				$20,000
	TOTAL COST				$840,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

S. Seventh Street - Greenview to Scio Church - Alternate B - Porous Pavement
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
S. Seventh Street Improvements	$ 840,000.00	50	$ 615,000.00
TOTAL CAPITAL COST	**$ 840,000.00**		$ 615,000.00
INTEREST DURING CONSTRUCTION Assumes 1 year interest at 2%			$ 17,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 1,000.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 13,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 645,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 48,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

721 N. Main Street

Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Demolition/Grading	**LSUM**	1	$490,000	$490,000
2	Hardscape	**LSUM**	1	$110,000	$110,000
3	Site Work	**LSUM**	1	$31,200	$31,200
4	Lighting	**LSUM**	1	$33,600	$33,600
5	Landscaping	**LSUM**	1	$206,600	$206,600
6	Stormwater	**LSUM**	1	$154,600	$154,600
	SUBTOTAL				$1,026,000
	Construction Contingency (20%)				$205,200
	TOTAL CONSTRUCTION COST				$1,231,200
	Engineering and Construction Services (25%)				$307,800
	Geotechnical Investigation				$20,000
	Geotechnical Services During Construction				$80,000
	Financial and Legal (5%)				$61,600
	ALLOWANCES				
	Easement acquisition costs, if required				$15,000
	Major utility relocation				$15,000
	Permit fees, bonds and inspection fees from permitting agencies.				$20,000
	TOTAL COST				$1,760,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

721 N. Main Street
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Demolition	$ 735,000.00	Inf	$ 408,000.00
Structural / Site Work	$ 1,025,000.00	50	$ 751,000.00
TOTAL CAPITAL COST	**$ 1,760,000.00**		$ 1,159,000.00
INTEREST DURING CONSTRUCTION Assumes 1 year interest at 2%			$ 35,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 2,500.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 34,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 1,228,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 91,000.00**

Notes:

(1) June 2013 ENR 20 Cities CCI = 9542

(2) Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Village Oaks - Alternate A

Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Clearing	**LS**	1	$26,200	$26,200
2	Grading/Earthwork	**LS**	1	$61,400	$61,400
3	Seeding/Restoration	**LS**	1	$33,800	$33,800
4	Storm Sewer (110' of 15")	**LS**	1	$7,200	$7,200
5	Oulet Structure	**LS**	1	$3,000	$3,000
6	Mobilization	**LS**	1	$10,000	$10,000
7	Wetland Survey	**LS**	1	$4,000	$4,000
	SUBTOTAL				$145,600
	Construction Contingency (20%)				$29,100
	TOTAL CONSTRUCTION COST				$174,700
	Engineering and Construction Services (25%)				$43,700
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction (5%)				$20,000
	Financial and Legal (5%)				$8,700
	Permitting				$4,000
	ALLOWANCES				
	Easement acquisition costs, if required				$1,000,000
	Major utility relocation				$10,000
	Permit fees, bonds and inspection fees from permitting agencies.				$25,000
	TOTAL COST				$1,291,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Village Oaks - Alternate A
Present Worth Calculations

CAPITAL COST		SERVICE	
	CAPITAL	LIFE	PRESENT
Storm Sewer (110' of 15")	COST[1]	(YEARS)	WORTH[2]
Structural / Site Work	$ 291,000.00	50	$ 213,000.00
Easement Acquisition	$ 1,000,000.00	Inf	$ 554,000.00
TOTAL CAPITAL COST	**$ 1,291,000.00**		$ 767,000.00
INTEREST DURING CONSTRUCTION Assumes 1 year interest at 2%			$ 26,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 5,000.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 67,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 860,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 64,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Village Oaks - Alternate B

Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Clearing	**LS**	1	$27,800	$27,800
2	Grading/Earthwork	**LS**	1	$86,300	$86,300
3	Seeding/Restoration	**LS**	1	$35,800	$35,800
4	Storm Sewer (110' of 15")	**LS**	1	$7,200	$7,200
5	Oulet Structure	**LS**	1	$3,000	$3,000
6	Mobilization	**LS**	1	$10,000	$10,000
7	Wetland Survey	**LS**	1	$4,000	$4,000
	SUBTOTAL				$174,100
	Construction Contingency (20%)				$34,800
	TOTAL CONSTRUCTION COST				$208,900
	Engineering and Construction Services (25%)				$52,200
	Geotechnical Investigation				$10,000
	Geotechnical Services During Construction (5%)				$25,000
	Financial and Legal (5%)				$10,400
	Permitting				$10,000
	ALLOWANCES				
	Easement acquisition costs, if required				$1,000,000
	Major utility relocation				$10,000
	Permit fees, bonds and inspection fees from permitting agencies.				$25,000
	TOTAL COST				$1,352,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Village Oaks - Alternate A
Present Worth Calculations

CAPITAL COST		SERVICE	
	CAPITAL	LIFE	PRESENT
Storm Sewer (110' of 15")	COST[1]	(YEARS)	WORTH[2]
Structural / Site Work	$ 352,000.00	50	$ 258,000.00
Easement Acquisition	$ 1,000,000.00	Inf	$ 554,000.00
TOTAL CAPITAL COST	**$ 1,352,000.00**		$ 812,000.00
INTEREST DURING CONSTRUCTION Assumes 1 year interest at 2%			$ 27,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 5,000.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 67,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 906,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 67,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Maple Village - Alternative A - Standard Pavement with Stone Reservoir

Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	**LS**	1	$40,000	$40,000
2	Traffic Control	**LS**	1	$5,000	$5,000
3	Erosion Control	**LS**	1	$7,500	$7,500
4	Underground Detention System	**CFT**	235,000	$5	$1,175,000
5	Pavement Removal	**SYD**	48,400	$2	$96,800
6	Asphalt Pavement	**SYD**	48,400	$10	$484,000
7	Restoration	**LS**	1	$100,000	$100,000
	SUBTOTAL				$1,908,300
	Construction Contingency (20%)				$381,700
	TOTAL CONSTRUCTION COST				$2,290,000
	HEC-RAS Model				$15,000
	Engineering and Construction Services (25%)				$572,500
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction (5%)				$20,000
	Financial and Legal (5%)				$114,500
	Permitting				$4,000
	ALLOWANCES				
	Easement acquisition costs, if required				$40,000
	Major utility relocation				$10,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$3,090,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Maple Village - Alternative A - Standard Pavement with Stone Reservoir
Present Worth Calculations

CAPITAL COST	CAPITAL COST[(1)]	SERVICE LIFE (YEARS)	PRESENT WORTH[(2)]
Structural / Site Work	$ 3,050,000.00	50	$ 2,235,000.00
Easement Acquisition	$ 40,000.00	Inc	$ 22,000.00
TOTAL CAPITAL COST	**$ 3,090,000.00**		$ 2,257,000.00
INTEREST DURING CONSTRUCTION Assumes 1 year interest at 2%			$ 62,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 1,000.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 13,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 2,332,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 173,000.00**

Notes:

(1) June 2013 ENR 20 Cities CCI = 9542

(2) Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Maple Village - Alternative B - Porous Pavement

Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	**LS**	1	$40,000	$40,000
2	Traffic Control	**LS**	1	$5,000	$5,000
3	Erosion Control	**LS**	1	$7,500	$7,500
4	Underground Detention System	**CFT**	103,000	$5	$515,000
5	Pavement Removal	**SYD**	48,400	$2	$96,800
6	Porous Asphalt Section	**SYD**	48,400	$15	$726,000
7	Restoration	**LS**	1	$100,000	$100,000
	SUBTOTAL				$1,490,300
	Construction Contingency (20%)				$298,100
	TOTAL CONSTRUCTION COST				$1,788,400
	HEC-RAS Model				$15,000
	Engineering and Construction Services (25%)				$447,100
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction (5%)				$20,000
	Financial and Legal (5%)				$89,400
	Permitting				$4,000
	ALLOWANCES				
	Easement acquisition costs, if required				$25,000
	Major utility relocation				$10,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$2,420,000

[1] June 2013 ENR 20 Cities CCI = 9542

Huron River 2013 SRF Project Plan
Non Point Source Projects

Maple Village - Alternative B - Porous Pavement
Present Worth Calculations

CAPITAL COST	CAPITAL COST[1]	SERVICE LIFE (YEARS)	PRESENT WORTH[2]
Structural / Site Work	$ 2,390,000.00	50	$ 1,751,000.00
Easement Acquisition	$ 30,000.00	Inc	$ 17,000.00
TOTAL CAPITAL COST	**$ 2,420,000.00**		$ 1,768,000.00
INTEREST DURING CONSTRUCTION Assumes 1 year interest at 2%			$ 48,000.00
ANNUAL OPERATION AND MAINTENANCE COST			
ANNUAL O, M & R COST (NON-ENERGY)		$ 1,500.00	
PRESENT WORTH OF OM&R COST (NON ENERGY)			$ 20,000.00
ANNUAL O, M & R COST (ENERGY)		$ -	
PRESENT WORTH OF OM&R COST (ENERGY)			
PRESENT WORTH			**$ 1,836,000.00**
AVERAGE ANNUAL EQUIVALENT COST			**$ 137,000.00**

Notes:

[1] June 2013 ENR 20 Cities CCI = 9542

[2] Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

[3] BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River 2013 SRF Project Plan

Lawton Park Stormwater Quality Storage Basin (Underground)

Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	**LS**	1	$300,000	$300,000
2	Traffic Control	**LS**	1	$5,000	$5,000
3	Erosion Control	**LS**	1	$7,500	$7,500
4	Basin Construction	**CFT**	825,000	$10	$8,250,000
5	Restoration	**LS**	1	$50,000	$50,000
	SUBTOTAL				$8,612,500
	Construction Contingency (20%)				$1,722,500
	TOTAL CONSTRUCTION COST				$10,335,000
	HEC-RAS Model				
	Engineering and Construction Services (25%)				$2,583,800
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction (5%)				$20,000
	Financial and Legal (5%)				$516,800
	Permitting				$4,000
	ALLOWANCES				
	Easement acquisition costs, if required				$20,000
	Major utility relocation				$20,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$13,520,000

Washtenaw County Water Resources Commissioner
Huron River 2013 SRF Project Plan
Non Point Source Projects

Lawton Park Stormwater Quality Storage Basin (Underground)
Present Worth Calculations

CAPITAL COST		CAPITAL COST[(1)]	SERVICE LIFE (YEARS)		PRESENT WORTH[(2)]
Structural / Site Work	$	13,520,000.00	50	$	9,906,000.00
TOTAL CAPITAL COST	**$**	**13,520,000.00**		$	9,906,000.00
INTEREST DURING CONSTRUCTION Assumes 2 year interest at 2%				$	540,000.00
ANNUAL OPERATION AND MAINTENANCE COST					
ANNUAL O, M & R COST (NON-ENERGY)			$ 5,000.00		
PRESENT WORTH OF OM&R COST (NON ENERGY)				$	67,000.00
ANNUAL O, M & R COST (ENERGY)			$ -		
PRESENT WORTH OF OM&R COST (ENERGY)					
PRESENT WORTH				**$**	**10,513,000.00**
AVERAGE ANNUAL EQUIVALENT COST				**$**	**782,000.00**

Notes:

(1) June 2013 ENR 20 Cities CCI = 9542

(2) Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River SRF Project Plan

Churchill Downs Park Stormwater Quality Storage Basin (Surface Storage)

Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	**LS**	1	$125,000	$125,000
2	Traffic Control	**LS**	1	$1,000	$1,000
3	Erosion Control	**LS**	1	$10,000	$10,000
4	Basin Construction	**CFT**	425,000	$5	$2,125,000
5	Restoration	**LS**	1	$125,000	$125,000
	SUBTOTAL				$2,386,000
	Construction Contingency (20%)				$477,200
	TOTAL CONSTRUCTION COST				$2,863,200
	HEC-RAS Model				
	Engineering and Construction Services (25%)				$715,800
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction (5%)				$20,000
	Financial and Legal (5%)				$143,200
	Permitting				$4,000
	ALLOWANCES				
	Easement acquisition costs, if required				$20,000
	Major utility relocation				$20,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$3,810,000

Washtenaw County Water Resources Commissioner
Huron River SRF Project Plan
Non Point Source Projects

Churchill Downs Park Stormwater Quality Storage Basin (Surface Storage)
Present Worth Calculations

CAPITAL COST		CAPITAL COST[(1)]	SERVICE LIFE (YEARS)		PRESENT WORTH[(2)]
Structural / Site Work	$	3,810,000.00	50	$	2,791,000.00
TOTAL CAPITAL COST	**$**	**3,810,000.00**		$	2,791,000.00
INTEREST DURING CONSTRUCTION Assumes 2 year interest at 2%				$	152,000.00
ANNUAL OPERATION AND MAINTENANCE COST					
ANNUAL O, M & R COST (NON-ENERGY)			$ 3,500.00		
PRESENT WORTH OF OM&R COST (NON ENERGY)				$	47,000.00
ANNUAL O, M & R COST (ENERGY)			$ -		
PRESENT WORTH OF OM&R COST (ENERGY)					
PRESENT WORTH				**$**	**2,990,000.00**
AVERAGE ANNUAL EQUIVALENT COST				**$**	**222,000.00**

Notes:

(1) June 2013 ENR 20 Cities CCI = 9542

(2) Cost is based on a study period of 20 years and a discount rate of 4.125%.
Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Huron River SRF Project Plan

Lans Basin Retrofits

Jul-13

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization (5%)	**LS**	1	$25,000	$25,000
2	Traffic Control	**LS**	1	$5,000	$5,000
3	Erosion Control	**LS**	1	$10,000	$10,000
4	Weir Adjustments	**EACH**	3	$15,000	$45,000
5	Basin Dredging and Disposal	**CFT**	200,000	$4	$700,000
6	Surface Restoration	**LS**	1	$15,000	$15,000
7	Restoration	**LS**	1	$40,000	$40,000
	SUBTOTAL				$840,000
	Construction Contingency (20%)				$168,000
	TOTAL CONSTRUCTION COST				$1,008,000
	Engineering and Construction Services (25%)				$252,000
	Geotechnical Investigation				$5,000
	Geotechnical Services During Construction (5%)				$20,000
	Financial and Legal (5%)				$50,400
	Permitting				$4,000
	ALLOWANCES				
	Easement acquisition costs, if required				$50,000
	Major utility relocation				$10,000
	Permit fees, bonds and inspection fees from permitting agencies.				$10,000
	TOTAL COST				$1,410,000

Washtenaw County Water Resources Commissioner
Huron River SRF Project Plan
Non Point Source Projects

Lans Basin Retrofits
Present Worth Calculations

CAPITAL COST		CAPITAL COST[(1)]	SERVICE LIFE (YEARS)		PRESENT WORTH[(2)]
Structural / Site Work	$	1,410,000.00	50	$	1,033,000.00
TOTAL CAPITAL COST	**$**	**1,410,000.00**		$	1,033,000.00
INTEREST DURING CONSTRUCTION Assumes 2 year interest at 2%				$	56,000.00
ANNUAL OPERATION AND MAINTENANCE COST					
ANNUAL O, M & R COST (NON-ENERGY)			$ 3,500.00		
PRESENT WORTH OF OM&R COST (NON ENERGY)				$	47,000.00
ANNUAL O, M & R COST (ENERGY)			$ -		
PRESENT WORTH OF OM&R COST (ENERGY)					
PRESENT WORTH				**$**	**1,136,000.00**
AVERAGE ANNUAL EQUIVALENT COST				**$**	**85,000.00**

Notes:

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Present Worth Costs are based on Straight Line Depreciation and no inflation.

(3) BMPs expected to last 50 years if properly maintained.

HURON RIVER 2013 SRF PROJECT PLAN

PREPARED FOR

Huron River Green Infrastructure Drainage District

APPENDIX B
PUBLIC HEARING

Public Hearing Notice

Notice is hereby given that the Washtenaw County Water Resources Commissioner (WCWRC) will hold a public hearing on the proposed State Revolving Fund Project Plan for the Huron River watershed within the City of Ann Arbor for the purpose of receiving comments from interested persons. The hearing will be held from 6:30-8:00 pm on Monday, June 24, 2013 at the NEW Center, located at 1100 N Main St. Ann Arbor, MI.

The purpose of the proposed project plan is to secure low interest funding for non-point source water quality treatment improvements in the Huron River watershed. The purpose of the projects described in the project plan is to help reduce storm water pollutants, flooding and flow to the River and low-lying neighborhoods by retaining, delaying, and infiltrating the storm water runoff. Twenty sites are being proposed based on the potential storm water management opportunities they provide to the watershed.

This project will be funded through loans from the State of Michigan Revolving Fund. The 20 project sites have a combined estimated construction cost of $25,000,000. This equates to $15.34 per residential equivalent unit on a quarterly basis.

Copies of the project plan detailing the proposed projects will be available for public review on May 23, 2013 on the fourth floor at Systems Planning of the Ann Arbor City Hall, on the first floor of the Western Service Center, 705 N. Zeeb Road and on the WCWRC web site.

Written comments received through June 24, 2013 will be entered into the public hearing record and should be sent to the Washtenaw County Water Resources Office, Attention: Harry Sheehan, 705 N. Zeeb Road, Ann Arbor, MI, 48107-8645

STATE OF MICHIGAN)
County of Washtenaw ss Dawn Sutton

Being duly sworn deposes and say he/she is Principal Clerk of

ANN ARBOR.COM
DAILY EDITION

a newspaper published and circulated in the County of Washtenaw and otherwise qualified according to Supreme Court Rule; and that the annexed notice, taken from said paper, has been duly published in said paper on the following day(days)

May 16 A.D. 20 13

Sworn to and subscribed before me this 17th day of June 2013

Janice M. Ringler
JANICE M. RINGLER
Notary Public, State of Michigan
County of Kent
My Commission Expires: 10/03/2014
Acting in the County of Kent

PUBLIC HEARING NOTICE

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Copies of the project plan detailing the proposed projects will be available for public review on May 23, 2013 on the fourth floor of the Ann Arbor City Hall, 301 E Huron St., Ann Arbor, MI; or on the first floor of the Washtenaw County Water Resources Office (WCWRC), 705 N. Zeeb Road, or on the WCWRC web site.

Written comments received through June 24, 2013 will be entered into the public hearing record and should be sent to the Washtenaw County Water Resources Office, Attention: Harry Sheehan, 705 N. Zeeb Road, Ann Arbor, MI, 48107-8645

RECEIVED
JUN 21 2013
WASHTENAW COUNTY
DRAIN COMMISSIONER

From: Harry Sheehan

To: vpc@acwg.org; "annarborgary63@gmail.com"; antonuk@umich.edu; "antonuk@umich.edu"; "arthur.herold@comcast.net"; BarbaraAppelman@gmail.com; "BarbaraAppelman@gmail.com"; "barbrdwyer@sbcglobal.net"; barrygates@comcast.net; "barrygates@comcast.net"; bdcrankshaw@aol.com; bob@bparnes.com; "bobwolfe@umich.edu"; "bwinters@umich.edu"; "chinlucy@yahoo.com"; Cindy Spinks; "conlonh@sbcglobal.net"; Cresson Slotten Forward; cvl.mi@yahoo.com; damato@umich.edu; "damien.wetzel@stantec.com"; donagata@earthlink.net; "donagata@earthlink.net"; "donnak@umich.edu"; "dorissanford@comcast.net"; fburdick1@aol.com; "fishere@comcast.net"; Fred Metzger; "gjohnston@emich.edu"; "glbeeman@gmail.com"; gszalews@gmail.com; Janet Fisher ; janwolfe@umich.edu; "janwolfe@umich.edu"; "jbmccarthy@comcast.net"; "Jecnmpc@sbcglobal.net"; "jgwalls@umich.edu"; jlawson@a2gov.org; jlGoBlue@aol.com; jmniet@gmail.com; "jmniet@gmail.com"; "joforpoley@sbcglobal.net"; Judithhanway@sbcglobal.net; julinwei@yahoo.com; junear5575@sbcglobal.net; "jwight@umich.edu"; "jzak@umich.edu"; kalousdian@comcast.com; kathryn.uhler@gmail.com; "kaycliff@umich.edu"; ktimmer@comcast.net; "ktpfoster@sbcglobal.net"; "lisaclairep@yahoo.com"; lpeck@mml.org; "lynnlumbard@gmail.com"; "m.keller@comcast.net"; margep@jamorell.com; Mari Lohela; marten@umich.edu; "martin.reineman@gmail.com"; mgobluebarn47@yahoo.com; michael.uhler@gmail.com; "michael@etllc.com"; "mwag@aol.com"; nancy.yalonen@gmail.com; "Nicholas.j.Bayley@gmail.com"; papagena13@aol.com; paul.shelburne@sbcglobal.net; petehauk@gmail.com; Peter Forster; polot@comcast.net; pottsethel@att.net; "ptreed@gmail.com"; "pzkussurelis@comcast.net"; qsamonte@emich.edu; radixon@umich.edu; Randall.webb@att.net; "rheaslip@umich.edu"; "RobertD211@aol.com"; ruth.gonzalez33@yahoo.com; "scott.aschenbach@gmail.com"; sdwestover@sbcglobal.net; Sharon Malloy; "sleebae@gmail.com"; smwalls@comcast.net; "Sonia_a2@yahoo.com"; "stevtri@mindspring.com"; "SWestover@ycua.org"; "the3diamonds@aol.com"; Thomas Johnson; tsteeri@hotmail.com; wadeww2434@sbcglobal.net; wherrymat@gmail.com; "wherrymatt@gmail.com"; whiggins27@gmail.com; "whiggins27@gmail.com"; wilfacf@aol.com; .; .; .; .; .; .; .; a2jallen@att.net; abnolan@comcast.net; agranoff@umich.edu; akhajra@umich.edu; Ann Hubbard; arlinghaus@ltu.edu; BobDonnellan@comcast.net; BStark1@aol.com; checkbook1948@yahoo.com; cmfingerle@webtv.net; cozygrabb@comcast.net; Craig Hupy Forward; cressgeorge@comcast.net; davehowell00@att.net; Dennis Wojcik; dianehoff@comcast.net; Dick Chase; dobbsjl@sbcglobal.net; donleo@comcast.net; egoldman@umich.edu; eoffen@hotmail.com; gradwohl@umich.edu; harveyiwax@gmail.com; HDLMJL@aol.com; hebegb28@sbcglobal.net; howa2@aol.com; hwoghin@gmail.com; Hwstark1@aol.com; hzylman@earthlink.net; info@robertburke.com; jacquie.h.lewis@gmail.com; janelumm@comcast.net; jangrich1@yahoo.com; Janis Bobrin; jbdevine@msn.com; Jeffrey Dehring; jlumm@a2gov.org ; John Hieftje Forward; jrtaylor@umich.edu; lisamann@comcast.net; lrp9147@earthlink.net; LTreemore-Spears@a2gov.org; magpat04@att.net; marymatossian@earthlink.net; mcacore@umich.edu; melmanis@umich.edu; mgoldman@umich.edu; mgwheeler@comcast.net; MmeRice@aol.com; murrwood@sbcglobal.net; ncaplan@umich.edu; Pattydubi@aol.com; qathome@comcast.net; RBurke1111@aol.com; rgfaber@comcast.net; rododawson@comcast.net; Sarah Pressprich; sarhaus@umich.edu; Shawn Severance; stolzie@speakeasy.net; stsai38@yahoo.com; swoghin@gmail.com; tconlin@conlintravel.com; waggoner@umich.edu; williamctyler@yahoo.com; Yousef D. Rabhi

Cc: John Hieftje Forward; skailasapathy@a2gov.org; Sbriere@a2gov.org; JLumm@a2gov.org; SPetersen@a2gov.org; CTaylor@a2gov.org; SKunselman@a2gov.org; MHiggins@a2gov.org; MTeall@a2gov.org; CWarpehoski@a2gov.org; MAnglin@a2gov.org; Andy LaBarre; Yousef D. Rabhi; Conan Smith; Stickel Karyn; Lawson, Jennifer; Evan Pratt; Cresson Slotten Forward; Craig Hupy Forward; Laura Rubin

Subject: Notice of Public Hearing: Potential Stormwater Projects

Date: Monday, June 17, 2013 4:07:50 PM

Attachments: Notice of Public Hearing.pdf

Prior to implementing certain projects to improve stormwater conveyance and reduce pollution to the Huron River, the City and County collaboratively establish the basis for these projects with the Michigan Department of Environmental Quality. The State Revolving Fund Project Plan documents the need, and allows projects to be considered for grant and loan funding.

The SRF Project Plan will be submitted to the MDEQ shortly. But before that happens, the City and County will be jointly holding a **Public Meeting to present the details, benefits and costs**. You are invited to attend this brief presentation and open discussion. Public comments are welcome and will become part of the process of project selection.

See the attached for details. Thank you!!!

SRF Project Plan Public Hearing

Date: **June 24th**

Time: **6:30 - 8 PM**
Location: **NEW Center**
1100 N. Main Street, 2nd floor

Harry

Harry Sheehan
Environmental Manager
Washtenaw County Water Resources
705 N. Zeeb Road, PO Box 8645
Ann Arbor, MI 48107-8645
(734) 222-6851
sheehanh@ewashtenaw.org

EVAN N. PRATT, P.E.

WATER RESOURCES COMMISSIONER
705 North Zeeb Road
P.O. Box 8645
Ann Arbor, MI 48107-8645

email: drains@ewashtenaw.org
http://drain.ewashtenaw.org

DENNIS M. WOJCIK, P.E.
Chief Deputy Water Resources Commissioner

DANIEL R. MYERS, P.E.
Director of Public Works

Telephone 734.222.6860
Fax 734.222.6803

Contact: Evan Pratt (734) 222-6886

ANN ARBOR STORMWATER IMPROVEMENTS

Stormwater runoff continues to be the primary cause of water pollution in the Huron River; eroded soil and phosphorus degrade habitat and cause algae blooms. Oils, heavy metals, *E. coli* and salt contaminate the river each time it rains.

Over the past several years the Office of the Water Resources Commissioner has partnered with the City of Ann Arbor, the Department of Environment Quality, and the Ann Arbor Public School District to improve stormwater infrastructure, reduce flow and improve water quality.

The result of this collaboration can be seen at Mary Beth Doyle Park, Leslie Park Golf Course, Pioneer High School, West Park and along the newly constructed segments of Stadium Boulevard and Miller Avenue. All of these projects include stormwater treatment elements. All were funded by a low interest state revolving loan; most received grant funds that will not have to be repaid.

The funding deadline to identify future stormwater improvement projects for state revolving loan funding is July 1, 2013. The Water Resources Commissioner has drafted a 5-year plan, currently available for public review at 705 N. Zeeb Road and at City Hall, 4th floor. Electronic copies are available by contacting sheehanh@ewashtenaw.org.

All 20 projects in the five year plan are located in Ann Arbor. Many are associated with road reconstruction that will include stormwater detention & treatment underground, or in the right-of-way.

The total estimated cost for all projects is approximately $40 million. Each project is eligible for federal and state grant funding and can receive financing at 2.0% for 20 years. Debt obligations are repaid by the City's Stormwater Utility. All projects will be programmed into the City of Ann Arbor's Capital Improvement Plan. There will be *no* rate increases associated with these projects. Should project needs exceed available funding, projects will be prioritized and some deferred.

A public hearing on the plan will be held on Monday June 24th from 6:30 - 8 PM. A brief presentation will be made prior to an open discussion. Public comments are welcome and will become part of the process of project selection.

Location: NEW Center
1100 N. Main Street, 2nd floor

= END =

From:	Irvin Mermelstein
To:	Harry Sheehan; Curtis Hedger; JUDITH HANWAY
Subject:	Re: Application for SRF Financing
Date:	Sunday, June 23, 2013 3:46:42 PM
Attachments:	130621 Notice re No More CMs for SRF projects CMs deq-ess-mfs-CMprocess_425295_7.pdf

Harry--

I regret having to have to write this email. My apologies in advance for the strident tone, but that is unavoidable now. Curt Hedger has been copied on this. You should involve him quickly, in my view, and talk to him about whom he wants me to communicate with.

I am deeply concerned and disappointed at the County's approach to the SRF process, after all the talk about transparency and making sure that people's voices are heard. Please read this email and make a contingency plan for re-scheduling your hearing, whether you miss your July 1 deadline or not. I will get to your SRF application process below. The first subject is past false statements to MDEQ and EPA in City documents, including the 2010 SRF, and the prevention of future false statements to the state and federal governments in your draft SRF application.

False Statements in 2010 City SRF Application for FDDP Funds

I told Evan at your kickoff meeting several months ago that the County was not starting with a *tabula rasa* in this particular area of Ann Arbor with a study connected with the FDDP in any way. The Mallets Creek Study is plainly hard-wired to the FDDP. This is indicated by the original version of the "Over-Arching Technical Oversight and Advisory Group" flow diagram and the OHM Proposal for the FDD Effectiveness Study itself, which are now public record. I told you, Harry, that the FDDP is a program that has an enormous amount of baggage of every sort and has a style of doing business that is and has been an accident that was just waiting to happen. Now its happening, and your SRF popped up exactly at the least propitious moment for your SRF.

In March, I starting turning up evidence that one particular bit of FDDP baggage is **a consistent pattern of false statements in documents from the City relating to the FDDP, including the 2010 SRF Applications and (of course) the SSO Report.** When I finally saw your email and its reference to an SRF application, I happened to have been reviewing for the last week the FY 2010 SRF by the City. **It is the fifth document I have reviewed that has serious and consistent problems of false statements, including misrepresentations, fabrications, omissions, and fudging of dates.**

Let me be clear that these are false statements by any measure you wish to apply, though there is one federal statute that is a matter of concern in particular, as discussed below. You don't have to take my word for it. I'll give you and Curt a list of false statements from several documents when it comes to fdds and a clear explanation of why they are false. This is a problem going back to 2001.

These are not differences of opinion or matters of shading or interpretation or pushing the envelope. They are transparent and undeniable false statements of fact that can be easily verified, as in one example I will cite below, just by comparing a statement in the text with the Exhibit (in the example below, the SSO Report) the text refers to. I don't have any need, in fact, for picking nits in these documents--there are plenty of the really material false statements (egregiously so, in some cases) to be found with no difficulty.

As an example, the SSO Report states that "[p]revious studies conducted in Ann Arbor have reported that the footing drain connection from a single home could contribute as much as 10 gpm during a storm." So if the Project is audited by EPA (they have an Office of Inspector General for SRFs that does that), then apart from the question whether there were any such studies (I doubt it), the City has now said to the auditor that "as much as 10 gpm" of storm water can be removed from the sanitary sewers from one residence. It's a pitch for the FDDP--a selling point for fdds being made to DEQ and to EPA. It's material.

So that is the first number for the auditor on effectiveness--"as much as 10 gpm," from the SSO Report. Then, however, the auditor reads the text of the SSO about the actual data gathering and the results are an "assumed" 1.4 gpm, which I am not sure is a good number anyhow. So now the auditor knows that the document is internally inconsistent. Is it 10 GPM? Or is it 1.4?

Then, the auditor looks at the FY 2010 SRF Application (because I tell him about it), which says as follows:

> Field investigation by City personnel revealed **the range of footing drain flows to the sanitary sewer system to be 2 – 15 gallon per minute (gpm) per individual footing drain connection.**

This is the third version of FDD effectiveness the auditor is seeing now: 1.4 gpm, 10 gpm and 2-15 gpm. The 2 can fit between 1.4 and 10, but where does 15 gpm come from? It's not in the SSO report, unless I missed it. The statement says it came from "field investigation by City personnel." Really? The only field investigations I am aware of are the ones done for the SSO Report (which is the Drain Commission's document as much as the City's), which said 1.4 gpm average (measured by the "bucket and stopwatch method") and "as much as 10 gpm."

The ACO was attached to the 2010 SRF too, though I don't know why as it expired in 2009. It has **another** "assumed" number for flows from fdds--4.0 gpm, which happens to be the number used in the DOM, but it is not 1.4, 2, "as much as 10," or 15. It's a fourth version of FDD effectiveness in the SRF, which the EPA auditor knows about because I tell will tell EPA that.

The SRF also says (again about flows from FDDs):

> Monitoring of flows from a representative sampling of FDDs will occur during the first two years of the project. The purpose of this monitoring is to confirm the flows being removed from the waste water system.

Notice how the first sentence speaks about monitoring of flows as if it is going to happen in the future--"will occur during the first two years of the project." This is a sort of rhetorical tic I am finding in these documents: reordering of chronologies. What is the auditor meant to think here? Are we in the first year of the Project or the tenth year? The suggestion here is that future data is coming from future flow monitoring from a future program--that had been in existence for almost 10 years when this SRF was written! I will be pointing this out to the feds. And isn't this the monitoring phase of the FDDP that the City never funded after the SSO Report? My impression was that that was one of the things that OHM is trying to fix in the SSO Report.

Take a look at the description of the DOM program in the Application. I don't know what is being described there, but it is not the DOM program. The first sentence of the text on this says:

> An Offset-Mitigation Program (O-MP) **is to be implemented** by the City that requires for each new residential dwelling unit and/or premises connected to the system, that there shall be a reduction of 2500 gallons per day (gpd) per residential equivalent unit of peak flow I/I in the City's sanitary sewer system.

Where does that come from? **This statement is completely false and I am going to be telling the feds that.** The DOM Guidelines say nothing about "a reduction of 2500 gallons per day (gpd)....", so why is the City of Ann Arbor telling the DEQ and the EPA that it does? Note the chronological tic again. The Application speaks about a future Offset-Mitigation Program. I am putting aside the question why the DOM has to have three names: DOM for insiders, "Developer Mitigation Program" for people in the Target Areas, and "O-MP" for the government. What a record.

So there are false statements in the FY 2010 SRF Application and in other City documents concerning the FDDP. Lots of them. I will now be looking at **all** the SRFs that have FDDP money in them. The FDDP money in the 2010 SRF (about $2.5 million) was funded, wholly or partly, with ARRA funds, as you know. Multiple false statements in the application document are easily documented by me to the extent they are about the FDDP. One obvious question is: How many times has this happened and how much money has the FDDP obtained from the US government based on applications with material false statements in them? We're going to find that out.

Making material false statements to the DEQ and EPA in order to get ARRA money (or any federal money) is prohibited under 18 USC §1001. Violation of 18 USC §1001 is a felony. Conspiracy to make a false statement to an Executive Branch agency is also a felony.

I am well beyond out of patience with the County and the City here. I am sick of the dissembling and the sneaking around. There is absolutely no excuse for what is being done here and no apparent awareness that you are operating in a goldfish bowl now.

From my perspective, the County is connected to the FDDP at the hip now. The SSO is your document, as much as the City's. The technical group for these related studies includes the County and the FDDP. You have FDDP and Storm water people at the same meetings. You have a link to the FDDP at your website. It's perfectly plain from the Flowchart and the OHM Proposal that this is all one enterprise, one major purpose of which is to save the FDDP.

I am moving on to the Justice Department now. There is already a conversation under way with an AUSA, which conversation is continuing this week concerning the 2010 SRF Application by the City. This was supported by the thoroughly dishonest SSO Report, which the City has submitted as an exhibit to an application (more than one, I assume) for ARRA money and has been sent to government agencies over and again.

I will be reviewing your draft 345-page SRF to see what 's in it. I received it yesterday. Technical compliance with the State SRF application regs is not going to help the County or this new entity you created if I am discussing your document with the Justice Department. They could care less about your notice in the paper. To them it doesn't look like compliance. It looks like concealment.

If you have your "hearing" this week, your SRF will be open for discussion by me with Justice and EPA. I am not fooling around here. I am looking for a federal prosecution for the false statements made to date. Among other things, I'm a taxpayer and someone has been dishonest with the government.

Take advice from your own attorneys on this, and not the City Attorney's Office. They have their own problems already (which I doubt they are talking to you about, but affect you directly) and their own personal agendas. And whatever the City Attorney's Office may have told you about me, I **never** bluff. That is a hard and fast policy with me and always has been.

SRF Process

I'd like a copy of the Official Notice that appeared in a "local paper of general circulation," which I don't think we have in Ann Arbor anymore. If there has been a council resolution on this, I'd appreciate a copy of that too, and copies of any emails you sent to the neighborhoods about the council resolution.

Whatever may have been done on SRF's in the past so the City and County can satisfy public hearing requirements for SRFs, **this** SRF is not going to be done that way. Compliance with the SRF regs is going to take a back seat here to compliance with federal law on false statements. This is going to start being an honest process **under law. It has been neither up until now.**

I'd like to note for the record the following:

1. You did not put me on your email as an addressee, so I did not get your email or Evan's PDF. You know my interest in what you are doing and you have my email address.
2. You did not send your email to Jack Eaton either, even though he running for Council in Ward 4 against Marcia Higgins, who is a big supporter of the FDDP. I'm sure you have his email address too.
3. When were you planning to let people know AT YOUR WEBSITE that the SRF app existed? Never, that's when. Why isn't the SRF up at the website? It's a link to a dropbox account, for heavens sake. You folks talk a lot about public participation and "public engagement." You have every tool of communication available to you. You have a website that the taxpayers pay for and mobile apps for your study and you make sure everyone knows it. But for **this particular item of great importance to you (and much less so for the residents),** you think **a newspaper advertisement 30 days ago will do.** I beg to differ. You provided **no** information about a **345 page** SRF Application and informed no one in the community that you have been planning for this for this since..when? April? March? This is utterly unacceptable.
4. As noted, I am not interested in your technical compliance with the regs on notice. This is a question of ethics, fair play and federal laws against false statements. This is neither fair nor ethical, and your SRF is just one public hearing away from becoming a subject for discussion with a federal prosecutor.
5. What are you planning to put in your SRF on the subject of likelihood of public controversy? Everything about the FDDP or connected with the FDDP, like the Malletts Creek Study, is controversial. There is a federal lawsuit pending here and communications by me to the City Council about violations of law.
6. There is in fact **nothing** at your website about the SRF. How can that be? There is not even **a notice of your meeting** at the website.
7. Who is this new engineering firm? When did they get introduced?
8. **Who is the entity who is submitting this SRF Application? There are consequences to the use of a sewer district here. Why are you doing that?**

9. **There are people, including me, who are opposed to a retention facility at Village Oaks because, at last word from the City, Village Oaks would have to maintain it. Does ANYONE in my neighborhood--or on Ascot Road--know that this project is in your SRF? No. You didn't tell them. We are entitled to read about it IN YOUR SRF and before your "hearing," not from a power point presentation.**
10. People in the Target Areas think you are doing a "Mallets Creek Study" and that you are still thinking about what you plan to do as far as infrastructure **here, not all over Ann Arbor**. That is what Judy Hanway thought today. These people trusted you, Harry. You are a PE. They like you. Yet here we are, **with no information whatever from your office,** and you are getting ready to get people around here to show up at your "hearing" so that you can say that there was a public buy-in in that part of your SRF application. This is so you can meet a July 1 deadline to apply for federal tax dollars for projects these people know nothing about, that you have made no effort to inform them about, many of which will have nothing to do with this area. That is utterly unacceptable to me, and I am the one going to the Justice Department.
11. **I will bet that you cannot find 5 people in this area who know what you are doing now. Or what an SRF is. Or why you have a July 1 deadline for this. Or that this is "public hearing." Whose decision was this? Who is advising you here? The City Attorney's Office?**
12. If you think you are going to demonstrate "public engagement" with this event, I assure you that you won't. If **anyone or any entity** (including the contractor who wrote your draft SRF) tries to tell the DEQ and the EPA that the County or your new green district did **anything** here to satisfy a public input requirement, or that you informed people about what you are doing and why you are doing it, I will make sure everyone up and down the chain from State to Federal in the application process knows that you did exactly the opposite. It's disgraceful.
13. This is no public engagement at all. This is manipulating residents and treating them like sheep. We are done with that. We are done with Charlie Fleetham and the CAC that "has to endorse the work of the technical group." How that OHM Proposal ended up in the Council Packet, I don't know, but there it is. I'll send a copy of Charlie's book along with the OHM Proposal.
14. The OHM Proposal goes to Justice (where it belongs) along with the FY 2010 SRF because the Proposal is an official City document relevant to truthfulness about the FDDP, when truthfulness about the FDDP is the issue. DOJ and the EPA OIG need to know about "public engagement" strategies favored by OHM and the FDDP, such as nonrational leadership from Mr. Fleetham (who writes in a public document that **engineers** want the public to make decisions on engineering questions by mixing emotions with logic), and a rigged Citizen's Advisory Committee.
15. As further evidence, I will be talking to Justice about Phil Westmoreland as an examplar of what Spicer Group and OHM think is an effective way to run a public meeting about FDDPs. They can see a copy of his piece about Auburn Hills from the WEF Private Property Workshop, while I figure out who signed up in Auburn Hills for an fdd after "a rumor was passed."
16. I brought Mr. Westmoreland to your attention in good faith and you ignored it. You did nothing. It's a matter of record. I told you this one would end up as a law enforcement matter and that is precisely what is about to happen. It's as good as done. Let the County explain to someone **way above the County** what this man's role is in getting money from the Federal government. If there was federal money in the Auburn Hills project, I will find that out too.
17. Finally, I'd like to know how the attached advice from DEQ on the use of CMs for 2015 projects (no more unless you meet the July 1 deadline for submission) figures into all of this. Who is the CM going to be for the FDDP and alll the rest of these projects? Surely not CDMI for the FDDP. OHM? Who benefits on this score?

Reschedule your meeting. I am not asking. Send a copy of this email to your colleagues. They have a right to decide about their own futures and whether they want to make the newspapers in this particular fashion. I don't talk to the City, so you may wish to send a copy of this email to them as well. I won't. We had a big problem about a public FDDP meeting last August that the City jammed the neighbors with in the middle of Labor Day Vacations on six days' notice. The City Attorney's office handled that one. Ask them how well that's worked out for them.

This is a matter of record now, including allegations of existing violations of federal law and anticipated violations arising out of your planned "hearing." Things just went from bad to worse for all these studies, the FDDP and the people who work on them. If you go ahead with your "hearing," things won't will get even worse starting immediately afterward and this email will be there in your files for later discussion.

Discuss this with Curt please. I want to hear back on this without delay. Things are going to start moving fast now.

Irv Mermelstein

On Sat, Jun 22, 2013 at 4:36 PM, Harry Sheehan <sheehanh@ewashtenaw.org> wrote:

> Yes
>
> Sent from my iPhone
>
> On Jun 22, 2013, at 3:11 PM, "Irvin Mermelstein" <nrglaw@gmail.com<mailto:nrglaw@gmail.com>> wrote:
>
> Harry,
>
> Was there a published notice in a newspaper about this?
>
> Irv
>
> On Jun 22, 2013 10:22 AM, "Harry Sheehan" <sheehanh@ewashtenaw.org<mailto:sheehanh@ewashtenaw.org>> wrote:
> Irv,
> Here you go. It takes a few minutes to load:
>
> http://db.tt/6uV4JDQW
>
> Sent from my iPhone
>
> On Jun 21, 2013, at 7:48 PM, "Irvin Mermelstein" <nrglaw@gmail.com<mailto:nrglaw@gmail.com><mailto:nrglaw@gmail.com<mailto:nrglaw@gmail.com>>> wrote:
>
> Hi Harry,
>
> Is there a draft of the SRF Application for the Mallett's Creek Project? I'd like to look at a copy before your upcoming meeting.
>
> Irv Mermelstein
>
> Law Office ▪ Irvin A. Mermelstein ▪ 2099 Ascot Road ▪ Ann Arbor MI 48103 ▪ 734.717.0383<tel:734.717.0383>

From:	JUDITH HANWAY
To:	Harry Sheehan
Cc:	Irv Mermelstein; Jack Eaton
Subject:	Confusion re: Public Hearing
Date:	Sunday, June 23, 2013 10:20:00 AM

Hello Harry,

I am confused and dismayed to hear that the public meeting (which I thought was about projects related to the Upper Mallett's Creek Study) scheduled for Monday June 24 is actually a Public Hearing for a variety of projects that reach far beyond our Upper Mallett's Creek study area!

I haven't had the time to fully read the 300+ page SRF document you sent yesterday but it seems very 'last minute notice' to me. In addition, when I got your email last week, I looked to see if there was more about it on the UpperMallett's Creek website. There is no notice or link there. This doesn't make sense to me.

From the meeting we had at Dicken on May 21, I thought the neighborhoods would be informed about the next steps. In retrospect, it now seems as if the County and City already knew what the next steps would be and had all the plans in place!

Neighbors will not be pleased to hear about all of this.

Respectfully,

Judy Hanway
2059 Ascot Rd.
Ann Arbor 48103
734-665-5571

From:	Irvin Mermelstein
To:	Harry Sheehan; Curtis Hedger; JUDITH HANWAY; Jack Eaton
Subject:	SRF
Date:	Sunday, June 23, 2013 6:26:57 PM

Harry,

As a courtesy to you and Curt, I will wait until tomorrow at 10 before my email goes to the papers.

You should have attached that draft to both the email and Evan's pdf. I don't understand that at all.You ran a community meeting here in Lansdowne and you didn't mention that a draft of the SRF, for inspection, would be ready the next day.

Irv

From:	Harry Sheehan
To:	Irvin Mermelstein; Judithhanway@sbcglobal.net
Cc:	Jack Eaton; Evan Pratt; Lawson, Jennifer; Curtis Hedger; MHiggins@a2gov.org; MTeall@a2gov.org
Subject:	SRF Project Plan
Date:	Monday, June 24, 2013 9:55:00 AM
Attachments:	Re Application for SRF Financing.msg Confusion re Public Hearing.msg

Judy and Irv,

Thank you for your comments regarding the SRF Project Plan. Your input and interest is appreciated.

This 2013 Project Plan includes 20 projects that may be implemented, but there is no obligation to do so. Projects are implemented after they have gone through the City's Capital Improvement Planning process, then included in a City of Ann Arbor budget, and finally approved for construction. All of these steps involve public input.

The 2013 Project Plan is a separate but complementary process to the CIP and budget. It is used to make the projects eligible for SRF funding should City Council decide to go forward with them. These are projects that fall under the Nonpoint Source category. Sanitary projects, including the FDD program, are a separate category of the State Revolving Fund as defined by the DEQ. I can only speak to the Nonpoint Source Plans with which I am familiar.

We have submitted Nonpoint Source Project Plans in 2005, 2009, 2010 and 2011. A summary table of the projects in those plans is located on Page II-9 (PDF Page 27). As you can see, many projects move forward, some do not. Again, sanitary projects would be a separate process.

Many of the proposed 20 projects identified on Page III-24 (PDF page 71) are already in the City's Capital Improvement Plan. Scio Church and South Seventh Street Reconstruction are examples. Other projects are not yet in the CIP or the City's budget: Lawton, Lans Basin, and Churchill. These three Upper Malletts projects were included in the draft after being positively received by the Citizen's Advisory Group and subsequently at the May 21 Upper Malletts Meeting. Inclusion does not obligate moving forward, but removes one potential delay should council (and the Drain Board) chose to proceed. They were included simply to avoid a costly and redundant amendment. The Plan is valid for 5 years, so we have that long to decide whether or not to proceed. (Obviously, the road projects will likely proceed.)

This Hearing on Monday is also a separate but complementary process to the Upper Malletts Study. Projects rejected by the Upper Malletts Study will not move forward, whether they are in the Project Plan or not. We have the ability to add projects from Upper Malletts study (e.g. Las Vegas Park), or remove projects like Lawton, Churchill and Lans Basin based on the conversation Monday night. We simply thought it prudent to include Lawton, Churchill and Lans Basin because the scale of those projects suggests we'll need grants and financing should they proceed.

I apologize for the confusion regarding this process. The SRF Public Hearing is a federal requirement to assure that the public is involved at one point in the process. Even the content of the presentation is strictly prescribed. In the case of Ann Arbor, there is public input well above this

minimum standard. Upper Malletts is one example. As with any large-scale project, public meetings will also be held for each project that moves toward implementation.

I hope to see you tonight and look forward to answering any questions you may have.

Harry

Harry Sheehan
Environmental Manager
Washtenaw County Water Resources
705 N. Zeeb Road, PO Box 8645
Ann Arbor, MI 48107-8645
(734) 222-6851
sheehanh@ewashtenaw.org

From:	Harry Sheehan
To:	Lawson, Jennifer
Cc:	Stickel Karyn
Subject:	RE: Baffle Box question
Date:	Tuesday, June 25, 2013 8:53:49 AM

Jen,
You probably know more about this than I. Would you mind putting together a few sentences?

Harry

Harry Sheehan
Environmental Manager
Washtenaw County Water Resources
705 N. Zeeb Road, PO Box 8645
Ann Arbor, MI 48107-8645
(734) 222-6851
sheehanh@ewashtenaw.org

From: Roger Moon [mailto:rogamoon@hotmail.com]
Sent: Tuesday, June 25, 2013 8:43 AM
To: Harry Sheehan
Subject: Baffle Box question

Hi Harry,
I wanted to attend last night's public discussion on the stormwater treatment plans but didn't see the notice until Monday morning and couldn't make it.
To make this short, I only have one question, which you may elect to answer or just add it to the record.

Regarding baffle boxes, drain traps, catch basins and hydrodynamic (swirl) separators; is there sufficient servicing available to keep these devices working efficiently? As I travel about town, vacuum trucks and other drain cleaning vehicles are rarely seen and as cleaning is recommended every 30 days during the wet season, I question whether we have adequate service equipment budget funds. You could also add street / gutter sweeping to the list.
Guess this is why the BMP is to capture runoff near the source; which is why you have the rain garden program.

Sincerely,
Rog Moon

Huron River 2013 Project Plan

Project Plan Public Hearing

June 24, 2013

Introductions

Washtenaw County Water Resources Commissioner's Office

- Harry Sheehan

City of Ann Arbor

- Jen Lawson

Hubbell, Roth & Clark, Inc.

- Karyn Stickel, P.E.
- James Burton, P.E.

Existing Stormwater Challenges

- Overall degradation of the watershed associated with urban conditions
  - High amounts of runoff
  - Pollutants in runoff
  - Lack of stormwater infiltration
- Compliance with MDEQ Total Maximum Daily Loads (TMDL)
- Removal of *E.coli*, total phosphorus (TP), and total suspended solids (TSS)

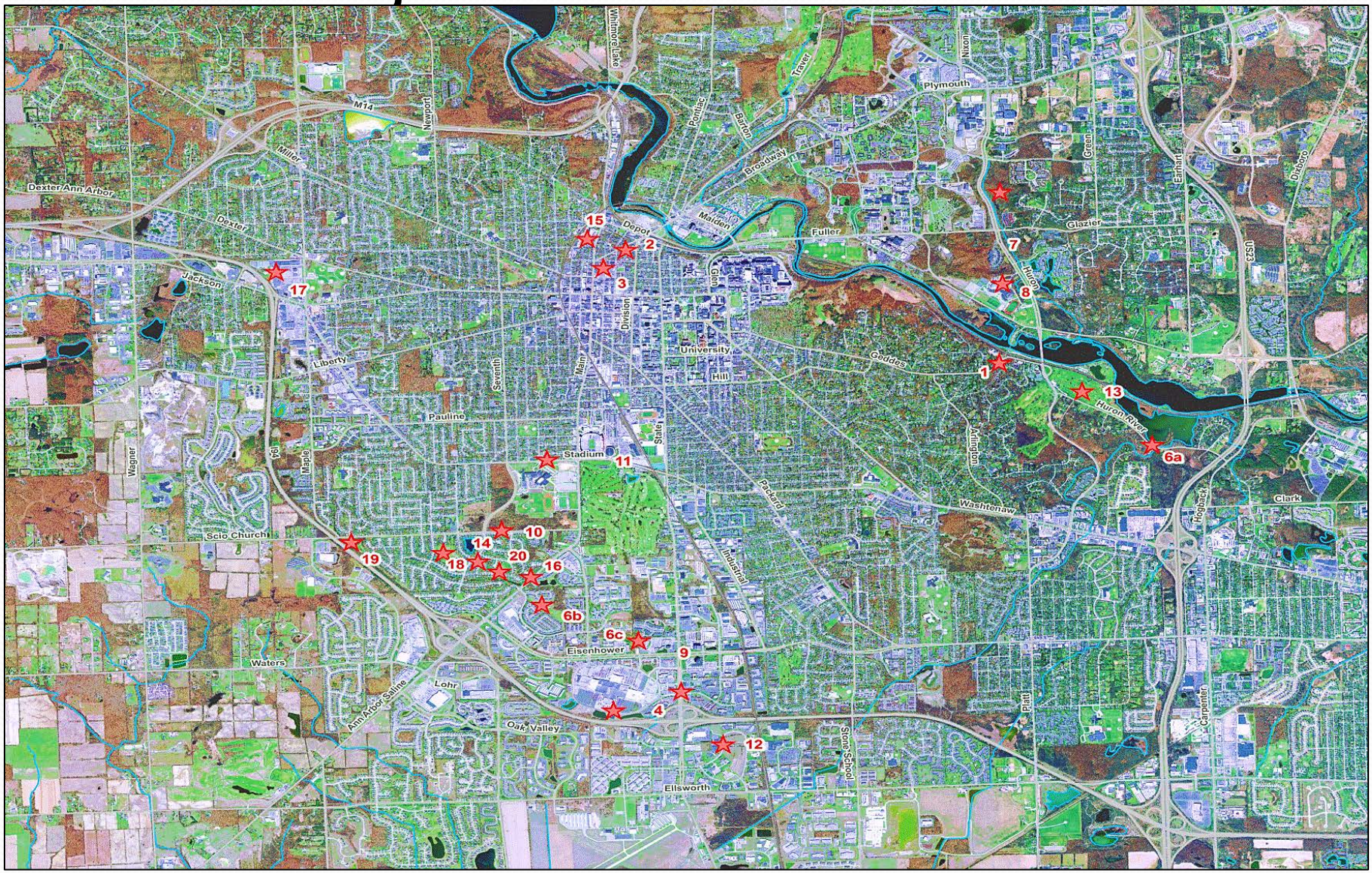
Project Plan Objectives

- To mitigate and capture first flush stormwater runoff and pollutants, and larger events if practical
- To implement Best Management Practices (BMPs) for stormwater management
- Project selections intend to fulfill portions of the City's Capital Improvement Plan (CIP)

Selected Project Alternative Summary

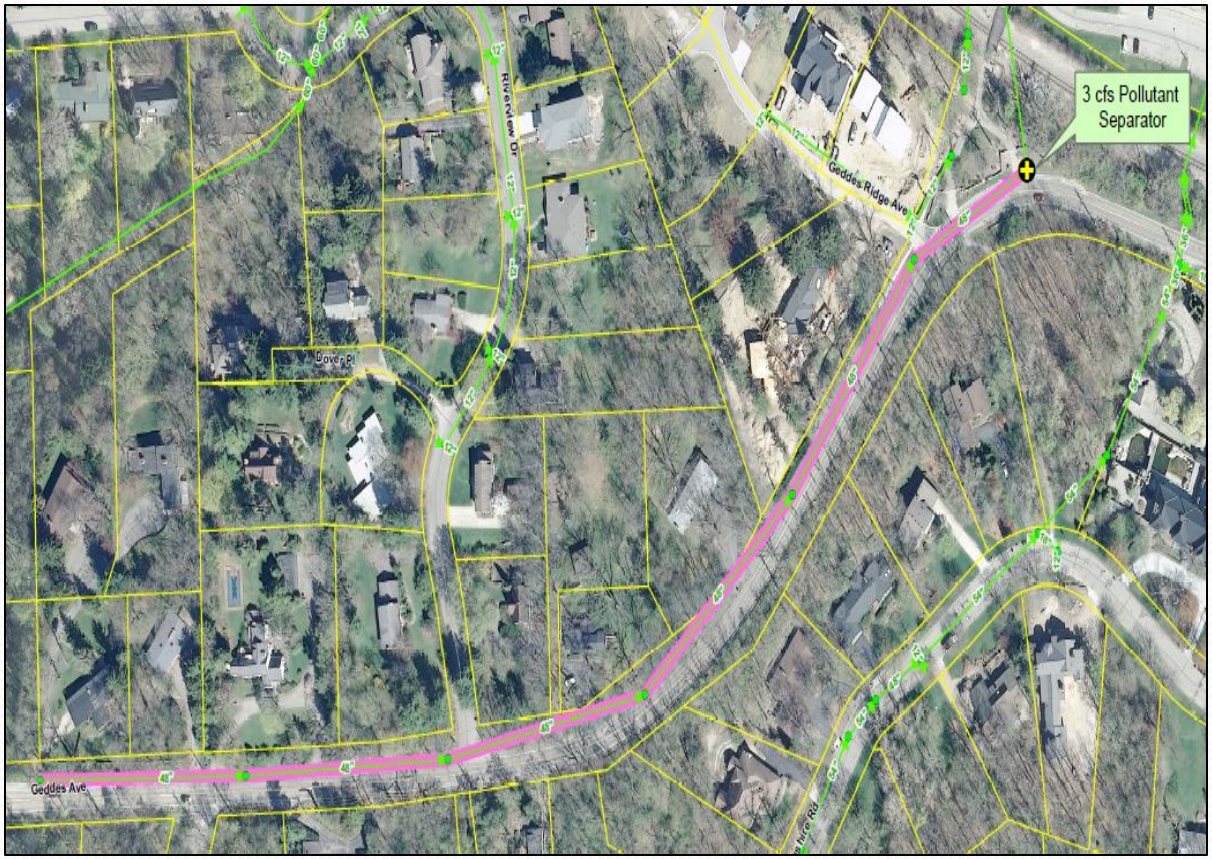
- **Alternative 1: No Action**
- **Stormwater Management**
  - **Water Quality BMPs**
    - Geddes Avenue
    - Detroit Street
    - Farmers Market Parking Lot
    - Street Tree Planting
    - State Street
    - Scio Church
    - Stadium Drive
    - 721 N. Main Street
    - S. Seventh Street
    - Maple Village Shopping Center
    - Lawton School Detention Basin
    - Churchill Downs Park
- **Optimization of Existing Facilities**
  - Lans Basin
  - Village Oaks
  - Research Park Wetlands Detention
  - Briarwood Mall Ponds Retrofit Project
- **Streambank Stabilization**
  - Mallett's Creek
  - Millers Creek
  - Huron High School Baffle Box
  - Huron Hills Golf Course

Overall Project Locations



Geddes Avenue
Arlington Boulevard to Huron Parkway

- HMA with infiltration/ sub-surface stone reservoir section.
- Stepped detention system with weirs
- Possible outfall to the river
- Pollutant Separator



Detroit Street
Catherine Street to Division Street

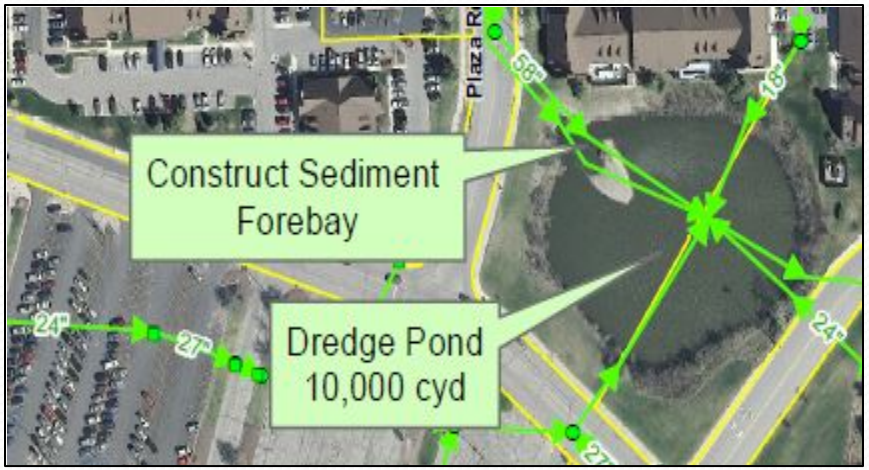
- Oversized pipe or stone reservoir section for water quality detention and pollutant separator

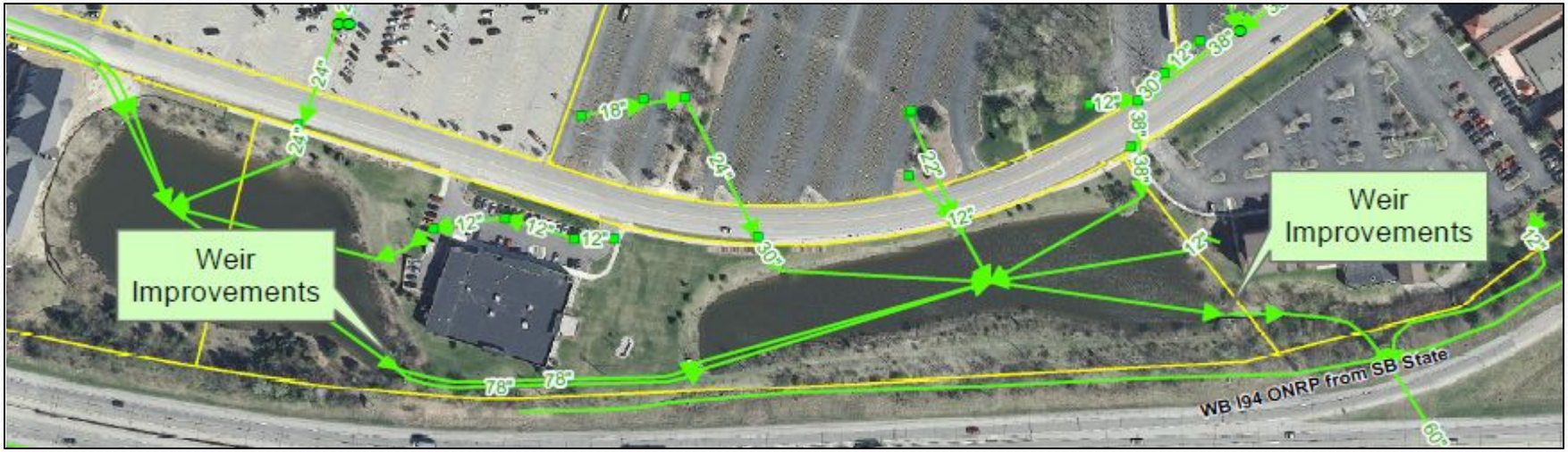
Farmers Market Parking Lot

- Oversize storm sewer pipe or stone reservoir for storm water quality detention
- Catch basins and manholes with sumps
- Pollutant Separator

Briarwood Mall Ponds

- Outlet structure improvements
- Retrofitting 3 ponds
  - Plaza Drive Pond
  - Von Maur Pond
  - Holiday Inn Pond



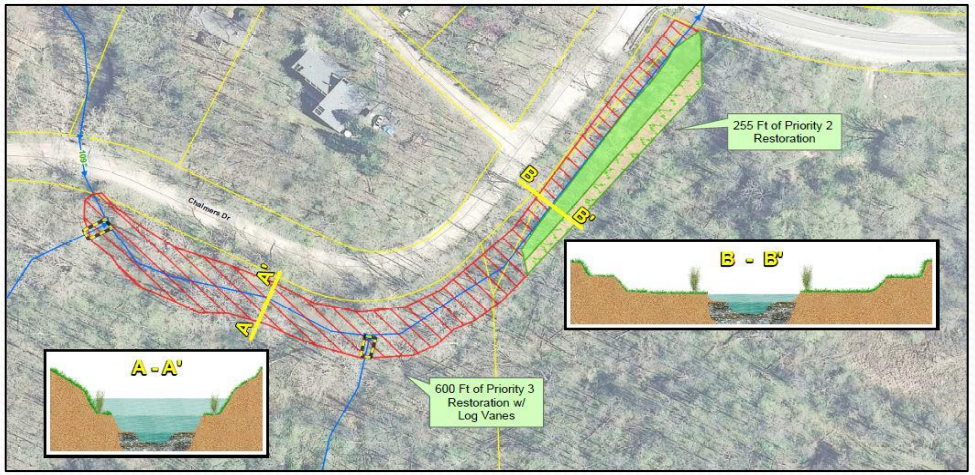


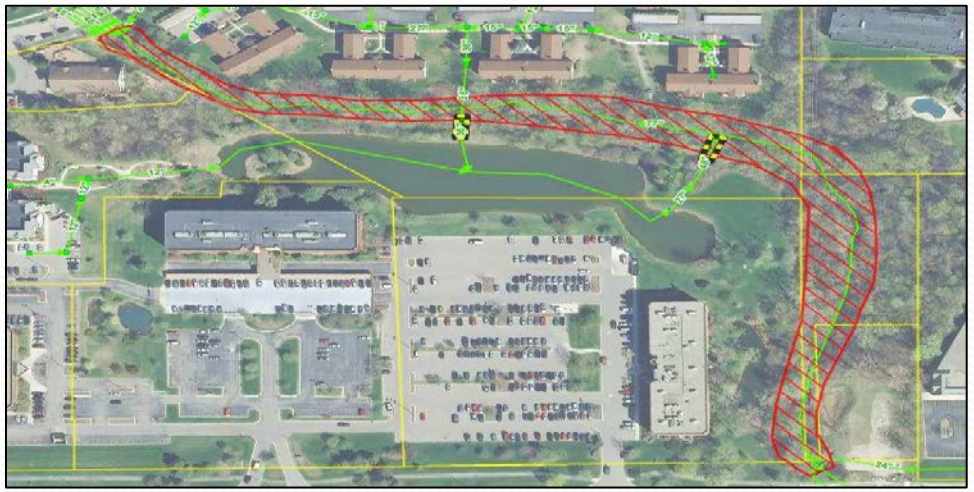
Street Tree Planting

- A single tree can remove about 3,000 gallons of stormwater per year
- Installation of approximately 750 trees/yr over 5 years
- Located along road corridors and public property

Malletts Streambank Stabilization

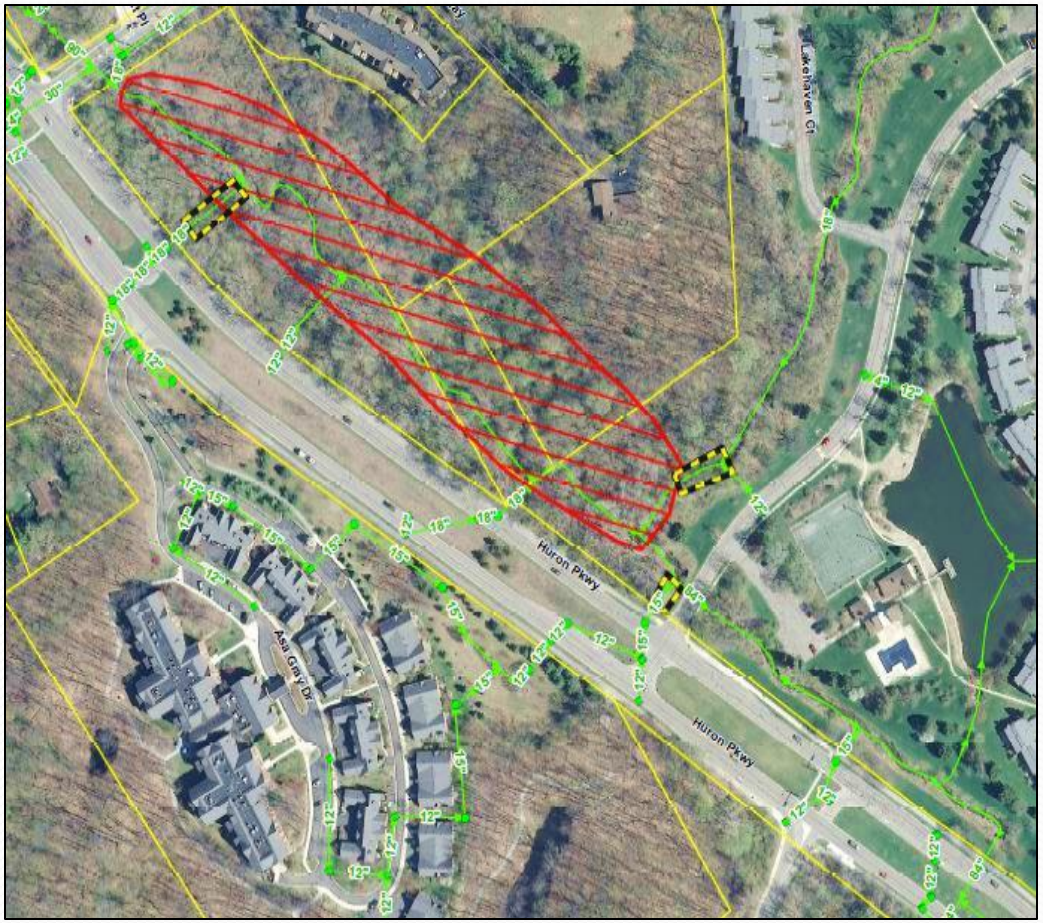
- *Chalmers to Huron River*
- *Oakbrook to Eisenhower*
- *Cranbrook Park*





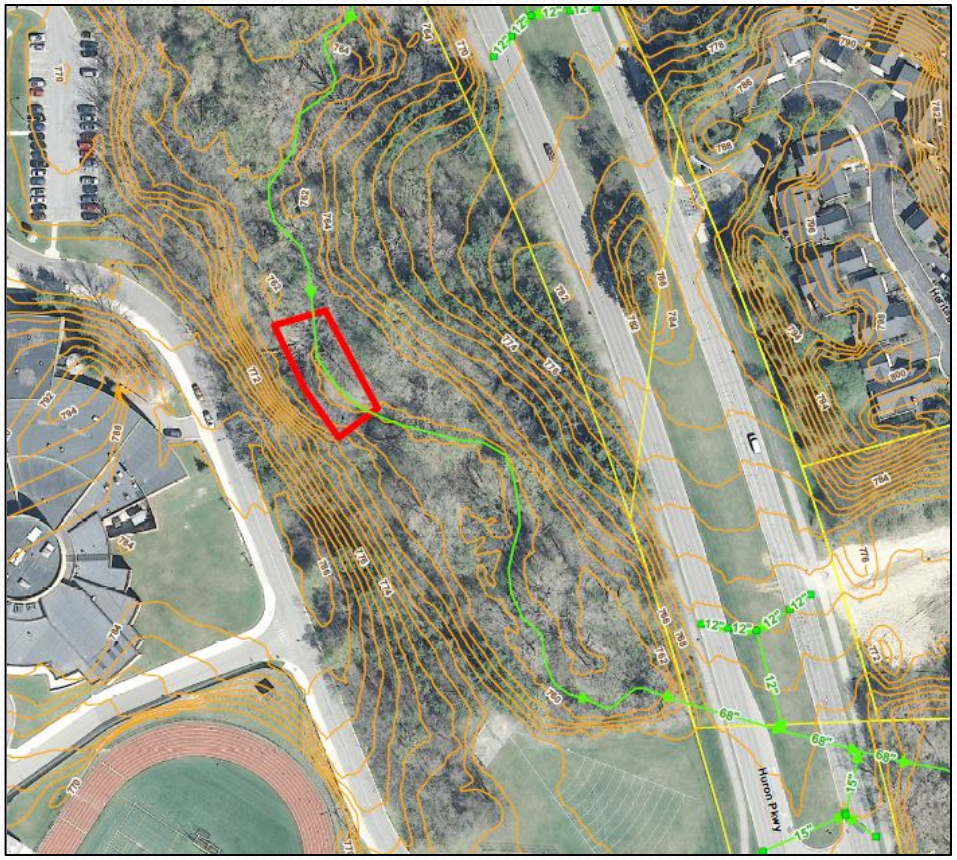
Millers Streambank Stabilization

- Floodplain restoration
- Slope stabilization
- Riparian vegetation management



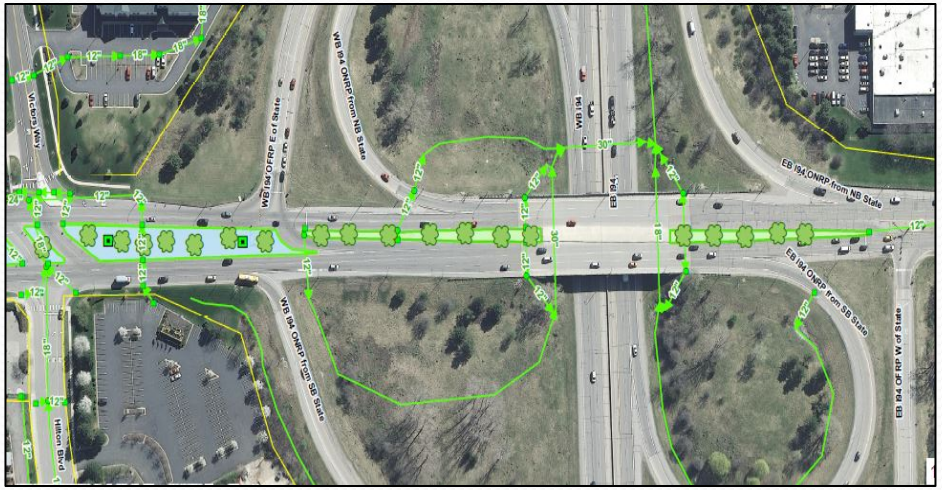
Huron High Baffle Box

- Precast baffle box
- Potentially trap up to 230 tons of sediment annually (63% of upstream sediment)
- Construct regional basin to provide for better access for maintenance



State Street

Eisenhower Parkway to south of I-94

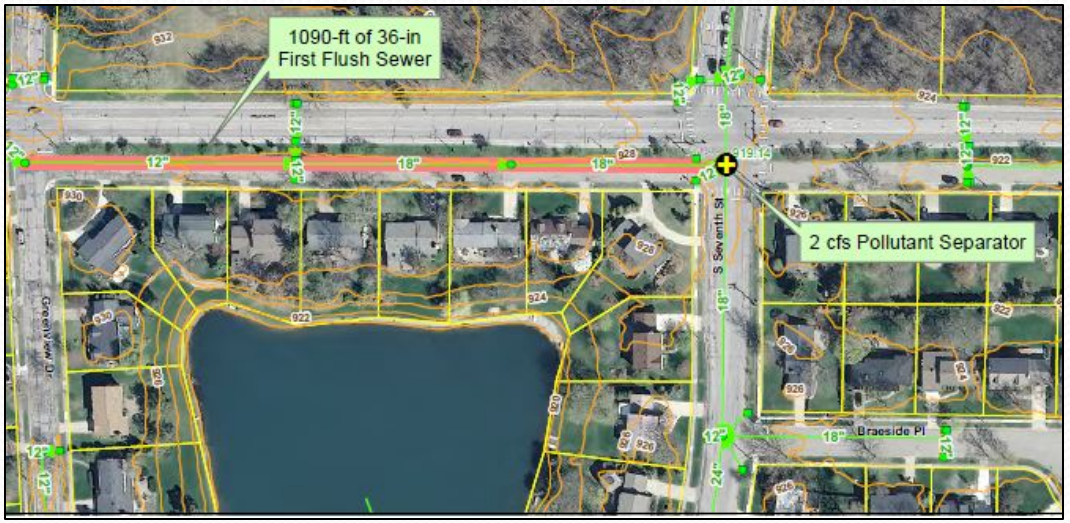


- Replacement of concrete islands with infiltration swales or subsurface stone reservoir
- Tree plantings with structural soil
- Infiltration basins and manholes with sumps

Scio Church Road

Main Street to east of Seventh Street

- Oversized storm sewer or subsurface stone reservoir for water quality detention
- Road replacement
- Pollutant Separator
- Subsurface reservoir if groundwater table allows

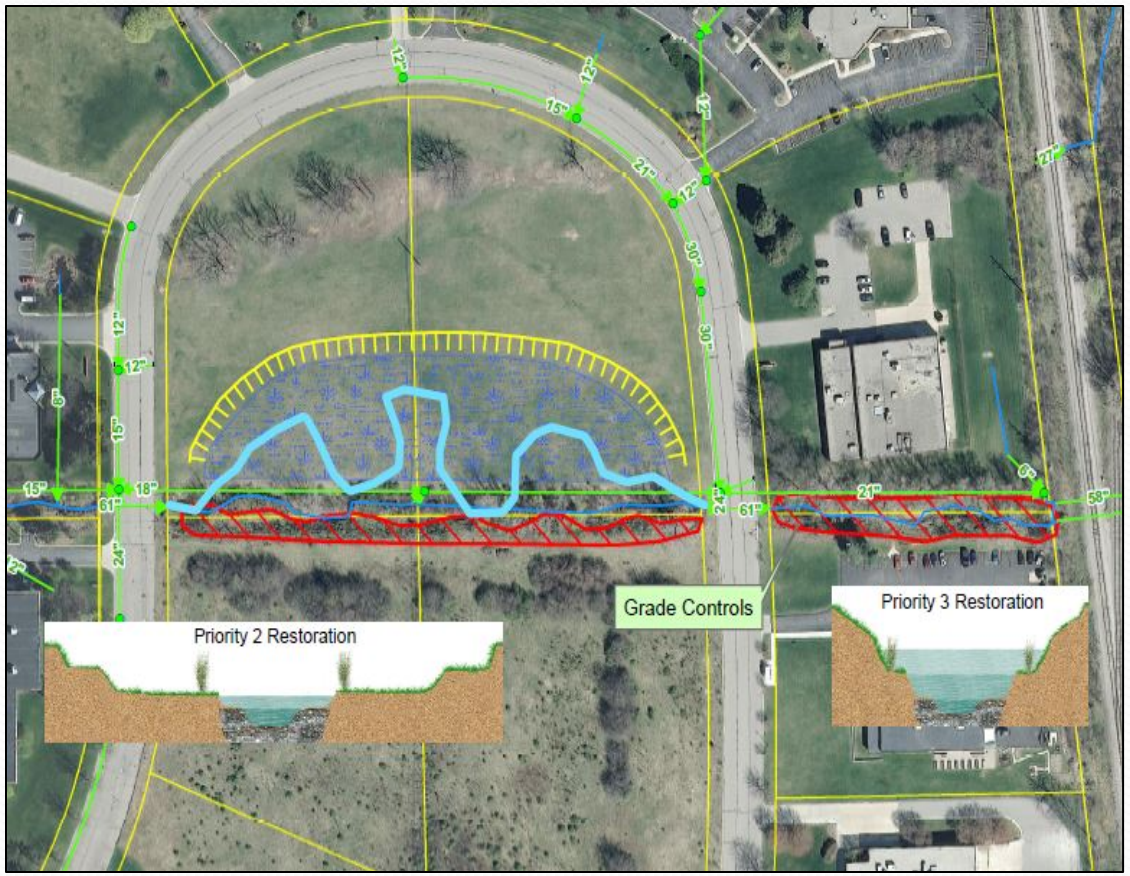


Stadium Blvd

Hutchins Avenue to Kipke Drive

- Oversized storm sewer or subsurface stone reservoir for water quality detention
- Trees with structural soil

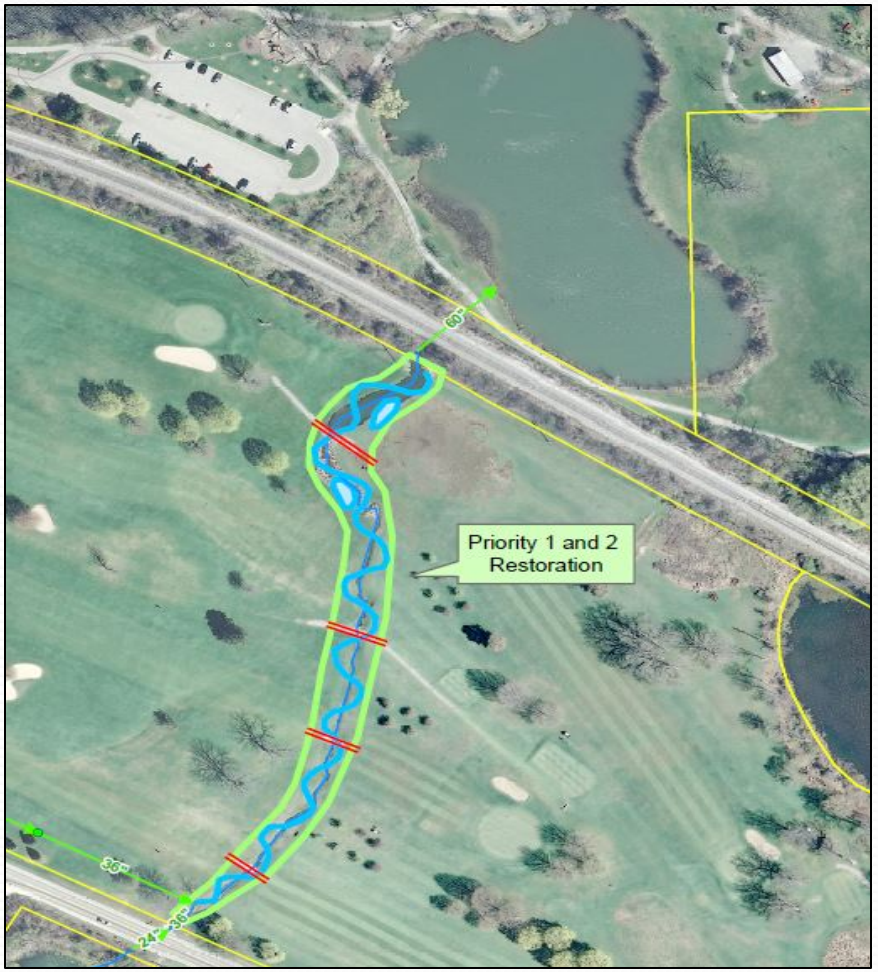
Research Park Wetlands Detention



- Wetland detention area
- Streambank reconstruction through the stream
- Removal of invasive vegetation

Huron Hills Golf Course

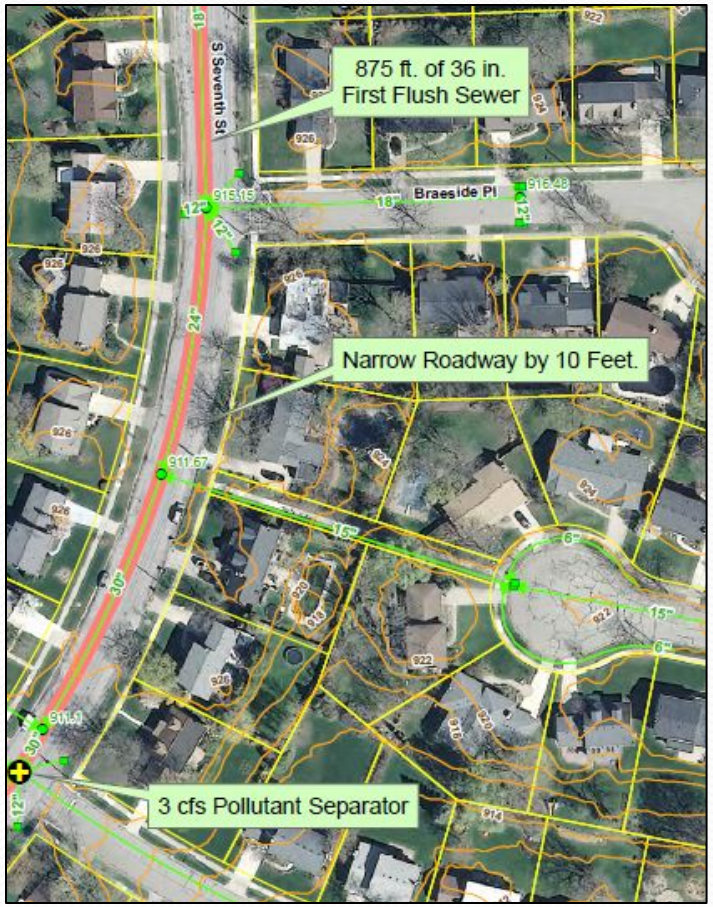
- Establishment of riparian vegetation
- Establishing floodplain wetlands
- Construction of floodplain crossings



S. Seventh Street

Greenview Drive to Scio Church Road

- Porous Pavement
- HMA with subsurface stone reservoir
- Catch basins and manholes with sumps
- Removal of 0.2 acres of impervious area

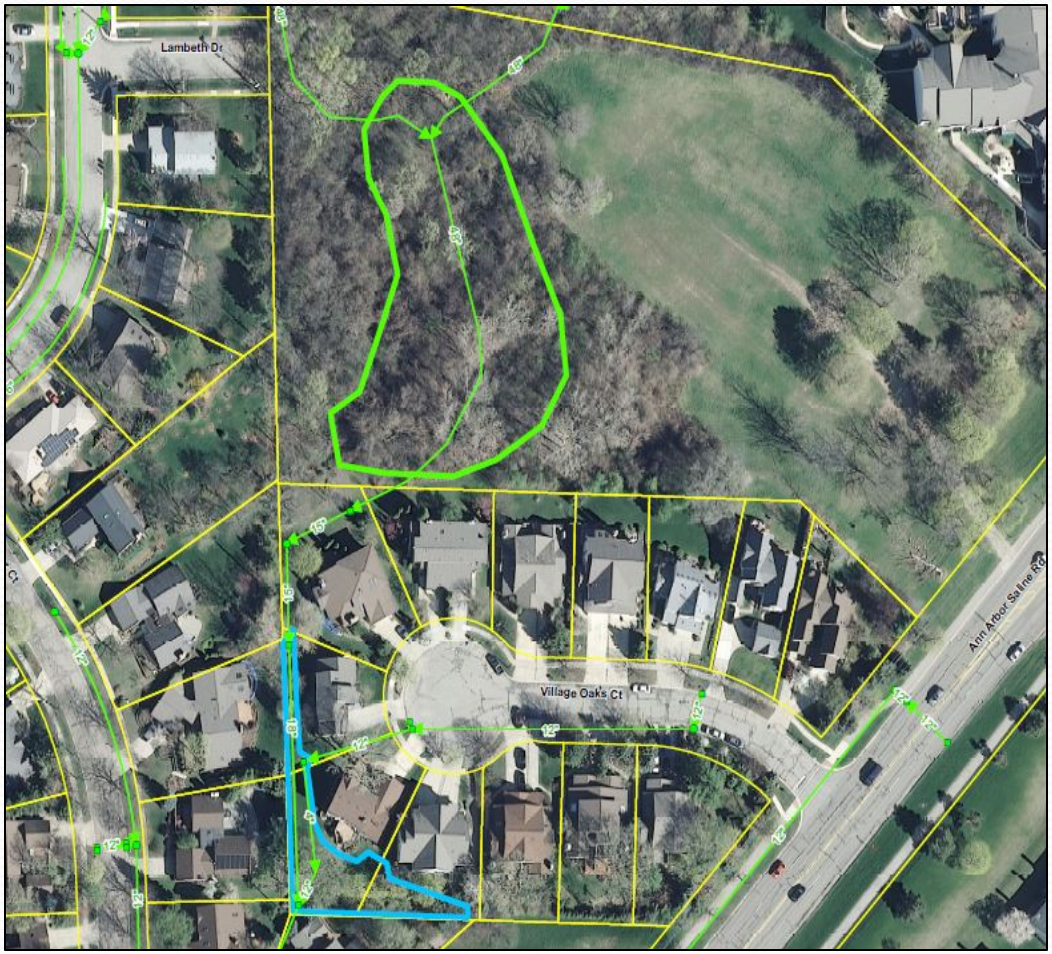


721 N. Main Street

- Remove structures and parking lots from designated floodway
- Removal of 2.5 acres of impervious area from designated floodway
- Construction of Stormwater wetland

Village Oaks

- Improve drainage and water quality in the area through retrofits to existing basin
- Implement Infiltration
- Alternative 1: provide additional storage in several basins
- Alternative 2 (selected alternative): provide a large regional basin

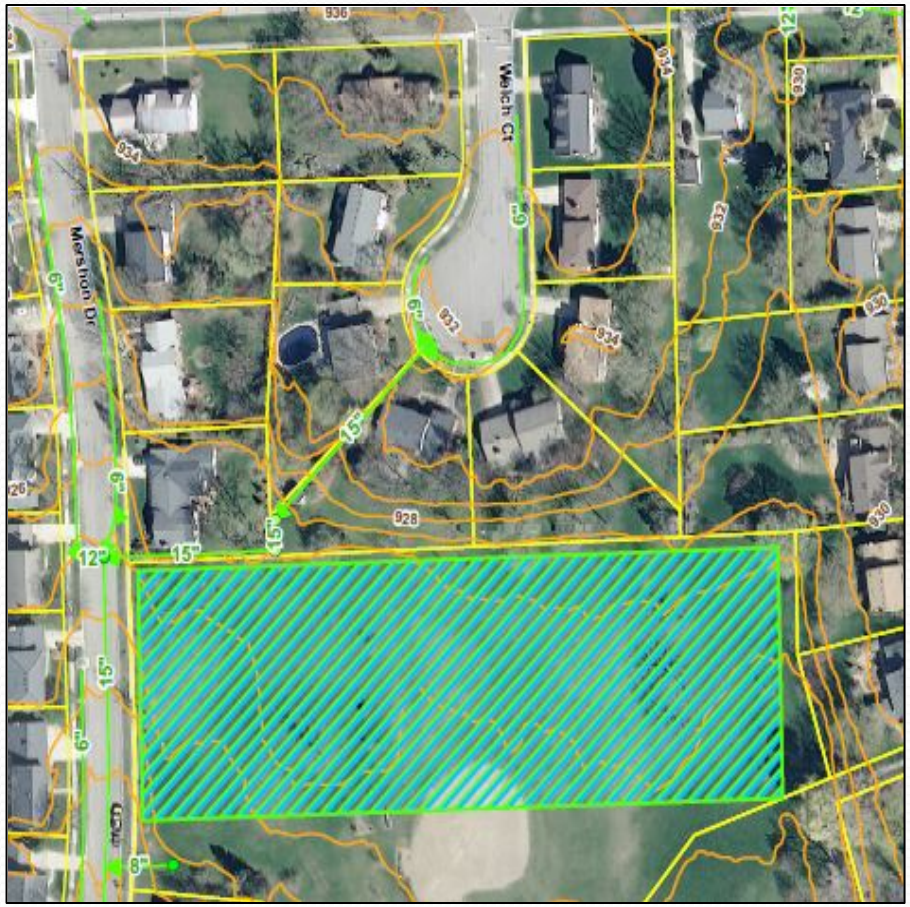


Maple Village Shopping Center

- Alternative 1: underground detention/infiltration with HMA pavement for the site
- Alternative 2: underground detention/infiltration with porous asphalt for the site
- Alternative 3: underground detention/infiltration with standard HMA for the basin

Lawton Park Detention Basin

- 825,000 cubic feet of underground storage on City-owned park or school property
- Surface storage could not be considered as it would eliminate use of the park.

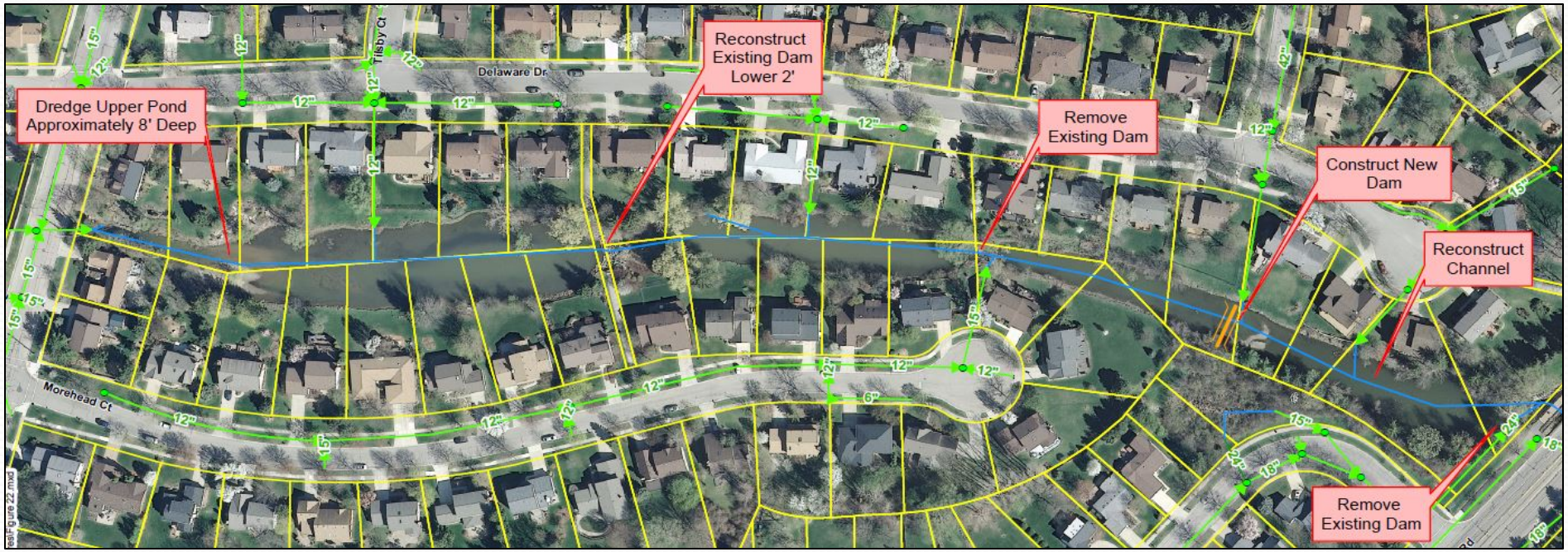


Churchill Downs Park

- 625,000 cu ft of above ground storage on City-owned park property.
- Underground storage was considered but was infeasible due to grades.

Lans Basin

- Retrofits to existing storage area
- Dredging of sediment to restore basin to design function



Possible Impacts

- Minimal negative environmental impacts
- Temporary construction disruptions such as traffic, noise, and dust
- Limited use of surrounding facilities during portions of construction
- Will require the Farmer's Market to temporarily be relocated
- Will disrupt park services at several locations during construction
- Proposed projects will improve water quality of Huron River

Mitigation of Impacts

- Proper soil erosion control measure will be placed throughout construction
- All projects impacted wetlands or floodplains will be properly permitted by MDEQ
- Appropriate signage for pedestrian and vehicle traffic during construction
- Alternate locations will be found for park activities and Farmer's Market during construction

Project Schedule

Site	Project	Year	Quarter
1	Geddes Road -First Flush Storm Sewer with pollutant separation	2015	
2	Detroit St - First Flush Storm Sewer with pollutant separation	2018	
3	Farmers Market - First Flush Storm Sewer	2016	
4	Briarwood Mall Pond Retrofits	2019	
5	Tree Planting and Enhancement	2015-2019	
6	Malletts Creek Streambank Stabilization	2015	
7	Millers Creek Streambank Stabilization	2017	
8	Huron High School Baffle Box	2017	
9	State Street - Eisenhower to S. of I-94 - Replacement of Concrete Islands with green space and infiltration swales	2019	
10	Scio Church - Main Street to east of Seventh - First Flush Storm Sewer	2016	
11	Stadium Blvd (Hutchins Ave to Kipke Dr) - First Flush Storm Sewer	2016	
12	Research Park Wetland Detention - Streambank Stabilization	2019	
13	Huron Hills Golf Course - Streambank Stabilization and Wetland Area	2019	
14	S. Seventh Street - Scio Church to Greenview - First Flush Storm Sewer	2016	
15	721 N. Main Street - Removal of Concrete Area and Replacement with Stormwater Park	2016	
16	Village Oaks – Chaucer Court Detention	2014	Q4 2014
17	Maple Village - Underground Detention and Infiltration	2019	
18	Lawton Elementary School	2016	
19	Lans Basin	2016	
20	Churchill/Eisenhower Park	2016	

Project Costs

Site	Site	Drainage Area (ac)	% First Flush Treated	TSS Removal (lb/yr)	TP Removal (lb/yr)	Cost	$/cf Storage	$/lb TSS Removed	$/lb P Removed
1	Geddes Drive	3.0	445%	1,230	0.45	$2,750,000	$199	$2,237	$6,111,000
2	Detroit Street	1.6	139%	643	0.24	$1,090,000	$289	$1,694	$4,628,450
3	Farmers Market Parking Lot	1.8	100%	717	0.26	$700,000	$186	$976	$2,666,667
4	Briarwood Ponds	160.0	67%	25,051	32	$1,230,000	$10	$49	$38,246
5	Street Tree Planting	NA	NA	NA	NA	$2,070,000	NA	NA	NA
6	Malletts' Creek	NA	NA	1,420	1207	$1,990,000	NA	$1,401	$1,649
7	Miller Creek	NA	NA	300	255	$650,000	NA	$2,167	$2,549
8	Huron High Baffle Box	NA	NA	457,296	450	$200,000	NA	$0.44	$444
9	State Street	12.2	29%	1,208	1.06	$860,000	$143	$712	$810,251
		3.6	64%	538	0.69	$200,000	$50	$371	$289,352
10	Scio Church	7.8	112%	2,815	1.09	$3,860,000	$97	$1,371	$3,549,425
11	Stadium Blvd (Hutchins to Kipke)	2.0	901%	971	0.60	$1,640,000	$205	$1,690	$2,733,333
12	Research Park	350.0	11%	478,429	212	$920,000	$102	$2	$4,335
13	Huron Hills	NA	NA	240	204	$1,220,000	NA	$5,083	$5,980
14	S. Seventh	1.9	481%	779	0.29	$840,000	$53	$1,079	$2,947,368
15	721 N. Main	2.5	267%	647	0.75	$1,760,000	$83	$2,720	$2,346,667
16	Village Oaks	15.0	122%	1,230	4.50	$1,352,000	$90	$1,100	$300,444
17	Maple Village	25.0	504%	21,475	6	$2,420,000	$23	$113	$387,200
18	Lawton Elementary	100.0	979%	85,901	25	$13,520,000	$16	$157	$540,800
19	Lans Basin	100.0	245%	85,901	25	$1,410,000	$7	$16	$56,400
20	Churchill Downs Park	100.0	765%	85,901	25	$2,990,000	$5	$35	$119,600

User Costs

- The total project costs are $44,000,000 for all 20 projects
- This equates to $27.79 per residential equivalent unit on a quarterly basis
- Projects that are scheduled within the next few years are included in the City's Capital Improvement Plan (CIP). Future projects will be introduced as part of the CIP planning process and will be evaluated accordingly.

Changes to the Project Plan since Draft

- Added three additional projects (Lawton Park, Churchill Downs Park, and Lans Basin), including updated project costs and user costs.
- Several of the original sites were updated to include either porous pavement of an HMA section with a subsurface stone reservoir.
- Pollutant removal tables were finalized.
- Cost estimates were updated.

Questions

- Please state name and address for the record.
- Questions are recorded and responded to at the end.

MEETING SIGN-IN SHEET

Project:	Washtenaw County Water Resources Commissioner Huron River 2013 SRF Project Plan – Public Hearing	**Meeting Date:**	June 24, 2012, 6:30-8 pm
Facilitator:	Harry Sheehan, WCWRC	**Place/Room:**	NEW Center, 1100 N. Main Street

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Joe Comen	779 LANSWAY	665 9605	~~JCEN~~
Vince Caruso	5826 Chelsea	(248)207	VPC@Alum.org

MEETING SIGN-IN SHEET

Project:	Washtenaw County Water Resources Commissioner Huron River 2013 SRF Project Plan – Public Hearing	**Meeting Date:**	June 24, 2012, 6:30-8 pm
Facilitator:	Harry Sheehan, WCWRC	**Place/Room:**	NEW Center, 1100 N. Main Street

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Evan Pratt	WCWRC		
Jen Lawson	Ann Arbor		

STATE OF MICHIGAN - CITY OF ANN ARBOR

PUBLIC HEARING

WASHTENAW COUNTY 2013 SRF PROJECT PLAN

June 24, 2013 - Ann Arbor, Michigan

PRESENTED BY:
EVAN PRATT
Water Resources Commissioner

HARRY SHEEHAN
Office of Water Resources Commissioner
705 North Zeeb Road
Ann Arbor, Michigan

And:
KARYN STICKEL, P.E.
JAMES BURTON, P.E.
Hubbell, Roth & Clark, Inc.
P.O. Box 824
Bloomfield Hills, Michigan 48303-0824

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ATTENDEES AT PUBLIC HEARING HELD JUNE 24, 2013

Ethel Potts
Kathy Boris
Kal Dutta
Burt Diamond
Gordon Beeman
Aram Kalousdian
William Higgins
Gary Light
Jack Eaton
Alice Ralph
John A. Yalonen
Mike Forgacs
Barry Gates
Sonia Manchek
Kathy Griswold
Pat Marten
Joe Comen
Vince Carn
Laura Rubin
Craig Trombley
Frank Pelosi
Judy Hanway
Tom Bletcher
Karyn Stickel
Jamie Burton
Jen Lawson

Ann Arbor, Michigan

June 24, 2013 - 6:30 p.m.

MR. SHEEHAN: All right everyone. We're going to get started. Can everybody hear me okay back there? If I start to fade or start to mumble just put your hand to your ear and I will recognize that as the international sign of "you're mumbling".

Yes?

MS. BURTON: Just a quick question. We all want to know who owns this building?

MR. SHEEHAN: The non-profit Enterprise at Work which is a start up non-profit corporation.

MS. BURTON: Oh. They own and then they lease it out to non-profits?

MR. SHEEHAN: Yes. And the Huron Watershed Council is housed here so they are actually hosting us tonight.

MS. BURTON: Okay.

MR. SHEEHAN: So a couple logistics. The by law or by rule for this type of funding, the meeting tonight has a verbatim transcript so I will be speaking toward this directional microphone. I will be giving about a half-hour presentation. Then the public hearing begins, public meeting. I like to think of it as a discussion. We'll try to keep it that was as best we can but I am going to ask for people to come up here and stand at the corner of this table and make a

comment or ask their questions after we're done with the presentation that way. If you've ever seen one of these verbatim transcripts and people are talking throughout the room it says "inaudible", "inaudible" and "inaudible" and you just don't get the sense of the meeting so I'm going to ask that people accommodate us that way.

It makes it easier for the DEQ to evaluate the comments that you made and the discussion that we had.

If you have cell phones could you please turn them to vibrate or off. There are bathrooms just out that door and around to the right. Okay. Any questions before I get started.

Oh. So this is a collaboration, the Huron River 2013 Project Plan. It's a collaboration between the city of Ann Arbor and the Washtenaw County Resources Commissioner, the Commissioner's Office. And our consultant is Hubbell, Roth & Clark on this project.

I'm Harry Sheehan. Most of you know me. I work for Mr. Pratt over there. He is your Water Resources Commissioner. City of Ann Arbor is represented here by Jen Lawson who is greeter and Jamie Burton from Hubbell, Roth & Clark who is also a greeter and Karen Stickel over here manning the sound in whites. Okay.

MS. BURTON: Several cars just pulled in the parking lot, shall we --

MR. SHEEHAN: Eppie, do you serve as a dignitary from the city any more? Okay. All right. So.

The problem statement. What are we here for.

The existing stormwater challenges are that essentially the Huron River Watershed within the city of Ann Arbor is about somewhere between 35 and 40 percent paved over or covered in rooftops so water doesn't tend to get to the ground that way. There is an overall degradation of the watershed as a result. There is a high amount of runoff. Runoff happens frequently. Creates flashy flows and there are pollutants in that runoff. It may seem like just a little bit here and there but if you add it up over the entire Huron River Watershed there's a lot of stuff that washes off the landscape after it rains. It is the number one source of pollution to the Huron River, the number one threat to the Huron River and that is also true at the larger scale, at the state wide and the federal level.

It's a non-point source pollution. It's the landscape pollution. The stuff that we leave behind is the number one cause of our problems.

There's a lack of infiltration which gets to water getting to the creeks slowly the way it naturally would in prairie or a woodland setting.

We're also here because there are Total Maximum Daily Loads which are set by the DEQ. Those are actually from

the federal level and they are essentially an identification of what pollutants are in the river and what pollution -- what pollutants are -- need to be kind of managed. So they set a budget for pollution in the Huron River for sediment, for phosphorus and E.Coli. Which is the third bullet. Next please.

So our objectives with this plan aside from the financial aspect because it is called the State Revolving Loan Fund, our objectives are to mitigate and capture the first flush or the runoff from the smaller half inch type storms. And the pollutants that are in that water and if possible and practical to capture and treat larger events and to implement Best Management Practices for stormwater management where there just aren't any. Okay.

The project selections intend to fulfill portions of the CIP, the City's Capital Improvement Plan. Meaning that things that are already in the Capital Improvement Plan that are related to stormwater are in this project plan. This project plan has other projects that are not yet in the CIP but they would need to go through that CIP and budgeting and council approval process before they would move forward. This is strictly to identify potential projects to get in line for funding at the state level at the DEQ. Okay.

There's 20 projects that we're going to go over individually. But very briefly and then we are going to have

that discussion afterwards.

Each project has a no action alternative. We don't have to do these projects. In fact, we're required to look at the cost benefit analysis and determine whether or not the no action alternative makes sense.

The action alternative is we need to do something. If we do no action the Huron River problems won't be improved. We won't make progress and the action alternative is to start chipping away and doing retrofits and improving stormwater management throughout the watershed. Within the action alternatives there are these three bullet points, stormwater management. Putting stormwater in places where the stormwater detention and treatment in places where there currently is none. Taking places where there currently is some stormwater management and improving that and streamback stabilization. Those are the three categories.

You have a handout of this map because we couldn't get it turn out very well. So this is the city of Ann Arbor. US 23, 94, M-14, downtown, there's the golf course, Pioneer High, stadium right there in the middle. So our projects are throughout the city. There's some in Miller Creek. There's some that drain directly to the river, the river going right through the city, obviously. Some in Malletts Creek at the downstream end. Some in Mallett's Creek at the upstream end. Mallett Creek and Allen Creek. Okay.

Project number one is Geddes Avenue. Geddes Avenue is scheduled to be reconstructed from Arlington to Huron Parkway. So our opportunity here is to take a road that doesn't have any detention. Water hits the pavement and runs down and it goes into a valley and into the river. So there's -- I don't even think there's storm sewers on this road but what we'd like to do is put in -- when you see HMA, HMA translation is asphalt. Okay, it's hot mix asphalt. So what we'd like to do is put in the equivalent of a porous roadway. We're going to have regular asphalt on top going to curb and gutter and that water will then be distributed through equalization pipes into a stone reservoir that detains and infiltrates the water. This is the way that Fourth Avenue is currently being constructed and Forest is currently being constructed. I'm sorry, after Art Fair will be constructed. We're waiting for that.

So there will be also, it's a sloped roadway so there will be steps, it will step down but that will all be underneath the pavement. There may be a possible new outfall to the river if that helps prevent eroding and there will be a swirl concentrator at the end, at the downstream end. So a swill concentrator essentially is a chamber that allows the water to flush through it and the centrifugal forces allows the sediment and the phosphorus to fall out into a sump that we can then clean out and it also has a baffle system on the

top that allows us to skim off the oils that come off the roadway and from our cars.

A point of clarification? Yes?

MR. DIAMOND: How much rain would that capture, 100 year rain, 500 year rain? All the rain?

MR. SHEEHAN: We're going to get into that.

MS. MANCHEK: Excuse me. Are you going to explain this sheet here because I'm looking at the figures and I don't understand them.

MR. SHEEHAN: Absolutely.

Detroit Street -- number two, Detroit Street is the paved section basically from Farmer's Market all the way out past Zingerman's and out passed Treasure Mart and out to Division. It's going to be replaced with historically appropriate materials. At some point in the future I believe it's in the CIP, correct? But it's not in the two-year budget so we would like to put in the same, essentially the same reservoir system underneath there. If we find the sand scene we'll do infiltration but we're going to have the detention system underneath that roadway.

At the bottom there's a swill concentrator again.

Next.

Farmer's Market parking lot. This has been in the CIP for quite a long time. It's been under discussion for quite a long time. There are obviously some practical

considerations that need to go into any type of major construction at Farmer's Market but the fact is that the pavement is deteriorating. In this area where the house was taken down several years ago it's still a gravel lot. Should that be reconstructed we will put in a stone reservoir or oversize pipes underneath there so we have restore the water after a rainstorm. There are sumps where the sediment will fall out and can be cleaned out and there's a pollutant separator at the downstream end.

Next.

Briarwood Mall ponds. Were kind of the first stormwater basins built in Ann Arbor, 1977-ish. They were built to handle very large storm events. They were built in reaction to flooding that happened a decade earlier. They don't control small storms at all. They have very little water quality benefit. And they are full of sediment so we have one planned up here on the northeast segment so Sears would be down here. This is Plaza Drive that goes out to Art Van. This pond is full with sediment. You can see a sediment island with vegetation on it. It would beneficial for Mallet's Creek to get all that sediment dredged out, ship it off site, create a maintenance access down there so that we can continually remove sediment. So that pond isn't just importing and exporting and importing and exporting sediment. It would land there. Every five years or so we would empty it

out. It would capture sediment again.

These two ponds on the south side by the Holiday Inn Express and furniture -- Lazy Boy, those two ponds, they could be turned into dry ponds. Right now they hold water all the time. And that isn't very efficient when it rains because water just flows right over the top of the water as it's there and out and downstream towards Mallet's Creek. So the outlet controls. There's quite a big drop here. The outlet could be managed so that these ponds are lowered or dried and then when it rains you could store the amount of water that's in there now plus some when it rains and capture it, slow it down, allow it to filter downstream very slowly. In the meantime you have a sediment forebay where you can have a maintainable access to remove the sediment.

Phosphorus which we're not talking about directly is tied to the sediment. They correlate. Okay.

Street Tree Planting. We've been planting about 750 trees a year under our previous project plan. It is part of the city's urban stormwater, urban forest management plan which is almost complete to improve and increase the city forest canopy for many reasons. One of those reasons is because it captures the smaller storms. It captures a degree of stormwater before it hits the ground. The trees themselves also absorb a lot of stormwater in saturated areas. Okay.

MS. MANCHEK: What percent of -- do you have any

idea of what percent it captures before it hits the ground? Just curious. I mean is it like a half a percent or quarter percent?

MR. SHEEHAN: Yes. Can you ask that question in about 15 minutes?

MS. MANCHEK: Yes.

MR. SHEEHAN: So Mallet's Creek stabilization if you live near Huron, Chase or Chalmers or Huron Parkway or County Farm Park you've seen the streambank stabilization we've done in the past. This is a continuation of that. So we have three sections that we're looking at. And those two would be basically taking sections of creek that are kind of vertical and eroded. There's not a whole lot of vegetation on them and soil is being exported away every time it rains. This is the downstream, very downstream section. This is Chalmers and Huron Parkway. The Huron Hills Golf Course is over here. South Pond is over here. So there's one section that we have not yet gotten to that's got pretty bad erosion.

This one here is behind Art Van on Eisenhower. This is Burlington Plaza so there's a small section that goes from Art Van and then in behind all these buildings go over to Oak Valley. And there's going further upstream if you cross South Main Street behind Busch's there's Cranbrook Park and that's also an area where we can do some streambank stabilization.

Miller Creek the same idea as in Mallet's Creek.

There are a road of channels. This is even more -- a higher degree of slope at the bed of the channel. It's got the highest slop of any creek in the Huron River system. So it drops off pretty good. This is Huron Parkway and Lakehaven Drive so this is Geddes Lake condominiums and this is just -- this is Glazier Way so it's the area in between those.

The Miller Creek watershed improvement plan recommended a baffle system to capture sediment because all this sediment is coming from the high end of Miller Creek and deposits right around Huron High School in the woods just to the east of Huron High School and then it fills up this culvert underneath Huron Parkway and it deposits in Wurster Park. So a convenient, easily accessible area that wouldn't affect the park would be right here on Huron High School property. That would require an easement and discussions with Ann Arbor Public Schools. We have done projects in collaboration with them in the past. This would be one we'd bring to them.

State Street south of Huron, south of Eisenhower Parkway so north is that way. This is Eisenhower. This is going south toward the freeway. And this photo continues thereon. So. Here's the freeway crossing and then you've got outside the freeway range. And that's, you know, it's a main gateway to the city. It's not very attractive. It has a kind of a boulevard island in the middle of it but it's been paved

over for many years. We'd like to unpave that, turn it green, put some bioswells in there with some trees, capture some stormwater.

Scio Church Road, Main Street to South Seventh. So that's the area just south of the Pioneer High property. That's got a very high groundwater table so what we'd be looking to do there is improve the drainage. There's 12 and 18 inch pipes. We proposed putting in about three-quarters of a mile or more of, quite a bit more, maybe a half mile of 36 inch and 60 inch storm sewer in these locations. And essentially you're just creating storage, detention during a rain storm.

There are pollutant separators at three points at the downstream end.

Stadium Boulevard, Hutchins to Kipke, that's kind of a last -- that's right north of Pioneer High, between Pioneer High and the Stadium. That section is the last section to be paved along Stadium west of the railroad track. It's been done all the way up to Kmart and Plum Market but that section has not yet been done.

So again, 60 inch storm sewer or a stone reservoir if utility, there's a lot of utilities under there if that will allow. Infiltration if we find a sand scene. It will also displace water that would be going into the Pioneer High basin that we constructed there a few years ago so it would

make that basin more efficient. There will also be trees, street trees.

MR. PELOSI: That is pretty efficient already. Is that the basin near Pioneer High School, is that the problem, is that helping or --

MR. SHEEHAN: No, but if you take an area that doesn't currently have any detention and you take it out of that system and detain it on site then it has the ability to handle more water that comes in a larger store.

Where are we at. Research Park is one of those corporate circle developments that is south of I 94 and east of State Street. North of Ellsworth and we have a drain, Malletts Creek going through there. We have an easement. We have a streambank stabilization project that's needed there. There is an opportunity to expand the streambank stabilization and incorporate a small constructed wetland detention system on one of these parcels, or two of those parcels. So that would require additional easements. But if you've ever seen Doyle Park it would be a miniature version of that.

Huron Hills Golf Course. We just finished a project at the golf course from Leslie Park. They have interest now in doing this direct drainage that goes across Huron Parkway and into Gallup Pond. There's a small fishing pond on the way. There is some erosion there. It's cut, it's straight channel and it's incised. There is an ability for us to put

some meanders in there and some rocks to drop the creek at various intervals to take some of the energy out of it and prevent some of that erosion.

There's also a flood plain wetland at the downstream end of it.

South Seventh Street is a street reconstruction from Greenview to Scio Church Road. There is a potential to do porous asphalt or asphalt with the same type of porous asphalt section. If there is a sand scene which I highly doubt we can infiltrate there as well. This road is very wide. It was supposed to be a -- Seventh Street was supposed to continue on at one point so there's an ability to narrow that roadway by about ten feet.

721 North Main. Is everybody familiar with that? That's a city owned parcel. That old city yard.

MS. MANCHEK: Oh, on the west side of the street?

MR. SHEEHAN: Yeah. So there's a plan and a grant from the DNR to look at removing some of the imperviousness on this parcel, putting in some pathway, some green space and with that there's an ability to put in a small first flush wetland treatment system for that site. Maybe a little bit of water that's coming from upstream.

Village Oaks is an area just west of Busch's. Busch's at South Main would be right here and going along here you get Village Oaks and there's Chaucher Court and the back

yards in between are subject to flooding. There's a lot of water that's coming from various developments here. This development is beginning stages of discussions about you know actually building something there so that study suggested that the solution would be to put in a regional detention system here to prevent flooding and to capture some of the sediment that's coming in from upstream. That alternative that is selected is basically right out of that report that happened last year. We're not changing that at all.

Maple Village Shopping Center is also, there has been preliminary discussions about redeveloping that site. That's Plum Market, Kmart and we would like to work with them and have discussions about whether it makes sense since they're going to redevelop at some point they're going to need to put in the full stormwater management system that any new development would be required to put in. We believe there's an opportunity to infiltrate that water. There's a lot of sandy soils and potentially capture what's upstream water as well there's a 30 inch pipe coming onto the site so it treats the highway and some stuff behind this mall, shopping mall, and that neighborhood that's just kind of south of Dexter-Ann Arbor Road, Evergreen neighborhood. So there's a drainage area that's about twice the size of Maple Village that drains through there and it's not part of this development.

Lawton Park Detention Basin. This was added at the

very last minute after discussions with folks at the Upper Malletts meetings. This is the big one. This is, we'll get to the cost but this is the thirteen and a half million dollar project. There are issues with stormwater conveyance in that neighborhood. Part of the solution is finding places to store water. This is a publicly owned piece of land. It is a potential project similar to Pioneer where we could put underground storage in and put the soil back on top, put the park on top, and you would have a stormwater pond that's buried. It's three or four times the size of Pioneer and the water is already lower than the water would be at Pioneer so there's a lot of digging.

UNIDENTIFIED SPEAKER: How deep?

MR. SHEEHAN: You'd have to go down nine feet just to get to where the water is and then you've to, you know if you wanted to create five foot of storage you'd have to go down there to. But it's also just the area is bigger. All right.

Churchill Downs is just upstream of that so this is where Scio Church crosses I-94. There are two branches of Mallets Creek that come in. One is from Scio Church Road and one from underneath I-94 in Pittsfield Township and those are both open channels. This is before it gets into the pipe. There is an active use park. Churchill Park here. I think it used to be called Steeplechase. And then there's an area of

public land, park land that is not currently used actively for recreation. There is a potential to put in quite a bit of storage there on the surface and this would be, this would not be a basin. This would not be filled with water until it rains. It would be a low flow channel going through that area just like it is now. But the outlet would be controlled such that when it rains water would start to back up to a certain elevation before it is controlled through release and it would slowly and once it's hit its maximum storage capacity it would slowly go down after a storm.

Lans Basin is just downstream of that area. This is a county drain but the ponds are right in people's back yards. They are managed by weirs or dams that are owned by the homeowner's association. There is a pedestrian bridge that is no longer functional. That stream path is no longer functional and across there. It's very tight. We'd need easements. We'd need access but there is the potential to provide additional storage and sediment control there. Right now they are pretty much filled with sediment, particularly the one furthest that way. So, should the Upper Mallet study indicate that this is a project that should go forward we'll have that discussion with the community at the larger level. We'll have that discussion with the homeowner's association. At that scale currently what it looks like would be recommended would be that the third weir dam would be removed.

This would be brought to like an open channel section instead of a pond. Restore it to an open channel section. This dam would be moved down here and dropped a couple of feet so that you could still have the surface, the footprint of a pond would be the same in terms of size but it would be lower. And it would be -- it wouldn't be like the weir that's there now where it's just flat on top. It would be lower because there would be a notch or some kind of orifice that lets the water in the dry weather go through it and then when wet weather comes there would be too much flow going through it and it would start to back up and elevate a couple of feet before it would then go over the top of a dam. So it would provide a couple feet of storage in a rainstorm.

UNIDENTIFIED SPEAKER: Is that Delaware, is that the street? That's Delaware and Moorehead below, is that?

MR. SHEEHAN: Yes.

And then finally this one could also be dropped a couple feet after it was dredged so it would have storage.

MR. PELOSI: That wouldn't become a dry bed would it? That area there? When you notch them here? Am I hearing you correctly?

MR. SHEEHAN: Well --

UNIDENTIFIED: I mean I don't -- it's not to me one way or another. It's just a question.

MR. SHEEHAN: We could get into it more but the

answer is no.

There's just a couple more slides.

Possible Impacts: Minimum negative environmental impacts. These are supposed to be environmental project to protect water quality. Temporary construction often includes disruption in traffic, noise and dust and general disillusionment. Limited use of surrounding facilities during portions of construction. We'll be in people's back yards. If Farmer's Market was to go forward we'd temporarily have to relocate Farmer's Market or the -- I wouldn't be in charge of that. Someone else would. It would disrupt park service where we're dealing with park properties. Proposed project will improve the water quality in the Huron River.

And I believe the last hopefully.

Mitigation of Impacts: there is soil erosion that happens during construction. We have soil erosion control measures that will be put in place. There are potential wetland and floodplain pacts. We'll get permits from the MDEQ. Appropriate signage for pedestrian and vehicle traffic during construction and alternate locations for Farmer's Market.

So these next two were on your handout. We'll go through these. It's a five-year plan but I've noticed that if you start at 2013 and go to 2019 that's not five years. So we'll have to fix this but we're dealing with different

fiscal years so these are set up in CIP years for the city and we'll probably have to convert those to DEQ years which is a different fiscal year. So the one that's scheduled to go to loan closing next year is Village Oaks/Chaucher Court. Everything else is a year further out or a year further out (sic), okay. So 2015 would include Geddes Road, Mallets Creek streambank stabilization, that's it. 2016 would be into South Seventh, 721 North Main, Lawton Elementary, Lans Basin, if we could fit all these projects in, there are estimates of when this could be done.

Costs, listing all 20 projects we start with the drainage area if it's an appropriate measure of the streambank stabilization projects don't have that but if there's a system that we're putting in that holds water we want to know how many acres are going to it. That's what that column is. We're trying to treat the first flush or more. This is a percentage of first flush that we're treating. Most of them are above.

This is the amount of sediment removal we get in pounds per year and phosphorus removal we get in pounds per year. This is the cost of the projects and they range from 13.5 million to 200 -- well, that's a portion of. Okay, $200,000 yeah 200 for the baffle box so quite a range.

We've been talking about non-points first pollution and even the DEQ semi-officially recognizes that all of those

non-point source problems are related to the fact that the hydrologic condition changes when we put pavement down. Water can't get into the ground and it goes to the river. So this is a very good estimate of the cost benefit of a project. How much are you spending to store a cubic foot of water over the 20-year life span of the project. So these are dollar figures for cubic foot storage. They are fairly low. Even though -- even if you look at a $13.5 million project that number is lower than several of the others.

The TSS removed also in the low thousands to double digits. Those are fairly low numbers. It's a fairly good cost benefit. You can look at those relative to each other. We can look at those relative to past projects as well. And the phosphorus removal is the last column and those numbers are very high. It takes a lot of -- once phosphorus is in the water half of it s dissolved and half of its bound and you can only deal with the stuff that's bound and even then you can't get a whole lot of it. So that's not a very good measure if you were going to use that as your optimal water quality benefit parameter to look at, that would not be the one to choose but these two indicators are looking very good.

MS. MANCHEK: So the lower the number the better the benefit?

MR. SHEEHAN: Okay, I'm going to go through one more slide. I think.

MS. MANCHEK: Okay.

MR. SHEEHAN: Maybe two. Total project costs are $44 million for all 20 projects. This equates to $27.79 per quarter on your water bill. My water bill is $25 a quarter so we're not talking about increasing the water bill. This would be programmed into that $25 and you don't have to be a mathematician to figure out that $27.79 is too high for the average customer. So without outside sources of grant funding or changes to the stormwater utility which are not planned, there are no rate increases planned to accommodate these projects. We are going to have to pick and choose. We may have to defer and extend some of these projects. We may have to simplify some of them.

Projects that are scheduled within the next few years are included in the CIP. Future projects will be introduced as part of the CIP plan and process and will be evaluated accordingly and scored accordingly.

So for instance the $13.5 million project is not currently in the CIP so room would have to be made for it given the existing stormwater utility rate.

Changes to the project plan since the draft. We've added those three project at Upper Mallets -- actually they were it here but we didn't have any backup, any cost or size figures. Several of the original sites were updated to include porous pavement, and asphalt with a stone reservoir,

pollutant removal, tables are finalized and cost estimates were updated. So if you've asked me for the electronic version of this, those were the updates that were made.

I think that is it.

Okay, so we really do want to document the question and the response so if we could go and take turns, step up to the microphone, ask your question, make your comment. That's going to make our ability to demonstrate to the DEQ that your questions and concerns were addressed. I appreciate you helping us out with that. Do you want to start?

Questions are responded to either here or if we don't have the answer they'll be responded to in writing.

MR. COMEN: So my name is Joe Comen. I live on 779 Lansway in the Lansdowne Sub. And my question, my first question is would all of these hold up areas have provisions for periodic clean out and is the cost and operation of that included somewhere in our cost estimate making process?

MR. SHEEHAN: Okay. So it is not in the cost of construction but there are pages after the individual site descriptions that have operation and maintenance costs. The DEQ looks at those. The state finance authority looks at those to make sure we have the ability to actually generate that revenue. So they are included.

I can give you the individual detail for Lans Basin if that's -- it's just a one-page document I can provide for

you.

MR. COMEN: Well, the reason for the question is a lot of these areas have accumulated sediment that hasn't been cleaned out in 20, 30 years.

MR. SHEEHAN: Uh-huh.

MR. COMEN: So.

MR. SHEEHAN: Right. And there's a different -- so these projects have to be on publicly-owned property or within a public easement. The weirs themselves at Lans Basin right now are not part of the county drain system. That's why we haven't cleaned them out. Once, if there's a public benefit not just to the homeowners association and the properties around Lans Basin but to Mallets Creek upstream and downstream then we would need to have the easements to go in and have long-term maintenance capability. None of these projects will be built without the ability to go in and maintain. The exception would be streambank stabilization in a very critical area where you wouldn't drive an excavator a quarter mile in a creek just to maintain an area because there was a tree that fell.

MR. CARUSO: Thanks for all your effort on this. I thin that it generally looks good.

MS. STICKEL: What's your name, sir?

MR. CARUSO: Vince Caruso. C-a-r-u-s-o, 556 Glendale Circle. I'm glad to see the city and the county

working on infiltrating more than just capturing the water in detention basins. I think that's a good thing. I think the city's water committee with the environmental commission has worked on green streets effort and there will be something coming out of that group pretty soon to encourage porous pavement and infiltration into the roadways. I think we had an opportunity on I-94 for Allens Creek and Mallets Creek. If they're going to rebuild that or repave I-94 we could have looked at having porous friction course on the top and porous full depth on the shoulders and that would have captured a tremendous amount of water, would have quieted the roadway about 70 percent, reduce heat island, reduce the noise, lots of you know -- and I'm told from or things I've read show it's actually expensive than conventional ways of repaving. Our neighborhood, well that Liberty Glendale area has a lot of flooding issues. We have a regular high water conditions in a commons that we'd like to see more effort to reduce that flooding. The March 15th, 2012 rain event that had the tornado associated with it, we had water in the commons lapping up against, or close to houses. I have photographs of that. That needs to be reduced by infiltration upstream. Liberty has infiltration in it which was a great thing. It was the first street in the state of Michigan to have infiltration which has -- helped us out. I think we have less water but we still have a lot of issues.

A question I have on Maple Village and any other project that involves a commercial district like Briarwood, would we require and I would like to encourage, requiring the owners to participate in paying for that effort. And I think they're encouraged by comments that were at the Stadium Road reconstruction meetings when we -- something that's beautiful in the Allens Creek group and other Washtenaw groups came to those meetings and discussed the need to reduce flooding downstream. Of those businesses they were very much interested in that. They felt that their customers downstream of them would appreciate it. Would give them a better community presence. So from those meetings that I went to, they were very interested in having an effort that join the city and then maybe rebuilding some of their parking lots, putting in some porous on some of their frontage so that water running off these huge parking lots up on Stadium. The largest retail district in the city are just inundating until our neighborhood, the Old West Side. And the Old West Side has tremendous flooding potential that we need to deal with before the next big rain which are being predicted. We're getting more intense rain events. I personally think that the rain event on March 15th was a record for Ann Arbor from what I gather off the Internet.

And one more item. On the support document you have, the middle Huron initiative, the -- the Off-Street

group was not involved in that. We were not contacted as stated, 2011. As far as I remember unless there's something that I'm not aware of. But I think that that should be corrected. Thanks.

MR. SHEEHAN: Okay. Thank you, Vince.

So just a few points. When we constructed Stadium Boulevard all the way along the upstream area that Vince is talking about we did put in the maximum amount of detention and infiltration that we could. Most of that is detention.

With regard to commercial properties; it kind of depends on what stage they're at. Maple Village, if that's a complete reconstruction they don't have stormwater management so they would be required by city code to come up to full compliance. What we'd be asking for is something above and beyond that that would benefit not Maple Village but upstream and downstream areas.

Briarwood was built under code in 1977 so that's more of an issue of maintenance. They would be responsible for a portion of the project. They would certainly be responsible for maintaining the ponds that are out there that currently are not. The regulation and the enforcement authority was pretty loose back then so that would be a negotiation process.

Okay. I put the podium up here hoping people would feel more comfortable being their inner thespian. Eppie, why

don't you come up next.

MS. POTTS: One of my major interests always is in the base for making decisions.

MR. SHEEHAN: Would you say your name and address.

MS. POTTS: Oh. Ethel Potts, 1014 Elder Boulevard.

I'm interested in the data that backs up whatever decisions we make and I'm hoping that as you're doing these, see you're doing it based on your present knowledge, your engineering knowledge, assumptions of what will work and what won't work. I'm not sure what those assumptions are based on in every case, however I would like to think we were collecting data for the future. We did not collect data in the past so we're starting from you know, a dead stop to try to make some corrections and some new kind of means of managing stormwater, cleaning stormwater but at the very least I would like to hope that we were collecting data for the future. When some kind of a scheme works or doesn't work, we need to now why. And we don't know why now because we have no baseline data to know what it is that's gone wrong or that has made it work or whatever. So that's, for me, please, please a few little rain gauges here and there, that won't do. We need a lot more information.

Thank you.

MR. SHEEHAN: So on a larger scale we do have a stormwater calibration project that's going on city-wide.

Within the next 12 months we should it calibrated for 12 months. A calibrated model.

MS. POTTS: I mean I think I've seen it charted that there are very few gauges.

MR. SHEEHAN: So that's the larger, the macro scale. On the smaller scale the funding source that we used in the past, both the SSRF and another funding source for nonpoint search projects didn't necessarily accommodate monitoring very well. They didn't provide money for it. With the new program that's coming through it's called the SAW program, that is an eligible activity so we will be able to do pre-and post-construction monitoring on future projects. Cal. I'll get you next, Higgins.

MR. PELOSI: When you separate --

MR. SHEEHAN: I'm going to do Cal first, okay?

Go ahead. Go ahead. It was a tie.

MR. HIGGINS: Name is Higgins, 2131 Chaucer Drive.

MR. SHEEHAN: Higgins. 2131 Chaucer Drive.

MR. HIGGINS: 2131.

MR. SHEEHAN: Okay.

MR. HIGGINS: I need to be straightened out on the Upper Mallets projects versus these. There are some Upper Mallets projects on here and some are not.

MR. SHEEHAN: Yes.

Mr. HIGGINS: So, is that another super-imposed

project to be developed? The cost of that, of Upper Mallets, the Lawton School thing is on the Upper Mallets list.

MR. SHEEHAN: Uh-huh.

MR. HIGGINS: So I'm surprised that a number of these projects are on that list and some are not.

MR. SHEEHAN: Right.

MR. HIGGINS: Where do they appear? I mean what if we had got approval on all of these and some of the Upper Mallets would be taken care of, wouldn't they, but not all of them?

MR. SHEEHAN: This just -- this project plan essentially gets these projects in line for potential funding. So I didn't put -- we didn't put all the Upper Mallets project that are currently being discussed in for us or our funding because some of them are small scale.

MR. HIGGINS: Yeah.

MR. SHEEHAN: Some of them wouldn't be on public property.

MR. HIGGINS: Right.

MR. SHEEHAN: But some of the solutions that we are looking for are backyard drainage issues. The projects that we see that have a potentially strong benefit to the Upper Mallets area that cost a lot of money and we know we're going to need grants and loans.

MR. HIGGINS: They're on here.

MR. SHEEHAN: Those are in there. But because they're in there doesn't mean that they take precedence over any other projects that come out of Upper Mallets. They simply provide a place at the table when we look at state funding for project state-wide, we're on the list.

MR. HIGGINS: Uh-huh. One of the larger ones that we've been talking about on Upper Mallets are on here.

MR. SHEEHAN: Yes.

MR. HIGGINS: For example we didn't include outside of the city because they're private, probably. Private impounds, that type of thing. So.

MR. SHEEHAN: Well --

MR. HIGGINS: There are some areas missing you know, but they're not all city.

MR. SHEEHAN: Yes.

MR. COMEN: The Lands Lake did too.

MR. HIGGINS: Yeah.

MR. SHEEHAN: The Lands Lake was looked at and that would be a very difficult project to actually get approved. For the same reason you don't destroy a wetlands for stormwater management it would be a very tough sell to put polluted water in that lake. Even though it would be a tremendous benefit. I doubt very much that we could get that -- that we'd get -- pass muster, get a permit. That would be a difficult sell.

MR. HIGGINS: That will probably be dropped from the Upper Mallets -- at least explained.

MR. SHEEHAN: Yes.

MR. HIGGINS: Yes.

MR. SHEEHAN: Yeah. That would probably be dropped as a high priority project. You would be taking a lake where people swim in and make it unswimmable and that kind of counters the idea of improving water quality.

MR. HIGGINS: Well, I also was thinking of the Ice Cube that represent, it's big but its private.

MR. SHEEHAN: That needs to be fixed outside of this. Public money shouldn't go to that.

MR. HIGGINS: Oh, I see what you're saying. But we were talking about raising the impound quantity.

MR. SHEEHAN: If we do that that's a pretty cheap fix. We didn't -- it costs more money to do a loan than that would entail.

MR. HIGGINS: Okay.

MR. DUTTA: My name is Kal Dutta. I live at 2361 Delaware Drive. And my question is very simple. I would really like to understand the algorithm for prioritizing the 20 projects. Or however many that wind up being ultimately.

MR. SHEEHAN: So about half the projects are projects that are going forward that are not solely stormwater projects but could be a road project or a park project. Or a

tree reforestation project. They're happening anyway so we are quantifying, I wouldn't call it an algorithm because it's not that scientific but we are quantifying the stormwater benefit, the percentage of the project that has a stormwater benefit. So for instance Forest, Forest Road that's going to be reconstructed is about 40 percent stormwater project and the other 60 percent is roads and sanitary so that's how they get on this list and that's how we determine how much stormwater funding eligibility there is.

In the past we've been able to take advantage of principle forgiveness because there's been special programs through; there's been the Stimulus Package and then another special program through the EPA so we've been able to get about 50 percent of the principle forgiven on these projects so that would make more projects more affordable and that's what we've been able to do in the past.

The other ten projects, approximately that are not in the capital improvement plan are projects that they would -- they show a potential of being put in the capital improvement process next time so we're just getting a head start. Essentially this is a funding mechanism for things that go through the capital improvement planning process. We're capturing things that are in that plan and we are looking at potential projects that may go into that plan next year. They may go in six years in advance so they may be 2019

projects but we're putting them in this plan because it takes quite a bit of money to pull together this plan and to pay a consultant to do a lot of the leg work on this. It's costs very little incrementally -- incrementally it costs very little additional money to put more projects in.

MR. LIGHT: I'm Gary Light. I live at 1225 Morehead Court. And my question is, if the 20 projects that you're putting forward go through funded, in 2020 we have a March storm year past. What can my neighbors then expect in the area from Churchill, Mershon, Seventh Street, Delaware, Morehead, what can we expect as far as the trash cans going by my house and such. Can that be stopped?

MR. SHEEHAN: That's a question that I can't answer right now. We are -- we have another consulting firm who is modeling the result that would happen if we put together a package of these projects and they've kind of created seven combinations of these projects and they've modeled those and we're going to get the results on those. I don't have those yet and then we're going to refine those down to three and those -- the intent and my hope, my perception of what the engineers are going to show me is that the next two public meetings, we're going to see what the result of the March 15 storm would be if we put these in place. These will be alternative solutions and we'll be able to weigh them relative to one another and look at the costs.

MR. LIGHT: I'd like to add just one statement. You mention Lans Lake and the possibility of doing some retention work there. I don't know what your thought is on that's not a possibility but I sometimes believe if you ask and if the situation is urgent enough you might be surprised what people would agree to do and I would encourage you to roll over all those stones that may not look like you should at the current time. At some point in the near future add it into the project plan.

MR. SHEEHAN: Done.

MR. LIGHT: Thank you.

MR. SHEEHAN: It's been done.

MS. GRISWOLD: Kathy Griswold, 3565 Fox Hunt Drive. I drive the Geddes, I believe it's Avenue rather than Drive but I drive that area frequently. I've written many letters to the city. I'm extremely concerned the roadway is a road and I think it's got a 20 degree slant right now. There is at least a 50 degree cliff off -- are you familiar with that area?

MR. SHEEHAN: Uh-huh.

MS. GRISWOLD: Oh, okay.

MR. SHEEHAN: I don't drive it as much as you.

MS. GRISWOLD: I've also seen cyclists use it and what happens is there is a bike lane that dead ends. There is limited sight distance. It's extremely difficult so I just

want to state for the public record that is an extremely dangerous area that I have brought to the city's attention many times. I thought it was going to be reconstructed in 2014 according to the CIP. Do you know? And I would hate to have it delayed a year to fit in this project. I'd rather move this project up to 2014 than delay that another year.

MS. LAWSON: I can actually answer that question. Real quick. As Harry mentioned before, the city's fiscal year is listed on there.

MS. GRISWOLD: Right.

MS. LAWSON: We have 2015 listed in the plan. Our fiscal year starts six months prior and so we would actually start working on Geddes in July of 2014.

MS. GRISWOLD: Oh, good. Okay. I just don't want it delayed. In fact if I had any authority there would be some kind of barricades, flashing lights up there right because of the danger. So. Okay, so July 2014?

MS. LAWSON: I can't promise construction in July but --

MS. GRISWOLD: But it's on the project plan then.

MS. LAWSON: It's on the project list for design and construction starting in July of 2014.

MS. GRISWOLD: And it's number one here. Does that mean it’s the number one priority or it just happens to be number one?

MR. SHEEHAN: There is no order of priority.

MS. GRISWOLD: That's not the answer I was looking for but okay.

MR. SHEEHAN: It's not 20.

MS. GRISOWLD: It's earlier than most of them.

MR. SHEEHAN: Yes, it is.

MS. GRISWOLD: So. All right.

MR. SHEEHAN: And there is an engineer doing pre-design work on that already. So.

MS. GRISWOLD: Okay, great.

MR. SHEEHAN: I'm just not sure of the timing.

MS. GRISWOLD: Yeah. Thank you.

MR. SHEEHAN: And I know it's a very tight right-of-way and the bicycle lane is not up to snuff.

MS. GRISWOLD: It's gone in some areas.

MR. SHEEHAN: That would be -- yeah.

MS. GRISWOLD: Thank you.

MR. SHEEHAN: Okay.

MR. PELOSI: Frank Pelosi, 2066 Chaucer Drive. Many of the residents in the Lansdowne neighborhood have disconnected their sanitary sewers and using sump pumps and they're having more flooding problems after installing the sump pumps. Are the stormwater problems going on that neighborhood contributing to that phenomenon where they're getting more basement flooding problems after the sump pump

installation than before?

MR. SHEEHAN: So I think there's been a lot of different categories with issues with basements so this is -- I'm going to be brief because the Footing Drain project is a groundwater and a sanitary project and we have very little ability to work on those projects through either this program or through our office.

There's been basement flooding documented in the Upper Mallets area, Lansdowne, since the 1950's when homes were built there and north of Scio Church as well. And a great deal of them had to do with basement backups and it was sanitary basement backups. Part of the solution to that and the reason that those backups were occurring was because the volume of groundwater that goes around peoples' foundation was taking up too much capacity of the sanitary sewer. So when there was too much inflow and groundwater into those systems sanitary waste backed up into the basements. There's a separate process that predates me. I was not involved with this project was separate from that but they evaluated potential solutions and they chose the Footing Drain project. The Footing Drain project takes the groundwater that comes around foundations from the house and it puts it into the storm pipes. Or it puts them out into the surface in back yards or front yards or side yards. The stormwater system, the pipes and stormwater are much, much bigger than sanitary.

They have the greater capacity to carry those. But they do take up that -- that water does take up some of the stormwater conveyance capacity. That is being analyzed. We've visited about a dozen or 15 homes just in relation to this project and I know other elements of the city and consultants have visited other homes that have had problems in those areas.

What I saw was problems that were related to cracks in foundations; problems that related to downspouts that were discharging too close to the home; projects that were related to the ground fault in the electrical on the sump going out; problems that were related to losing power during a storm. All sorts, a wide range of problems that caused basement flooding and some of it was tremendous and there's also a couple of instances where there's been living space created, bedrooms created in the basement and code requires that you have a walk out window and those windows in some cases were built too low and there was water flowing right in from them. So there's been a wide range of causes of flooding as a result of these sump pumps.

I'm not an expert on that program. We are taking the water that's coming from that program and modeling it to insure that we have conveyance and that we have a way of detaining the maximum amount of water that we can detain.

Higgins?

MR. HIGGINS: On the Chaucer there's been a lot of

new street drains put in which only increased the surface drainage in these pipes we're talking about. There's at least six of them on my street alone have been added and more are up on Scio so if we're exceeding the capacity of the surface water with the sump pump diversion of the water from the sanitary to the sump pump it's even getting worse now if there are more drains from the street. So I don't know where that leaves us except these sump pumps are a real pain and I don't see any answer coming other than the sanitary study. If it's a sanitary backup that's a different matter. And the sanitary, we're so close to capacity now with all the expansions out Jackson Road and so forth and so that study has got to answer that question but I just wanted to point out that I can count it just in my area six new drains in the street.

MR. SHEEHAN: Uh-huh. And I will wait for that study to deliver answers to that.

MR. HIGGINS: Yeah.

MR. SHEEHAN: Because I don't have them. There are problems with stormwater conveyance in that some pipes just aren't big enough to convey the amount of water going to them and there are places where there is just not enough curb inlets to get the water into the pipe. And where that has been identified as an issue, that's when we're expanding the curb inlets to allow more water to go into the pipe which is a

good thing.

Kal you were next and number two. You'll be on deck.

MR. DUTTA: Kal Dutta, 2361 Delaware Drive again. On these 20 projects would it be possible to somehow show which are in the CIP and which are not?

MR. SHEEHAN: Yes.

MR. DUTTA: Or are they all in this CIP?

MR. SHEEHAN: Yes. Can we go back to the 20 projects? All right, so I want to give this a try and you correct me if I'm wrong, Jen.

MS. LAWSON: Yes.

MR. SHEEHAN: Geddes is in?

MS. LAWSON: Yes.

MR. SHEEHAN: Detroit Street is in?

MS. LAWSON: Yes.

MR. SHEEHAN: Farmer's Market is in?

MS. LAWSON: Yes.

MR. SHEEHAN: Briarwood Mall is not?

MS. LAWSON: No. It is.

MR. SHEEHAN: It is. Okay. Tree planting is?

MS. LAWSON: Yes.

MR. SHEEHAN: Mallets Creek streambank stabilization is?

MS. LAWSON: Yes.

MR. SHEEHAN: Millers is?
MS. LAWSON: Yes.
MR. SHEEHAN: Huron High is?
MS. LAWSON: As a part of the Millers Creek project, yes.
MR. SHEEHAN: Okay. State Street?
MS. LAWSON: No.
MR. SHEEHAN: So number nine is not. Scio Church is?
MS. LAWSON: Yes.
MR. SHEEHAN: Stadium is?
MS. LAWSON: Yes.
MR. SHEEHAN: Research Park is not?
MS. LAWSON: Correct.
MR. SHEEHAN: Huron Hills?
MS. LAWSON: No.
MR. SHEEHAN: South Seventh Street is?
MS. LAWSON: Yes.
MR. SHEEHAN: 721 is?
MS. LAWSON: No.
MR. SHEEHAN: It is not. Okay. Village Oaks?
MS. LAWSON: Yes.
MR. SHEEHAN: Maple Village?
MS. LAWSON: No.
MR. SHEEHAN: And the last three are no.

MS. LAWSON: Correct.

MR. SHEEHAN: So that would be on the written record in case we didn't get it all.

Did anybody do a count?

MR. HIGGINS: There's eight not in.

MR. SHEEHAN: Eight are not in there. Three of them are the bottom three.

Okay, you are next and Amanda you'll be on deck.

MR. TROMBLEY: My name is Craig Trombley, I live at 2355 Delaware. I'm in the Lans Basin. And I've got my four or five questions. We're talking about phosphorus reduction for our neighborhoods and part of the reason why we're having to do all this. Are they looking at other things to reduce the phosphorus that's being implemented to our drainwater and I don't know if they are considering ordinances or some measure of restriction on them. The other question I have is, is how you're determining which projects move forward based upon the greatest value or priority or water volume versus the cost. That's one of the things that I'm trying to understand, your project out dates.

In Lansdowne or the Lans Basin, if we were to turn over the weirs to you for your control what does that mean for us as far as what they can do in the future and how it will resemble what we bought into so to speak. The other thing is that none of these talk about the length of time for the

residential disruption. In other words you're coming in our neighborhood. Heavy equipment is coming in. Do we have to go find a summer cottage for four or five months to live our life? Or not. I'm very curious how that's going to be done and then --

MR. SHEEHAN: Oops that four.

MR. TROMBLEY: Oh, I've got one more. The interconnecting of all the projects, are they sequenced to -- for a particular reason and the way I see it based on your study or your cost study that I've got here for my particular number 19 Lans Basin, we're number third in drainage area, we're number eight in first flush percentage treated, we're number third in TSS removal pounds per year; we're number five in TP removal. We're number tenth in cost so it's a very low cost. We're number two in dollars per cubic foot of storage. We're number two in dollars per pound of TSS removed and we're number seven in cost and our cost for those pounds per removed of phosphorus, we're number seven, we're at a cost that's substantially less than most of the rest of the projects that you've got going on so I got a little -- you know, and I'm curious about the -- in my particular opinion it's the third year for our project to start so I'd like of like that. I know I've left you a lot.

MR. SHEEHAN: Okay. Stay right there. Okay, so phosphorus. There's been a phosphorus ordinance done at the

city level. That phosphorus ordinance has gone on to become state legislation where you know, lawn landscaping companies can't use phosphorus unless they can demonstrate the need for it through soil testing or they are establishing new turf. They are pooper scooper laws, there are ways to detect illicit sanitary connection to the storm so yes, there are other ways to remove phosphorus. It's always there. It's just part of the soil. Every time it rains I see it in the curb line on my street so there's always some. The process for prioritizing. It doesn't just look at stormwater. It looks at the other aspects of these projects including if they're a road, or if they're road or if they're sanitary or if they're a park, what the maintenance would be; what the critical factors are. That's the capital improvement planning process. This is on the side of that but that's the process where there's public input and people that are elected to make decisions. To make decisions about capital improvement plan and budgeting on a two-year basis and then moving forward and approving construction. That's how that happens. The weirs on Lans Basin, that would be a negotiation process about what the easement means, what's improved in the easement, what's not; what maintenance capabilities we have; what access restrictions you maintain for us.

The Lans Basin itself is a very good water quality project. It's also got some practical issues. It's very

difficult of getting to the timing. You know, we'd probably want to do that project in the winter or in the driest part of the summer. We probably wouldn't want to be in there for more than three months. That would be my hope. Hopes often are the first thing to fail in a construction project.

The --

MR. TROMBLEY: Interconnected sequential.

MR. SHEEHAN: Yeah, the problem with Lans Basin is that it's just not that water quality. This is we're talking about water quality plan here. There are other projects that do more for flood control but I think in this case Lans Basin is also ranked high for that. I think the problem with Lans Basin is that you're dealing with an expensive dredging project, weirs, people's back yard and limited access. All those things have to be worked out. And sequencing is the modeling that's going on in the Upper Mallets project and that will be presented in late July or early August.

MR. TROMBLEY: But my comment was that it's tenth on the money list but when you look at the volume of per acre it's probably a very good value when you're looking at 100 acre drainage versus some of the smaller ones that are only 1, 2, 3, 4 acre sites. So.

MR. SHEEHAN: I don't disagree.

Okay. I'm sorry. You were next.

MS. BORIS: Yes.

MR. SHEEHAN: You'll be on deck and then Al you can be next.

MS. BORIS: My name is Kathy Boris and I live at 1726 Charlton and my question is very like the previous man's but I'd like you to describe the process that was used to come up with this list of 20 projects and tell us some of the projects that didn't make this list.

MR. SHEEHAN: So any project that's currently in the capital improvement plan for the city that has a stormwater component, that has the ability to capture, to -- a road project for instance the city ordinance says that if you're reconstructing a road you have to do a first flush and bankfill storage. There's a requirement to do a certain amount of stormwater detention. That automatically puts it on this list. 721 North Main, there's been lots of public input on what to do with that piece of property. It's been suggested that there be -- it become part of the Allen Creek Greenway. It's been suggested that there's an opportunity to put a stormwater detention on there. That is not currently on the CIP. But it's been out there in the public discussion for quite some time. It's in the Flood Plain. It's going to be converted from imperviousness to open space. That has brought it in to make this list. The three projects at Upper Mallets that were 18, 19, and 20 are brought in because they are something that we're looking at putting in a document that

says this is the way we would like to move forward. We don't know for a fact that that's going to wind up being the case but there's a high likelihood that they will be put into a plan that says this is where we want to be in the years to come. So it was included in the plan. Lans Lake was taken out. Maple Village has been taken out in the past just because there was nothing going on with it. Veterans Park was taken out because they -- instead of us putting detention in Veterans Park there was an opportunity to put it in Maple Village plus they were putting the skate park where we wanted to put infiltration plus Gelman, the plume is there. There were projects that involved putting in pipe treatment in Esch Park. It was taken out because of cost and practicality. It was removed. So there are projects that were looked at the conceptual level. And they were stricken -- or they were looked at -- they were in previous plans and they haven't happened and they haven't happened because they're not practical.

MS. BORIS: How many plans did you look at before winnowing down to 20 and was 20 your target number or?

MR. SHEEHAN: Fifteen was our target number.

MS. BORIS: Okay.

MR. SHEEHAN: And we wound up with 20. And you know, we put in as many as we could. We've done this, this is our 4th project plan and there will be more in the future if

this program continues. If Congress keeps appropriating it so we will be -- it will be a continual process of incorporating CIP projects into the stormwater funding stream.

MS. BORIS: And how many did you look at? Did you look at 75 before you came down to 20 or just 20?

MR. SHEEHAN: No, I mean we pretty much looked at everything that was being considered. You have to exclude projects that are on private property that we would never have public ownership of. You have to exclude projects that have a minimal non-point source benefit because they won't fund it. So I don't know the answer to that. It's partially in the sausage making process of just kind of knowing what projects are out there, public and private and seeing if there's a public benefit and if there's a way to incorporate it into a capital improvement. Most of them really are from the CIP.

MS. BORIS: Thank you.

MR. SHEEHAN: Okay. I can't remember the order I just said.

MR. COMEN: I think it was me. Joe Comen again from 777 Lansway. And the question is a follow up. Earlier you mentioned that the surface waters are somewhat polluted and so I guess I'm curious whether there is a potential adverse impact to the aquifers from trying to employ the sandseam infiltration which we were using at Pioneer. You're talking about trying to use it under some of the road beds?

MR. SHEEHAN: So, this question to me always sounds like it's too polluted for the groundwater so let's keep it in the creek which I don't necessarily think is a good idea because that water goes to the Huron River. Most pollutants that are not soluble and stubbornly soluble get collected in sandseams. Oils, hydrocarbons, metals, phosphorus. The things that make it through that kind of deep sandseam into a deeper aquifer are going to be nitrates and chlorides so you know, you can look. If there's a drinking water source around or if there's a reason that that would be an issue or if there's a major sources of that type of pollutant that would certainly be a consideration. But I would argue that, you know, the current standard for building gas stations doesn't protect streams from the stuff that runs off of gas stations so. Going into the ground would be a better option.

MR. CARUSO: Hi, Vince Caruso again. I think it would have been good if we had the water resources and the city actually come out or come to some of the watershed groups and ask them what ideas they had. I don't remember getting that kind of input. One thing I would say is that we have several people here, some from the West Park, some from Glendale, some from the Old West Side. You know, we've been trying to get a watershed study so we could say, okay, these are where we really should put some effort. The watershed study has been in the CIP since 2010 for the Allens Creek

Watershed. We had a project at West Park that the city and the county were working on and we were supportive of that. In fact I was involved in trying to get you know, that into a funding stream for the revolving fund. But within a year or so that system had major problems. We have a neighborhood group down the street from me who went and did door-to-door surveys and found that half the houses in like a four-block area had major stormwater sewage over land flow issues. We had people in the Old West Side who were constantly contacting us about stormwater issues, flooding concerns. It would be great, I think, if we had the city and the county work together to try and do a watershed study. The Allens Creek watershed, we've been asking for years for that. We have enough, you know, evidence, that there had been problems. You know, the homeless shelter was originally planned. We said it was a bad idea. It came back and it was determined that that plan, the original plan, a million dollar plan was in the floodway and couldn't be built so they had to move it. A million dollars was lost on that project.

So -- and I'd like to reiterate something I've said before is that porous pavement I think has real benefits for the community. I'm glad it's being considered. It reduces heat island, it detoxifies almost 100 percent. It captures huge amounts of rain. It is on streets -- or parking lots and that are there anyway. You can repave them with porous

pavement. That's generally speaking less expensive and even in some of the clay soils the guy who wrote the book on porous pavement is out of Georgia and he says one of the top myths about porous pavement is it can't be used on clay. So I think we need to consider on sites that are not necessarily sandy which we do have a lot of including the downtown. But we do need to consider using it in spots where it may not be considered ideal.

MR. SHEEHAN: Okay. Thanks, Vince. In terms of process it probably is a valid criticism that we do not go to all of the individual creek, and Allen Creek, for greenway meetings. And to be honest in a practical sense, we used to do a lot more of that. You know. We don't -- we have more to do and fewer people to do it and I'm sorry if that sounds like an excuse more than a reason. I always look at your agendas and I know what you're discussing. And I don't think we've missed anything there so in terms of process it's a valid criticism that we haven't directly sat down with you and asked for your input on this project. I did send it to you as soon as it was done and told you when the meeting is going to be.

And in terms of flooding, Allen Creek is buried pipe. Buried creek and there's hundreds of structures over them and there's an issue with old structures and there's an issue with new structures and it is a larger discussion and it is interesting and valid but not part of the non-point source

plan that we're discussing on so I'm going to defer on that.

MR. CARUSO: The main point I wanted to make in that regard was that it would help in the planning project if we knew say for example West Park is really under the gun, you know, the Glendale neighborhood is really under the gun. They're going to be flooded out in the next big rain event. Should we do work upstream of those project places and prioritize and I think that would go a long way towards people feeling confident that what's being planned and what's being paid for is going to be a highly effective and the most bang for the buck.

MR. SHEEHAN: Dexter, Ann Arbor, Miller, Maple Village, Veterans Park has some. We're doing it. We're doing it piece by piece by piece. The problem is that you can't go into the residential areas and mow down homes and put in stormwater detention. You know. We're putting it in where it's possible. And as redevelopment occurs the impacts of the creek can be seen. The gauges, the effect of having stormwater detention can be seen. There's a very high percentage of land in Ann Arbor that's in single family residential and there's very little we can do outside of the road right-of-ways. Those road right-of-ways are important because when it rains they're essentially third order streams. They are directly connected. That's where we need to focus. Road reconstruction, road reconstruction, road reconstruction.

MR. CARUSO: It bothers me that we did a million dollar watershed park project in the Allens Creek watershed but yet we don't have the money to do a watershed study which would be half of that or a third of that. That's really bothersome for a lot of people in the Allens Creek watershed.

MR. SHEEHAN: Understood.

MS. RALPH: I have marks all over both sides of this page so I'll try to just pick a few.

THE REPORTER: Name, please.

MS. RALPH: Yes. I'm Alice Ralph. I live at 1607 East Stadium Boulevard. And I'll start with that one. You mention that the Stadium Boulevard section that's proposed in this project is the last section of Stadium, not west or east but to be reconstructed and yet my section of East Stadium was repaved and the water mains replaced last summer and the section between the new bridges and my section is a piece of East Stadium that is in bad shape and doesn't have any improvements as far as I know. So, keep in mind the contiguous and the continuous nature of the street right-of-way and the fact that the piecemeal is maybe not sufficient in the perception of people who live there and I think that's part of what Vince is saying. It may be all you can do especially when these loans are for construction and not for studies but it's one of the reasons why people feel like not everything is covered.

Another thing, instance, you mentioned that the Farmer's Market parking lot was gravel. I noticed within the last month they paved it.

MS. LAWSON: Temporarily.

MS. RALPH: Well, temporary.

MS. LAWSON: It was temporary. Regardless of this project they were looking at increasing stalls and they were getting a lot of complaints about dust and so as a temporary solution we just put down some asphalt and so it is paved but that doesn't mean that it's going to be permanent. That part would be included in this.

MR. SHEEHAN: I walk that about three times a week but it's usually on the way to my coffee so I didn't notice it.

MS. RALPH: So I think that also reflects on sequencing and coordination and now maybe they had to respond.

MR. SHEEHAN: I hear you.

MS. RALPH: But it does look bad. You know, like wasted effort. And since I'm on the Allen Creek Greenway Conversancy board I wanted to ask more about -- because I think it might help explain the cost versus the funding. I know that one of the things that is going on with 721 North Main is that the county parks has had contingent grant to the project which is $150,000 contingent on a grant coming from the Michigan Natural Resources Trust Find. We hope we have

good news on that by September. And the city has tentatively committed a certain amount in matching and so forth so the dollar figure of $1,760,000 I think it would help to explain if that's the amount of the loan and what portion of that money is additional or part of the project that's planned for that particular property.

MR. SHEEHAN: So each of these 20 projects if you'll look just past the maps there is a budget page for each one and it describes what the 1.7 or 2 or $5 million is. It's -- there's a complete breakdown. It is just the stormwater. It's an estimate of the stormwater component so it has nothing to do with if it's a $4 million project, you know, we're just quantifying what the stormwater component is. So that's the maximum loan amount that would cover just the stormwater piece. Whether that's in addition to what's been appropriated, that kind of depends. That's, if it's a road project -- stormwater costs are incorporated in the full construction engineer's estimate. We're just trying to recoup some of those costs through this loan process.

MS. RALPH: Okay. And the fact that it's not in the CIP I think it just reflects that sometimes there are opportunities that come up for external grants and funding that would help move a project along even though those opportunities weren't there when the CIP was developed.

MS. LAWSON: I can actually clarify that CIP

question. It isn't a parks and recreation capital improvements plan. It is not in the stormwater portion of the CIP which are two separate funding buckets paid for by two separate accounts.

MS. RALPH: Millages, yeah.

MS. LAWSON: And so there's a parks millage.

MS. RALPH: Right.

MS. LAWSON: And there's a stormwater utility where we get our funding from and so there are funds available at the city level from the parks but it's not in the stormwater CIP.

MS. RALPH: I'm not sure that this project is in this -- it's not really a CIP but it's the parks and recreation open space plan. Is that correct?

MS. LAWSON: It's in the pros (sic) plan but there is actually a line item in the CIP.

MS. RALPH: Okay.

MS. LAWSON: I looked at this afternoon because I wanted to clarify.

MS. RALPH: I think this just shows how complicated this is.

MS. LAWSON: Yes.

MS. RALPH: And how much time it takes to kind of sift through your own particular interests and I think I'll leave it at that for now.

MR. SHEEHAN: Okay. Thank you.

MR. DUTTA: Kal Dutta again. You know the term CIP has come up several times today. Could you please clarify who -- which governmental body is actually responsible for what gets in the CIP and for assessing, you know, what's on the big list and what actually gets on there? To me it's a bit of something I know very little about so I'd appreciate some clarification of that.

MS. LAWSON: I can answer that question. The CIP stands for capital improvement plan. That is the plan that the city utilizes to move forward with capital projects. The process is a little bit like an algorithm, Kal. We meet cross-departmentally with our engineering department, our field operations unit, our planning unit, our systems planning unit which is more infrastructure based and we look at all potential projects from roads to water main improvements to sanitary system improvements to parks projects and a lot of times those projects are intertwined so for example a road may be rated very poorly and there may be multiple water main breaks underneath it and so that would elevate the project to a higher standpoint and so it's very algorithmic if you will. We rate projects based on the impacts to each of the infrastructure levels and from that we get a priority ranking and from that priority ranking then comes our need for a budget.

MR. DUTTA: I understand the interdependence.

MS. LAWSON: Uh-huh.

MR. DUTTA: What I'm trying to get at is what's the organization that's responsible for this CIP and the list?

MS. LAWSON: The city.

MR. DUTTA: The city? Who?

MR. SHEEHAN: The city --

MS. LAWSON: The city of Ann Arbor.

MR. DUTTA: No, no, who in the city?

MR. SHEEHAN: City council.

MR. DUTTA: Is this city council? Are you serious? The city council does the prioritization?

MS. LAWSON: No.

MR. SHEEHAN: No, no, no.

MR. DUTTA: No, does the city?

MS. LAWSON: No, no, no. City council will approve it but it's done by staff across all multiple levels.

MR. DUTTA: Which is the staff where the integration happens? Is it planning, it just some amorphous body that comes together and says, "Oh, you know we're going to consider this list and put these on the approved list"? Or I'm trying to get some individual must be responsible. Is it the city manager?

MR. SHEEHAN: So in the previous CIP the person responsible was Cressence Lawton (phonetic) and this time

around it was Deb --

MS. LAWTON: Goslin.

MR. DUTTA: What is Deb Goslin's function?

MS. LAWTON: She is a systems engineer. But keep in mind her role and her position is to assemble.

MR. DUTTA: Right.

MS. LAWTON: But there are multiple people that are working together. I mean 50 people across different units at the city --

MR. DUTTA: I understand that.

MS. LAWTON: So you can't point this at one specific person.

MR. DUTTA: I'm not pointing anywhere.

MS. LAWTON: But I'm talking about responsibility.

MR. DUTTA: I'm not point anywhere. What I'm trying to get at is there must be somebody, or a set of people or an individual who looks at the list and decides, here's what gets on and here's what doesn't.

MS. LAWTON: It's not a yes or no.

MR. DUTTA: Okay.

MS. LAWTON: Like I said there is an algorithm -- I'm using your word.

MR. DUTTA: No, I'm a planner by profession and so I'm trying to get to --

MS. LAWTON: That's fine. So we rate and rank

projects.

MR. DUTTA: Uh-huh.

MS. LAWTON: Based on society impacts to the residents, environmental needs. Human health and safety.

MR. SHEEHAN: I want to make a suggestion at this point.

MR. DUTTA: Maybe I'm getting off track here.

MR. SHEEHAN: I'm going to make a suggestion at this point since it's 8:00 and I believe that was the advertised closing time; that we respond in writing and if it needs to be names.

MS. LAWTON: We can do that.

MR. SHEEHAN: For each of the areas.

MR. DUTTA: I can actually phrase my question in writing. Who would I send it to?

MS. LAWTON: Deb Goslin.

MS. POTTS: Could I say it briefly?

MR. DUTTA: Do you have an email address or something?

MR. SHEEHAN: Eppie?

MS. POTTS: Okay, let me make a try for it briefly. The profession staff at city hall by and large, it goes through the project, puts them on a list and sets up standards for priorities and prioritizes them. The political arm, the city council then approves or disapproves it.

MR. DUTTA: I understand that. What I am trying to get, really what my underlying question is, where are the criteria by which something, you know, is assessed and that would be very useful to know.

MS. POTTS: Have you looked at the plan, the criteria are there.

MR. DUTTA: Which plan?

MS. POTTS: The improvement plan. The CIP?

MR. DUTTA: I have not. This is the first time I've heard of CIP.

MR. SHEEHAN: So, the answer to the question is Deb is the person to respond to. If you could give Kal your card so he could go through you to get to Deb.

MS. LAWTON: Uh-huh.

MR. SHEEHAN: We can answer the question in writing. We can't spend the rest of the --

MR. DUTTA: No, I appreciate it. If you can give me an email address.

MR. SHEEHAN: Yes.

MR. DUTTA: That would be very helpful.

MR. SHEEHAN: Take it off mine.

MR. TROMBLEY: One of the things that I'm noticing --

MR. SHEEHAN: Give you name please.

MR. TROMBLEY: I'm sorry, I'm Craig Trombley, Lans

Basin, on Delaware, 2355 Delaware Drive. One of the -- I see the golf course as an overlooked area for retention. Is there some reason why we're avoiding this area to send some stormwater? Obviously the golfers need more challenges so maybe a couple more ponds might be helpful and I'm just kind of curious on your thought on the planning.

MR. SHEEHAN: Right. Yeah. So there are a lot of U of M properties where there are potential stormwater projects that could go forward to benefit the Huron River. Right now the golf course isn't on the top of that list. There are other projects that are on that list that are in the Miller Creek watershed improvement plan. There might be a couple others. We've been able to do one and we would like to do more.

MR. TROMBLEY: I mean it looks like about a 400 acre piece. That's why I'm saying.

MR. SHEEHAN: Yeah. Yep.

MR. HIGGINS: But I heard the pond in here, retention overflow is into the pond and the golf course already. That's what we were told.

MR. SHEEHAN: Yeah, well --

MR. HIGGINS: It's exit is into that pond--

THE REPORTER: I'm not going to get him.

MR. SHEEHAN: The question was from Higgins, Bill Higgins that the overflow from the Pioneer High already goes

into the golf course. Well yeah, it did. It did before the project and it does now.

MR. HIGGINS: Yes.

MR. SHEEHAN: The Pioneer High project intercepts the amount of water that it can store and it stores that and everything else, yes, that's true.

MR. HIGGINS: And it's the Allen Creek watershed. I'm talking about possible watershed. That's a whole another.

MR. SHEEHAN: I think the University of Michigan has people who are proponents of water quality and environment protection and they have people that run golf courses and we don't own the golf course.

I don't see any more hands raised. I think if there's no objection I'm going to close the official public hearing. It will be documented. If you have additional questions we'd be happy to answer. Evan, I or Jen will be able to answer them.

Closing thoughts?

MR. PRATT: Just in response to an email I read. For someone suggested water retention systems out of the roadways. I kind of chuckled when I first read that. Then after I thought about it went, that's not a bad idea. Has it been getting any --

MR. SHEEHAN: Yeah, we --

MR. PRATT: Do you recall the mail? It was just

recently.

MR. SHEEHAN: Yeah. This is common. So we've been building roads with stormwater retention. Bach to Liberty. That was the first one. The year was --

MR. TROMBLEY: Oh, ten years ago. It just seemed like it was a large -- more than a tunnel going under the roadway. Maybe I was visualizing something they weren't.

MR. SHEEHAN: Yeah. We can put the entire road section. We can do foot types. We can make it big.

MR. TROMBLEY: Go over to Forest Street and look at Forest Street construction. There's a lot of stone in the street.

MR. SHEEHAN: Do I see a closing comment from my boss in the back.

MR. PRATT: One comment. I just want to come up to the front so we all can hear it.

Thanks everybody for coming. We don't often get a good, as much turn out as we'd like for, you know these big picture planning things or the CIP type things or project things so it's good that people came here. Just to clarify a couple of things and I know this isn't necessarily what Vince wants to hear but one of the reasons we don't see stormwater modeling and things that are focused on quantity in here is we have to have water quality benefit to get something on this list. So unfortunately while we agree there are flooding

problems all over town and I would say there's probably more private homes in flood plain in Allens Creek than anywhere else by a significant number. You know we've love to tackle that unfortunately not in this bucket. Hopefully in other ways.

Secondly a little more detail relative to Lans Basin. It's in here right now. The idea is reach some type of agreement, work something out with the folks who are in the Upper Mallets area particularly the homeowners' association on what people would like to do there. In a perfect world ignoring the idea that there are some ownership and legal issues that go along with that. And with that the ownership and maintenance responsibility issues no different than maintenance at Maple Village. They have some certain obligations independent of a new project happening on their property for public good. Likewise in Lans Basin there are some obligations and we'll have to go through that process and it's not far and my feeling I guess as leader of that charge or backing up area. That charge is let's talk about what people would like to do and what makes sense. We may not be able to do it because of obstacles that, you know, causes people too much problems or there isn't a desire or there isn't the ability to come to some type of agreement as to well what would you have be done about this project getting specific to weirs and sediment. So that's a bridge we'll

cross and I just want to make sure and say it as we're talking about all the advantages. We see all those advantages and we're hopeful that there's a positive way to work something out. But right now if we don't get it on the list we don't get a chance to get into this funding pot and it just makes it that much harder. So that's where we're at.

MR. TROMBLEY: I think that we're on board and approve the city's responsibilities and our own community. You know, providing, that you know there is some a sensitivity of what we have. And I think we can work together.

MR. PRATT: Yeah. Just I wanted to say that just because there's enough people here that it makes sense to say it once in front of a group rather than one by one. And we will be meeting with the homeowners' association to talk about those type of things.

MR. SHEEHAN: Closing comments?

MR. PRATT: No. Just again to thank people.

MR. SHEEHAN: If there's objection --

MR. DUTTA: I have fallen into the water hazard at the U of M golf course and the water is really clean.

MR. SHEEHAN: Last word?

MR. DIAMOND: Well, I just have a question for the people that do live on Lans Basin and I'm one of those people. When do you anticipate that conversation taking place with the homeowners association?

MR. SHEEHAN: So I think we're going to be pretty close to finalizing or having a draft final document for the Upper Mallett studies in the fall. We're supposed to be completely done with that project by February. Right about then will be the time to start having those conversations. Or to continue having those conversations.

MR. PRATT: Late summer or early fall.

MR. SHEEHAN: Okay. Thank you all. Meeting adjourned. Thanks.

(At 8:07 p.m. concluded.)

STATE OF MICHIGAN)
COUNTY OF WASHTENAW)ss.

I certify that this transcript is a complete, true, and correct transcript to the best of my ability of the public hearing held on June 24, 2013 at the NEW CENTER, 1100 North Main Street, Ann Arbor, Michigan.

I also certify that I am not a relative or employee of the parties involved and have no financial interest in this case.

DATED: June 27, 2013

s/Amy Shankleton-Novess

_____

Amy Shankleton-Novess(CER 0838)
Modern Court Reporting

HURON RIVER 2013 SRF PROJECT PLAN

PREPARED FOR

Huron River Green Infrastructure Drainage District

APPENDIX C
RESOLUTION

Statutory Drainage Board of Huron River Green Infrastructure Drainage District
County of Washtenaw

Resolution Authorizing the S2 Grant Agreement

Minutes of the regular meeting of the Statutory Drainage Board of the Huron River Green Infrastructure Drainage District of _____ County of Washtenaw, State of Michigan, (the "Municipality") held on June 26, 2013.

PRESENT: Members: Evan Pratt, Yousef Rabhi

ABSENT: Members: Conan Smith

Member Rabhi offered and moved the adoption of the following resolution, seconded by Member Pratt.

WHEREAS, Part 52 (strategic water quality initiatives) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended ("Part 52"), provides at MCL 324.5204a that the Michigan Finance Authority (the "MFA") in consultation with the Michigan Department of Environmental Quality (the "DEQ") shall establish a strategic water quality initiatives grant program; and

WHEREAS, in accordance with the provisions of 2010 PA 231, which provides grants to assist municipalities in completing loan application requirements under MCL 324.5308 or completing loan application requirements for other sources of financing for sewage treatment works projects, storm water treatment projects or nonpoint source projects; and

WHEREAS, in accordance with the provisions of 1985 PA 227, as amended, Part 52, and other applicable provisions of law, the MFA, the DEQ, and the Municipality that is a grant recipient shall enter into a grant agreement (the "S2 Grant Agreement") that requires the Municipality to repay the grant under certain conditions as set forth in MCL 324.5204a, as amended; and

WHEREAS, the Municipality does hereby determine it necessary to undertake planning, revenue system development, and/or design activities related to a project for which it intends to seek financing for construction; and

WHEREAS, it is the determination of the Municipality that at this time, a grant in the aggregate principal amount not to exceed $13,673.00 ("Grant") be requested from the MFA and the DEQ to pay for the planning and/or design activities; and

WHEREAS, the Municipality shall obtain this Grant by entering into the S2 Grant Agreement with the MFA and the DEQ.

NOW, THEREFORE, BE IT RESOLVED THAT:

1. Washtenaw County Water Resources Commissioner (*title of the desginee's position*), a position currently held by Evan N. Pratt, P.E. (*name of the designee*), is designated as the Authorized Representative for purposes of the S2 Grant Agreement.

2. The proposed form of the S2 Grant Agreement between the Municipality, the MFA and DEQ (attached hereto as Appendix I) is hereby approved and the Authorized Representative is authorized and directed to execute the S2 Grant Agreement with such revisions as are permitted by law and agreed to by the Authorized Representative.

3. The Municipality shall repay the Grant, within 90 days of being informed to do so, with interest at a rate not to exceed 8 percent per year, to the Authority if any of the following conditions occur:

(a) the Municipality fails to submit an administratively complete loan application for assistance from the SRF, the SWQIF or other source of financing for the project within 3 years of the Grant award;

(b) the project has been identified as being in the fundable range or is approved for funding from another source and the Municipality declines loan assistance for 2 consecutive fiscal years unless the Municipality proceeds with funding from another source; or

c) the Municipality is unable to, or decides not to, proceed with constructing the project.

4. The Grant, if repayable, shall be a first budget obligation from the general funds of the Municipality, and the Municipality is required, if necessary, to levy ad valorem taxes on all taxable property in the Municipality for the payment thereof, subject to applicable constitutional, statutory and Municipality tax rate limitations.

5. The Municipality shall not invest, reinvest or accumulate any moneys deemed to be Grant funds, nor shall it use Grant funds for the general local government administration activities or activities performed by municipal employees.

6. The Authorized Representative is hereby jointly or severally authorized to take any actions necessary to comply with the requirements of the MFA and the DEQ in connection with the issuance of the Grant. The Authorized Representative is hereby jointly or severally authorized to execute and deliver such other contracts, certificates, documents, instruments, applications and other papers as may be required by the MFA or the DEQ or as may be otherwise necessary to effect the approval and delivery of the Grant.

7. The Municipality acknowledges that the S2 Grant Agreement is a contract between the Municipality, the MFA and the DEQ.

8. All resolutions and parts of resolutions insofar as they conflict with the provisions of this Resolution are rescinded.

YEAS: 2 Members: Pratt, Rabhi

NAYS: Members:

RESOLUTION DECLARED ADOPTED

I hereby certify that the foregoing is a true and complete copy of a resolution adopted by the Statutory Drainage Board of the Huron River Green Infrastructure Drainage District, County of Washtenaw, said meeting was conducted and public notice of said meeting was given pursuant to and in full compliance with the Open Meetings Act, being Act 267, Public Acts of Michigan, 1976, and that the minutes of said meeting were kept and will be or have been made available as required by said Act.

Mallory K Walczesky

Name Mallory K. Walczesky

County of Washtenaw, Clerk

Service Coordinator of Water Resources Commissioner County of Washtenaw

HURON RIVER 2013 SRF PROJECT PLAN

PREPARED FOR

Huron River Green Infrastructure Drainage District

APPENDIX D
MS4 STORMWATER PERMIT

STATE OF MICHIGAN

JOHN ENGLER, Governor

DEPARTMENT OF ENVIRONMENTAL QUALITY

"Better Service for a Better Environment"

HOLLISTER BUILDING, PO BOX 30473, LANSING MI 48909-7973

INTERNET: www.deq.state.mi.us

RUSSELL J. HARDING, Director

REPLY TO:

SURFACE WATER QUALITY DIVISION
KNAPPS CENTRE
PO BOX 30273
LANSING MI 48909-7773

RECEIVED
OCT 3 2001
UTILITIES DEPARTMENT
2000 S. Industrial Highway
Distribution/Collection

OCTOBER 1, 2001

CERTIFIED MAIL -- 7000 0520 0016 5014 0403

Ms. Yvonne Carl, Acting Clerk
City of Ann Arbor
P.O. Box 8647
Ann Arbor, Michigan 48107-8647

Dear Ms. Carl:

SUBJECT: NPDES Permit No. MI0053856 -- Ann Arbor MS4, various locations throughout Ann Arbor

Your National Pollutant Discharge Elimination System (NPDES) Permit has been processed in accordance with appropriate state and federal regulations. It contains the requirements necessary for you to comply with state and federal water pollution control laws.

REVIEW THE PERMIT EFFLUENT LIMITS AND COMPLIANCE SCHEDULES CAREFULLY. These are subject to the criminal and civil enforcement provisions of both state and federal law. Permit violations are audited by the Michigan Department of Environmental Quality and the United States Environmental Protection Agency and may appear in a published quarterly noncompliance report made available to agencies and the public.

Your monitoring and reporting responsibilities must be complied with in accordance with this permit. If applicable, Discharge Monitoring Report forms will be transmitted to you in the near future. These reports are to be submitted monthly or otherwise as required by your NPDES permit.

Any reports, notifications, or questions regarding the attached permit or NPDES program should be directed to the following address:

Mr. Linn Duling, District Supervisor
Jackson District Office, SWQD, DEQ
301 East Louis Glick Highway
Jackson, Michigan 49201-1556
Telephone: 517-780-7847

Sincerely,

William E. McCracken

William E. McCracken, P.E.
Chief, Permits Section
Surface Water Quality Division
517-373-8088

Attachment: Permit

cc: EPA-Region 5
Mr. Craig Hupy, Utilities Department, City of Ann Arbor
208 Agency – Southeast Michigan Council of Governments
Mr. Linn Duling, Jackson District Supervisor, SWQD (2)
PCS Unit, SWQD
Point Source Studies (Grand Rapids District Office), SWQD
Files

EQP 0100e
(Rev. 1/98)

Permit No. MI0053856

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq; the "Federal Act"), Michigan Act 451, Public Acts of 1994, as amended (the "Michigan Act"), Parts 31 and 41, and Michigan Executive Orders 1991-31, 1995-4 and 1995-18,

The City of Ann Arbor
P.O. Box 8647
Ann Arbor, Michigan 48107

is authorized to discharge from the municipal separate storm water drainage system ("drainage system") operated by the City of Ann Arbor in

various locations within the City of Ann Arbor
Ann Arbor, Michigan

designated as Ann Arbor MS4

in accordance with conditions set forth in this permit to the receiving waters named Huron River, Honey Creek, Allen Creek, Traver Creek, Miller's Creek, Mallets Creek, Swift Run Drain, Fleming Creek, First Sister Lake, Second Sister Lake, and Sister Lakes Drain.

This permit takes effect October 1, 2001. Any person who is aggrieved by this permit may file a sworn petition with the Office of Administrative Hearings of the Michigan Department of Environmental Quality, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Department may reject any petition filed more than 60 days after issuance as being untimely. If any condition of this permit is administratively challenged, the entire challenged permit is stayed and the previous permit will remain in effect until the Department takes final action after the Administrative Hearing.

This permit and the authorization to discharge shall expire at midnight, October 1, 2006. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit an application which contains such information and forms as are required by the Michigan Department of Environmental Quality to the Jackson District Supervisor of the Surface Water Quality Division by April 1, 2006.

In accordance with Section 324.3118 of the Michigan Act, the permittee shall make payment of a $200.00 annual storm water fee to the Department, which shall be postmarked no later than March 15 of each year.

This permit is based on a complete application submitted on March 28, 2000. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules. On its effective date this permit shall supersede National Pollutant Discharge Elimination System (NPDES) Permit No. MI0053856, expiring October 1, 2000.

Issued September 26, 2001.

William E. McCracken
Chief, Permits Section
Surface Water Quality Division

PART I

Section A. Authorizations and Coverage Provisions

1. Authorized Discharges

a. Storm Water Discharges by the Permittee

This permit authorizes the discharge of storm water, and non-storm water listed in Part I.A.1.c., to the waters of the state from all existing outfalls of the City of Ann Arbor's drainage system as listed in Part II.F. of this permit. The discharge of storm water from new outfalls in the City of Ann Arbor's drainage system is authorized only if installation and operation are in accordance with approved minimum measures requirements in Part I.B.3. – I.B.6.

b. Discharges Authorized under other NPDES Permits

The discharge of storm water commingled with discharges authorized under other NPDES permits is authorized under this permit.

c. Non-Storm Water Discharges

The following non-storm water discharges are authorized by this permit (unless such discharges are authorized under another NPDES permit), provided the permittee is implementing the storm water minimum measures as set forth in Part I.B. of this permit:

1) water line flushing,
2) landscape irrigation runoff,
3) diverted stream flows,
4) rising groundwaters,
5) uncontaminated groundwater infiltration (as defined by 40 CFR 35.2005(20)),
6) pumped groundwater (except for groundwater cleanups),
7) discharges from potable water sources,
8) foundation drains,
9) air conditioning condensate,
10) irrigation water,
11) springs,
12) water from crawl space pumps,
13) footing drains,
14) lawn watering runoff,
15) water from non-commercial car washing,
16) flows from riparian habitats and wetlands,
17) residential swimming pool discharges and other dechlorinated swimming pool discharges,
18) residual street wash waters, and
19) discharges or flows from emergency fire fighting activities.

Nothing in this permit authorizes discharges to the drainage system which result in violation of state Water Quality Standards.

2. Discharges Requiring Separate Authorizations

a. Tracer Dye Discharges

This general permit does not authorize the discharge of tracer dyes without approval from the Department. Requests to discharge tracer dyes shall be submitted to the Jackson District Supervisor of the Surface Water Quality Division in accordance with Rule 1097 (Rule 323.1097 of the Michigan Administrative Code).

PART I

Section A. Authorizations and Coverage Provisions

b. Water Treatment Additives

This permit does not authorize the discharge of water additives without approval from the Department. Water additives include any material that is added to water to condition or treat the water that discharges from the drainage system.

In the event a permittee proposes to discharge water additives, the permittee shall submit a request to discharge water additives to the Department for approval. Such requests shall be sent to the Great Lakes and Environmental Assessment Section, Surface Water Quality Division, Department of Environmental Quality, P.O. Box 30273, Lansing, Michigan 48909, with a copy to the Jackson District Supervisor. Instructions to submit a request electronically may be obtained via the Internet (http://www.deq.state.mi.us/swq/gleas/gleas.htm under SITE LINKS/Water Treatment Additives). Written approval from the Department to discharge such additives at specified levels shall be obtained prior to discharge by the permittee. Additional monitoring and reporting may be required as a condition for the approval to discharge the additive.

A request to discharge water additives shall include all of the following water additive usage and discharge information:

1) Material Safety Data Sheet;

2) the proposed water additive discharge concentration;

3) the discharge frequency (i.e. number of hours per day and number of days per year);

4) the monitoring point from which the product is to be discharged;

5) the type of removal treatment, if any, that the water additive receives prior to discharge;

6) product function (i.e., microbiocide, flocculant, etc.);

7) a 48-hour LC50 or EC50 for a North American freshwater planktonic crustacean (either *Ceriodaphnia sp.*, *Daphnia sp.*, or *Simocephalus sp.*); and

8) the results of a toxicity test for one other North American freshwater aquatic species (other than a planktonic crustacean) that meets a minimum requirement of Rule 323.1057(2) of the Water Quality Standards.

Prior to submitting the request, the permittee may contact the Great Lakes and Environmental Assessment Section by telephone at 517-335-4184 or via the Internet (http://www.deq.state.mi.us/swq/gleas/gleas.htm under SITE LINKS/Water Treatment Additives) to determine if the Department has the product toxicity data required by items 7 and 8 above. If the Department has the data, the permittee will not need to submit product toxicity data.

PART I

Section B. Storm Water Management Program – Minimum Measures

The permittee shall revise, implement and enforce the storm water management program designed to reduce the discharge of pollutants from the drainage system to the Maximum Extent Practicable (MEP), to protect water quality and to satisfy the appropriate water quality requirements of the Federal Act and the Michigan Act. The permittee shall submit for approval to the Jackson District Supervisor of the Surface Water Quality Division an approvable revised storm water management program plan. The submittal shall accompany the first annual report in accordance with Part I.C.1.b. The permittee shall continue to implement the storm water management program plan approved on September 7, 2000 until the revised storm water management program plan is approved. The permittee shall begin implementation of the revised storm water management program plan within one year after its approval, unless the Jackson District Supervisor specifies an alternate implementation date.

The revised storm water management program requires implementation of best management practices (BMPs) to comply with the minimum measures identified in this section. Minimum measures shall be carried out in a manner that is environmentally beneficial, technically feasible, and within the permittee's legal authority. If the permittee does not have the power or authority to comply with all minimum measures or parts thereof, the permittee may rely on another permitted public body or statutory housing authority that has the power or authority to carry out minimum measures or parts of minimum measures on the permittee's behalf. The specific measure(s) and a description of the area or portion of the drainage system that will be addressed by another permitted public body or statutory housing authority shall be identified by the permittee (see Part I.C.1.d.). The MEP requirement shall be met by implementation of BMPs to comply with the minimum measures for which the permittee has power or authority, plus cooperation with other permitted drainage system operators as necessary to assure compliance with all minimum measures in Part I.B., and a demonstration of effectiveness or environmental benefit for each BMP.

1. Education and Outreach on Storm Water Impacts - Public Education Program

The permittee shall have a public education program to promote, publicize, and facilitate watershed education for the purpose of encouraging the public to reduce the discharge of pollutants in storm water. The public education program may involve combining or coordinating existing programs for public stewardship of water resources. Pollution prevention shall be encouraged. Appropriate BMPs for this minimum measure and measurable goals for each BMP shall be included in the report required under Part I.C.1.b. of this permit.

"Public" shall be defined to include all persons who potentially could affect the quality of storm water discharges, including, but not limited to, residents, visitors to the area, public service employees, businesses, commercial and industrial operations, and construction activities.

The program shall be designed to accomplish the following, as appropriate, based on the potential impact on the watershed:

a. Educate the public of hazards associated with illicit discharges and improper disposal of waste. Encourage public reporting of the presence of illicit discharges or improper disposal of materials into the permittee's drainage system. Common illicit discharges are construction site wastes and sediment, carpet cleaner wastes, household wastes and motor vehicle fluids from home owners, septage and other commercially transported wastes, and commercial power washing (not including street wash water).

b. Educate the public on the availability, location and requirements of facilities for collection and/or disposal of household hazardous wastes, travel trailer sanitary wastes, chemicals, grass clippings, leaf litter, animal wastes, and motor vehicle fluids.

c. Educate the public regarding acceptable application and disposal of pesticides, herbicides, and fertilizers.

d. Educate the public concerning preferred car cleaning agents and procedures for non-commercial car washing.

e. Educate the public concerning the ultimate discharge point and potential impacts of pollutants from the drainage system serving their places of residence.

f. Educate the public concerning proper septic system maintenance.

g. Educate the public concerning management of riparian lands to protect water quality.

PART I

Section B. Storm Water Management Program – Minimum Measures

h. Educate the public about their responsibilities and stewardship in their watershed.

i. Educate commercial, industrial and institutional entities likely to have significant storm water impacts. At a minimum, educate commercial food service entities to prevent grease discharges to storm drains.

2. Public Involvement/Participation

Public input shall be encouraged in all aspects of the storm water management program. The following minimum actions shall be taken to encourage public input:

a. The permittee shall follow local public notice requirements, as appropriate, when notifying the public that a storm water management program must be implemented.

b. The permittee shall inform local stream or watershed protection organizations, if any, of activities under the storm water management program and shall allow them to review and comment on the storm water management program plan.

3. Illicit Discharge Elimination Program

The permittee shall develop, implement and enforce a program to prohibit and effectively eliminate illicit discharges, including discharges of sanitary wastewater, to the permittee's drainage system. Appropriate BMPs for this minimum measure and measurable goals for each BMP shall be included in the report required under Part I.C.1.b. of this permit.

"Illicit discharge" means any discharge or seepage that is not composed entirely of storm water into the drainage system, except for discharges specified in Parts I.A.1.b. and c. of this permit. Illicit discharges include dumping of motor vehicle fluids, household hazardous wastes, grass clippings, leaf litter, domestic animal wastes, litter or unauthorized discharges of sewage, industrial waste, restaurant wastes, or any other non-storm water waste into the drainage system.

"Illicit connection" means a physical connection to the drainage system that 1) primarily conveys illicit discharges into the drainage system or 2) is not authorized or permitted by the local authority (where a local authority requires such authorization or permit).

At a minimum, the Illicit Discharge Elimination Program shall include:

a. A program to find, prioritize, and eliminate illicit connections and minimize illicit discharges to the permitted drainage system from commercial, industrial, institutional, public, and residential sources. The program to find illicit discharges and illicit connections shall include a strategy to conduct routine dry weather screening of enclosed storm water drains leading to all outfalls from the drainage system and to all connections into drainage systems operated by other public bodies.

b. A program to minimize infiltration of ground water contaminated by seepage from sanitary sewers and on-site sewage disposal systems into the drainage system.

c. The legal authority to prohibit discharges into the drainage system operated by the permittee. The permittee shall have the legal authority, which may be a combination of state statute, municipal statute, ordinance, permit, order, rules, regulations, or other means available to the permittee, for the purpose of:

1) regulating the contribution of pollutants to the drainage system;

2) regulating the rate at which water flows into the drainage system;

3) prohibiting illicit connections and illicit discharges including the direct dumping or disposal of materials other than storm water into the drainage system;

4) requiring compliance with ordinances, permits issued by the permittee, contracts or orders; and

5) conducting all inspection, surveillance and monitoring procedures necessary to determine compliance with ordinances, permits issued by the permittee, contracts, orders, and the terms and conditions of this permit.

PART I

Section B. Storm Water Management Program – Minimum Measures

4. Post Construction Storm Water Management Program for New Development and Redevelopment Projects

The permittee shall revise, as necessary, implement and enforce a program to address storm water runoff from new development and redevelopment projects that discharge into the drainage system and: 1) disturb areas greater than or equal to one acre, or 2) disturb areas less than one acre but are part of a larger common plan of development or sale. The program shall ensure that controls are in place that will prevent or minimize water quality impacts, including resource impairment resulting from extreme flow conditions. Appropriate BMPs for this minimum measure and measurable goals for each BMP shall be included in the report required under Part I.C.1.b. of this permit.

Under the program for new development and redevelopment projects the permittee shall:

a. Develop and implement a comprehensive storm water master plan for development, implementation, and enforcement of controls watershed-wide or jurisdiction-wide to protect the designated uses in all receiving waters from the effects commonly associated with urbanization. Common effects of urbanization include stream "flashiness" (higher peak flows and lower base flow), increased stream-bank erosion, increased stream temperature and pollutant load, reduced stream-bank vegetation, and degraded fish habitat. Example master plan controls for prevention of impacts from urbanization include policies and ordinances that provide requirements and standards for directing growth to identified areas, protecting sensitive areas such as wetlands and riparian areas, maintaining and/or increasing open space (including a dedicated funding source for open space acquisition), encouraging infill development in higher density urban areas and areas with existing infrastructure,and coordinating release rates for detention basins to minimize flow conditions that may cause stream bank erosion.

b. Develop and implement ordinances or other regulatory mechanisms to address post construction storm water runoff from new development and redevelopment projects to the extent allowable under state or local law. Objectives of the ordinances or other regulatory mechanisms should be to protect receiving water quality from the impacts of development and limit the rate at which surface water runoff discharges from any specific site during and following development or redevelopment to not exceed the pre-development hydrologic regime. The ordinances or other regulatory mechanisms shall include:

   1) Requirements for implementation of appropriate non-structural and/or structural BMPs. Non-structural BMPs are preventative actions that involve management and source controls. Examples include: buffers along sensitive water bodies, education programs for developers and the public about project designs that minimize water quality and quantity impacts, minimum disturbance of soils and vegetation, and restrictions on directly connected impervious areas. Structural BMPs are physical controls that improve water quality, including storage practices. Examples of structural BMPs include: wet ponds and extended-detention outlet structures; filtration practices such as grassed swales, sand filters and filter strips; and infiltration practices such as infiltration basins and infiltration trenches.

   2) Requirements for adequate long-term operation and maintenance of BMPs.

c. Develop and implement a process for review of post-construction storm water BMPs in initial site plans, as applicable.

d. Minimize the occurrence of illicit discharges and spills into the drainage system by reviewing site plans for commercial operations to ensure that storm drain inlets are adequately isolated from pollutant sources. Equipment washing and waste material handling shall not result in discharge of wastes to the drainage system. Polluting materials shall be handled only in areas that provide secondary containment in accordance with state and federal law.

5. Construction Storm Water Runoff Control

The permittee shall revise, as necessary, implement and enforce a program to address storm water runoff from areas of construction activity that discharge into the permittee's drainage system. Appropriate BMPs for this minimum measure and measurable goals for each BMP shall be included in the report required under Part I.C.1.b. of this permit.

Under the Construction Storm Water Runoff Control Program, the permittee shall:

PART I

Section B. Storm Water Management Program – Minimum Measures

a. Notify the appropriate Soil Erosion and Sedimentation Agency and the Department in accordance with Part I.C.2.a. of this permit if a construction activity results in soil erosion and sedimentation that deposits or threatens to deposit solids into the drainage system. Take steps as necessary to prevent further deposit of solids into the drainage system.

b. Review preliminary site plans to ensure adequate allowance for soil erosion and sedimentation controls, as appropriate.

c. Have a procedure to receive and consider complaints or other information submitted by the public regarding construction site storm water runoff leading to the drainage system.

6. Pollution Prevention/Good Housekeeping for Municipal Operations

The permittee shall develop and implement a program of operation and maintenance BMPs with the ultimate goal of preventing or reducing pollutant runoff from municipal operations to the maximum extent practicable. The permittee shall ensure that employees properly handle wastes, recyclables, chemicals, and equipment used on the job; maintain a clean work area; regularly maintain storm water controls, and identify and report various storm water pollution sources including illicit discharges, malfunctioning post-construction controls, and poor soil erosion and sedimentation controls at construction sites. The program shall include employee training to prevent and reduce storm water pollution through proper implementation of BMPs in accordance with this minimum measure. The program may be developed and implemented using BMP guidance and training materials that are available from federal, state or local agencies, or other organizations. Appropriate BMPs for this minimum measure and measurable goals for each BMP shall be included in the report required under Part I.C.1.b. of this general permit.

The program, and all approved updates, shall satisfy the following requirements:

a. Structural Controls

Structural controls such as storm drain catch basins, vegetated swales, infiltration basins, sedimentation basins, and any controls installed or operated by the permittee to remove pollutants from storm water shall have routine maintenance, maintenance schedules, and long-term inspection procedures adequate to provide pollution removal effectiveness to the maximum extent practicable. Structural controls and cleaning schedules may need to be enhanced in the future if other control measures fail to adequately reduce the discharge of sediments, floatables and other pollutants that may be found in or discharging to or from drainage systems.

The permittee shall describe and implement procedures for the proper disposal of operation and maintenance waste such as dredge spoil, accumulated sediments, floatables, and other debris the permittee removes from the drainage system.

b. Roadways

The permittee shall construct, operate and maintain its streets, roads, highways, parking lots and other large paved surfaces in a manner so as to reduce the discharge of pollutants, including those related to deicing activities, into the drainage system

The procedural BMPs described shall, at a minimum, maintain effective street cleaning and catch basin maintenance programs. The street cleaning and catch basin maintenance programs shall be part of an overall plan to reduce the discharge of sediments, floatables, and associated pollutants into the drainage system. Salt and sand applied for improved traction shall be prevented from entering receiving steams to the maximum extent practicable.

The permittee shall not discharge to waters of the state any wastewater generated from cutting, grinding, drilling or hydrodemolition of concrete or asphalt.

c. Fleet Maintenance

The permittee shall assure that vehicle maintenance activities do not impact storm water runoff quality. Vehicle maintenance activities include adding or changing fluids including fuel, lubrication, mechanical repairs, parts degreasing, and vehicle or equipment washing. Discharge of wash water is not authorized by this permit. Vehicles and equipment shall be maintained for clean and effective operation to prevent impacts on storm water quality.

PART I

Section B. Storm Water Management Program – Minimum Measures

d. Storm Sewer Labeling
The permittee shall provide permanent identification (e.g., label, color coding, or other identifying characterstic) for any outfall structure that the permittee constructs or installs after March 10, 2004 that discharges storm water to waters of the state. Following the addition of permanent identification, the primary operator of the drainage system shall be readily identifiable by observation of the outfall structure.

e. Flood Control Projects
The permittee shall ensure that new flood management projects assess the impacts on the water quality of the receiving water and, whenever possible, shall examine existing projects for incorporation of additional water quality protection BMPs.

f. Pesticides and Fertilizers
The permittee shall minimize the discharge of pollutants related to the storage, handling and use of pesticides, herbicides, and fertilizers on land that the permittee manages. BMPs required under this measure include employee training, and soil testing on all lands that the permittee fertilizes. Fertilizers shall be applied only in accordance with soil test results and recommendations.

PART I

Section C. Program Assessment and Reporting

1. Annual Report and Storm Water Management Program Plan Submittal

a. Contact Person

The permittee shall designate a storm water program manager to serve as the contact person for the Department regarding activities carried out to comply with this permit. The permittee may replace the program manager at any time and shall notify the Jackson District Supervisor within ten days after the replacement.

b. First Year Report

On or before October 1, 2002, the first annual report describing the progress toward compliance with requirements of this permit shall be submitted to the Jackson District Supervisor for approval. The report shall include an approvable storm water management program plan consisting of descriptions and schedules for best management practices (Part I.C.1.b.1) and measurable goals (Part I.C.1.b.2) for those best management practices. The first-year annual progress report shall include all of the following:

1) Best Management Practices (BMPs)

The permittee shall submit a listing of the BMPs that will be or have been implemented for each of the minimum measures identified in Part I.B. of this permit. The list shall include BMPs already implemented or proposed under the permittee's existing storm water management program and any additional BMPs or efforts needed to comply with the MEP requirement of this permit.

2) Measurable Goals

The permittee shall submit a description of the measurable goals for each of the BMPs identified in accordance with Part I.C.1.b.1. The measurable goals shall demonstrate results that relate to an environmental benefit. The submittal shall also identify the years (and months as appropriate) that proposed BMPs will be implemented, interim milestones for all BMPs, and the frequency of actions.

Interim milestones may include descriptions of BMP implementation or the results of BMP implementation. Descriptions of BMP implementation should be quantifiable if possible. Examples descriptions include: total miles of storm sewer lines or number of buildings inspected for illicit discharges; number of fliers mailed or informational programs conducted for public education; or number of streets swept or catch basins cleaned as a pollution prevention activity. Results of BMP implementation may describe results such as the number and types of illicit connections identified and corrected; survey results showing a change in public awareness of storm water issues; or the volume of solids removed during street sweeping and catch basin cleaning operations.

3) Compliance Assessment

The permittee shall describe the status of compliance with the storm water management program plan submitted on September 7, 2000. Compliance status shall include reporting of program effectiveness as established under "Assessment of Storm Water Management Program Effectiveness" in Part III.A. of the previous NPDES storm water permit.

4) Receiving Water Quality Status

The permittee shall provide a description of the status of the water quality in the waters of the state within the permittee's political or territorial boundaries.

5) Receiving Water Quality Stresses

The permittee shall identify and prioritize the stresses on the waters of the state within the permittee's political or territorial boundaries.

6) Revised Fiscal Analysis

The permittee shall provide a summary of revisions, if necessary, to the fiscal analysis reported during the previous permit, pursuant to permit application requirements at 40 CFR 122.26(d)(2)(vi).

7) Upcoming Activities

The permittee shall provide a summary of the storm water activities to be implemented during the next annual reporting cycle.

PART I

Section C. Program Assessment and Reporting

8) Annual Budget
The permittee shall provide the previous fiscal year's annual expenditures and proposed budget for the fiscal year following the report.

c. Mid-Year Reports
On or before April 1, 2003, and annually thereafter, a mid year progress report shall be submitted to the Jackson District Supervisor. The mid-year progress report shall include a brief summary of information collected in accordance with Part I.C.1.e.1. for the period following the latest annual report.

d. Permitted Drainage System Operator Identification
Drainage systems can have multiple operators (co-operators). Often, no single drainage system operator has the power or authority to comply with all terms and conditions of this permit for its drainage system(s). If the permittee is not the sole permitted operator of a drainage system, then the permittee shall report under this part on or before April 1, 2003 to assure that all permitted co-operators are identified and that the terms and conditions of this permit can be met. The permittee shall not rely on a drainage system co-operator who has not applied for an NPDES permit for the portion of the drainage system co-operated with the permittee. Failure to report under this part, if applicable, is a violation of this permit.

1) Notice of Reliance on a Co-operator
The permittee shall notify the Jackson District Supervisor of all drainage system co-operators that will be relied upon to satisfy terms and conditions of this permit for drainage system(s) co-operated with the permittee. Notification shall include the name of all permitted or imminently permitted co-operators and shall specify the permit terms and conditions that will be satisfied by each drainage system co-operator identified. The permittee is solely responsible for the terms and conditions of this permit unless notice is received under this part and the co-operator obtains an NPDES permit.

A copy of the notice shall be sent to each drainage system co-operator named in the notice.

2) Notice of Obligation to a Co-operator
The permittee shall notify the Jackson District Supervisor if its storm water measures will satisfy any terms and conditions of a permit held by another drainage system co-operator. Notification shall include the name of the other co-operator(s) and shall specify the permit terms and conditions that will be met for the other co-operator(s).

3) Notice of Permitted Drainage System Operators Within Local Jurisdictions
The permittee shall submit to the Jackson District Supervisor a general description of each area or drainage system within the political or territorial boundaries of the City for which another drainage system operator is permitted or will imminently apply for a permit. A permittee that does not report under this part has sole responsibility to comply with the terms and conditions of this permit for all drainage system(s) within its political or territorial boundaries.

e. Subsequent Annual Reports
A report shall be submitted to the Jackson District Supervisor on or before October 1, 2003, and annually thereafter. The Jackson District Supervisor may approve an alternate date for annual report submittal if requested and adequately justified by the permittee. The annual progress reports shall contain the following information:

1) Compliance Assessment
The permittee shall describe the status of compliance with permit conditions, including a report of illicit discharges and illicit connections removed, shall assess the appropriateness of all identified BMPs, and shall describe the progress towards achieving the identified measurable goals for each of the BMPs. This requirement replaces the "Assessment of Storm Water Management Program Effectiveness" in Part III.A. of the previous permit.

2) Environmental Impacts
The permittee shall provide an assessment of the pollution reduction and probable receiving water quality impacts associated with program implementation. When applicable, a statement shall be included regarding any negative water quality impacts that may have occurred as a result of any illicit discharges or accidental spills during the past year.

PART I

Section C. Program Assessment and Reporting

3) Water Quality Assessment
The permittee shall provide an assessment of the water quality conditions within their jurisdiction.

4) Data and Results
The permittee shall provide a summary of all information collected and analyzed, including monitoring data, if any, during the annual reporting cycle.

5) Upcoming Activities
The permittee shall provide a summary of the storm water activities to be implemented during the next annual reporting cycle. The summary shall include schedules for elimination of any illicit connections identified but not disconnected prior to annual report submittal.

6) BMP Changes
The permittee shall describe any planned changes in identified BMPs or measurable goals for any of the minimum measures.

7) Notice of Changes in Reliance on Permitted Drainage System Operators.
The permittee shall describe any changes in the need to rely on other permitted drainage system operators to satisfy the terms and conditions of this permit, as defined in Part I.C.1.d.

8) Drainage System Changes
The permittee shall provide an update on areas added to the drainage system, if addition is due to annexation of lands outside Ann Arbor's ultimate boundary (if applicable). This condition does not apply to annexation of Ann Arbor Township, Scio Township, and Pittsfield Township that lie inside Ann Arbor's ultimate boundary.

9) Revised Fiscal Analysis
The permittee shall provide a summary of revisions, if necessary, to the fiscal analysis reported during the previous permit, pursuant to permit application requirements at 40 CFR 122.26(d)(2)(vi).

10) Annual Budget
The permittee shall provide the previous fiscal year's annual expenditures and proposed budget for the fiscal year following the report.

PART I

Section C. Program Assessment and Reporting

2. Notification Requirements

a. Regulated Discharges into the Drainage System
The permittee shall notify the Jackson District Supervisor, verbally, within 24 hours of becoming aware of any discharges to the drainage system that the permittee suspects may endanger health or the environment if the discharges are from facilities/sites that are not complying or will be unable to comply with the following:

1) requirements of an NPDES permit, including an individual permit, a general permit, or the Permit-by-Rule for storm water discharges from construction sites;

2) requirements of a State of Michigan permit for soil erosion and sedimentation control pursuant to Part 91 of P.A. 451 of 1994;

3) requirements of a State of Michigan permit for discharge of liquid wastes to groundwater pursuant to the Michigan Act;

4) requirements of Part 5 (Polluting Materials) of the administrative rules promulgated under the Michigan Act; or

5) Water Quality Standards.

Non-compliance as described above that does not pose imminent danger to health or the environment shall be reported by the permittee, either verbally or in writing, within five (5) days of the time the permittee becomes aware of it.

b. Noncompliance Notification
The permittee shall submit written documentation to the Jackson District Supervisor within 14 days of having knowledge of any reason the permittee is not complying with or will be unable to comply with any condition specified in this permit. Written documentation shall include the following information:

1) a description of the circumstances, including the type of noncompliance;

2) the period of noncompliance (if known), including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncompliance; and

3) for illegal discharges to the system, the estimated volume of discharge, a description of the type of pollutants in the discharge, the location of the discharge into the system, the location of the outfall from which the discharge enters waters of the state; identification of the parties responsible for the discharge, if known, and the facility or the construction site from which the discharge originated, if known.

3. Identification of Additional Point Source Discharges of Storm Water

If the permittee becomes aware of any drainage system discharge points it operates, which discharge either to waters of the state or to a drainage system operated by another public body or statutory housing authority, which were not on the list in Part II.F., the permittee shall provide the following information to the Jackson District Supervisor within 30 days of becoming aware of the discharge(s): the location of the discharge, if coverage of the additional storm water discharge is being requested, and the name of the receiving water or other drainage system operator that receives the discharge. This requirement may be satisfied by providing a map of the permittee's complete drainage system.

PART I

Section C. Program Assessment and Reporting

4. Recordkeeping

The latest approved version of the Storm Water Management Program Plan developed in accordance with this general permit shall be retained by the permittee and available for inspection in accordance with Part II.D.7. of this general permit. All records and information resulting from the preparation of the annual progress reports, including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation, shall be retained by the permittee for a minimum of three years, or longer if requested by the Jackson District Supervisor or the Regional Administrator.

5. Storm Water Management Program Modification

a. Modifications Requested by the Permittee
The approved Storm Water Management Program may be modified by the permittee as follows:

1) Modifications adding (but not subtracting or replacing) components, controls, or requirements to the approved Storm Water Management Program may be made by the permittee at any time upon written notification to the Jackson District Supervisor. Notification shall include a description of the modification.

2) Modifications replacing an ineffective or unfeasible BMP specifically identified in the Storm Water Management Program with an alternative BMP may be requested at any time by written notification to the Jackson District Supervisor. Unless denied by the Jackson District Supervisor, the modification shall be deemed approved and may be implemented by the permittee 60 days from submittal of the request. Such requests must include the following:

a) an analysis of why the BMP is ineffective or unfeasible (including cost prohibitive);

b) expectations on the effectiveness of the replacement BMP; and

c) an analysis of why the replacement BMP is expected to achieve the goals of the BMP to be replaced.

b. Modifications Required by the Permitting Authority:
The Department may require the permittee to modify the Storm Water Management Program as needed to:

1) address contributions by the drainage system discharges which impair receiving water quality;

2) include more stringent requirements necessary to comply with new state or federal statutory or regulatory requirements; or

3) include such other conditions deemed necessary by the Jackson District Supervisor to comply with the goals and requirements of the Federal Act or the Michigan Act.

6. Expiration and Reissuance

If the permittee wishes to continue a discharge authorized under this permit beyond the permit's expiration date, the permittee shall submit a written request to the Jackson District Supervisor on or before April 1, 2006. A person operating under an expired permit shall continue to be subject to the terms and conditions of the expired permit until the permit is terminated, revoked, or reissued.

If this permit is terminated or revoked, all authorizations to discharge under the permit shall expire on the date of termination or revocation.

7. Waste Load Allocation Reopener

If storm water controls are needed for the discharge based on waste load allocations that are part of "total maximum daily loads" (TMDLs) that address the pollutant(s) of concern, then the permit may be modified by the Department in accordance with applicable laws and rules.

PART II

Section A. Definitions

This list of definitions may include terms not applicable to this permit.

Ann Arbor's Ultimate Boundary means a boundary formed by a line starting at the east intersection of M-14 & US-23 west along M-14 & US-23, then southwesterly along M-14, then westerly along the south bank of the Huron River then southerly along Maple Rd, (except Barton Plateau Subdivision, Barton Plateau No. 2 Subdivision, Huron River Heights No. 2 Subdivision and Huron River Heights No. 3 Subdivision, all within the NW quarter section of section 18, Ann Arbor Township) then southwesterly along M-14, southerly along Wagner Rd, then easterly along Liberty Rd, then southerly and southeasterly along I-94, then south along State St., then easterly along Ellsworth Rd, then northerly along US-23 to M-14. The boundary shall also enclose that portion of the NE quarter section of section 15, Pittsfield Township, which lies north of the railroad right of way and contains the closed landfill, composting center and material recovery facility.

Department means the Michigan Department of Environmental Quality.

District Supervisor: The Jackson District Supervisor of the Surface Water Quality Division is located at the Jackson District Office-DEQ, Surface Water Quality Division, 301 East Louis Glick Highway, Jackson, Michigan 49201-1556, telephone: 517-780-7690 (fax: 517-780-7855).

Division of Health Facility Services – Health Facility Evaluation Section, Michigan Department of Consumer and Industry Services mailing address is P.O. Box 30195, Lansing, Michigan 48909.

Drainage System Operator: See "Municipal Separate Storm Water Drainage System Operator".

Drinking Water and Radiological Protection Division – Environmental Health, Michigan Department of Environmental Quality mailing address is P.O. Box 30630, Lansing, Michigan 48909-8130.

Municipal Separate Storm Water Drainage System Operator means a public body or statutory housing authority that owns a separate storm water drainage system, or has the power or authority to implement or carry out any of the minimum measures for storm water pollution control as listed in Part I.B. of this permit. There may be multiple drainage system operators within the same geographic area or for the same drainage system.

On-Site Sewage Disposal System means a natural system or mechanical device used to collect, treat, and discharge or reclaim wastewater from one or more dwelling units without the use of community-wide sewers or a centralized treatment facility.

Polluting Materials means oil and any material, in solid or liquid form, identified as polluting material under the Part 5 Rules of the Michigan Administrative Code.

POTW is a publicly owned treatment works as defined at 40 C.F.R. §403.3.

Public Body means the United States, the State of Michigan, city, village, township, county, school district, public college or university, single purpose governmental agency; or any other governing body which is created by federal or state statute or law.

Regional Administrator is the Region 5 Administrator, U.S. EPA, located at R-19J, 77 W. Jackson, Blvd., Chicago, Illinois 60604.

Separate Storm Water Drainage System means a system (including but not limited to roads, catch basins, curbs, gutters, parking lots, ditches, conduits, pumping devices, or man-made channels) that is designed or used for collecting or coveying storm water; is not a combined sewer where storm water mixes with sanitary wastes; and is not part of a POTW. The term does not include separate storm water drainage conveyances that serve an individual building or comparable discrete area. The system may convey the non-storm water discharges specified in Part I.A.1.b. through Part I.A.1.d.

Statutory Housing Authority means the governing body of a condominium association of co-owners or manufactured home community.

Storm water means storm water runoff, snow melt runoff, and surface runoff and drainage.

PART II

Section A. Definitions

Waters of the State means all of the following, but does not include drainage ways and ponds used solely for wastewater conveyance, treatment, or control:

- The Great Lakes and their connecting waters,
- All inland lakes,
- Rivers,
- Streams,
- Impoundments,
- Open drains, and
- Other surface bodies of water within the confines of the state.

Water Quality Standards means the Part 4 Water Quality Standards promulgated pursuant to Part 31 of Act No. 451 of the Public Acts of 1994, as amended, being Rules 323.1041 through 323.1117 of the Michigan Administrative Code.

PART II

Section B. Monitoring Procedures

1. Representative Samples

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations promulgated pursuant to Section 304(h) of the Federal Act (40 CFR Part 136 - Guidelines Establishing Test Procedures for the Analysis of Pollutants). For parameters not specified in the permit or covered by the regulations, test procedures shall be submitted for approval to the Jackson District Supervisor.

The permittee shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the permittee's laboratory Quality Control/Quality Assurance program.

3. Instrumentation

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring instrumentation at intervals to ensure accuracy of measurements.

4. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information: 1) the exact place, date, and time of measurement or sampling; 2) the person(s) who performed the measurement or sample collection; 3) the dates the analyses were performed; 4) the person(s) who performed the analyses; 5) the analytical techniques or methods used; 6) the date of and person responsible for equipment calibration; and 7) the results of all required analyses.

5. Monitoring by Permittee

If the permittee monitors any pollutant from the storm water point source discharges identified in Part II.F., the results of such monitoring shall be provided to the Jackson District Supervisor with the Annual Progress Reports required by Part I.C.1.

PART II

Section C. Reporting Requirements

1. Compliance Dates Notification

Within 14 days of every compliance date specified in this permit, the permittee shall submit a written notification to the Jackson District Supervisor indicating whether or not the particular requirement was accomplished. If the requirement was not accomplished, the notification shall include an explanation of the failure to accomplish the requirement, actions taken or planned by the permittee to correct the situation, and an estimate of when the requirement will be accomplished. If a written report is required to be submitted by a specified date and the permittee accomplishes this, a separate written notification is not required.

2. Spill Notification

The permittee shall immediately report any spill or loss of any product, by-product, intermediate product, oils, solvents, waste material, or any other polluting substance which occurs to the surface waters or groundwaters of the state by calling the Jackson District Supervisor of the Surface Water Quality Division at 517-780-7690, or if the notice is provided after regular working hours call the Department of Environmental Quality's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706 (calls from out-of-state dial 1-517-373-7660); and within ten (10) days of the spill or loss, the permittee shall submit to the Jackson District Supervisor a full written explanation as to the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken, and schedule of implementation.

3. Bioaccumulative Chemicals of Concern (BCC)

Consistent with the requirements of Rules 323.1098 and 323.1215 of the Michigan Administrative Code, the permittee is prohibited from undertaking any action that would result in a lowering of water quality from an increased loading of a BCC unless an increased use request and antidegradation demonstration have been submitted and approved by the Department.

4. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Jackson District Supervisor of the Surface Water Quality Division 30 days prior to the actual transfer of ownership or control.

PART II

Section D. Management Responsibilities

1. Duty to Comply

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit.

It is the duty of the permittee to comply with all the terms and conditions of this permit. Any noncompliance with the Special Conditions, or terms of this permit constitutes a violation of the Michigan Act and/or the Federal Act and constitutes grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of an application for permit renewal.

2. Facilities Operation

The permittee shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures.

3. Power Failures

In order to maintain compliance with the effluent limitations of this permit and prevent unauthorized discharges, the permittee shall either:

a. provide an alternative power source sufficient to operate facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit; or

b. upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit, the permittee shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this permit.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the surface waters or groundwaters of the state resulting from noncompliance with this permit including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the discharge in noncompliance.

5. Containment Facilities

The permittee shall provide facilities for containment of any accidental losses of concentrated solutions, acids, alkalies, salts, oils, or other polluting materials in accordance with the requirements of the Part 5 Rules (Rules 323.1151 through 323.1169 of the Michigan Administrative Code). For a Publicly Owned Treatment Work (POTW), these facilities shall be approved under Part 41 of the Michigan Act.

6. Waste Treatment Residues

Residuals (i.e. solids, sludges, biosolids, filter backwash, scrubber water, ash, grit or other pollutants) removed from or resulting from treatment or control of storm water, shall be disposed of in an environmentally compatible manner and according to applicable laws and rules. These laws may include, but are not limited to, the Michigan Act, Part 31 for protection of water resources, Part 55 for air pollution control, Part 111 for hazardous waste management, Part 115 for solid waste management, Part 121 for liquid industrial wastes, Part 301 for protection of inland lakes and streams, and Part 303 for wetlands protection. Such disposal shall not result in any unlawful pollution of the air, surface waters or groundwaters of the state.

PART II

Section D. Management Responsibilities

7. Right of Entry

The permittee shall allow the Michigan Department of Environmental Quality, any agent appointed by the Department or the Regional Administrator, upon the presentation of credentials:

a. to enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b. at reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect process facilities, treatment works, monitoring methods and equipment regulated or required under this permit; and to sample any discharge of pollutants.

8. Availability of Reports

Except for data determined to be confidential under Section 308 of the Federal Act and Rule 2128 (Rule 323.2128 of the Michigan Administrative Code), all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department and the Regional Administrator. As required by the Federal Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Act and Sections 3112, 3115, 4106 and 4110 of the Michigan Act.

PART II

Section E. Activities Not Authorized by This Permit

1. Discharge to the Groundwaters

This permit does not authorize any discharge to the groundwaters. Such discharge may be authorized by a groundwater discharge permit issued pursuant to the Michigan Act.

2. Facility Construction

This permit does not authorize or approve the construction or modification of any physical structures or facilities. Approval for such construction for a POTW must be by permit issued under Part 41 of the Michigan Act. Approval for such construction for a mobile home park, campground or marina shall be from the Drinking Water and Radiological Protection Division -- Environmental Health. Michigan Department of Environmental Quality. Approval for such construction for a hospital, nursing home or extended care facility shall be from the Division of Health Facility Services -- Health Facility Evaluation Section, Michigan Department of Consumer and Industry Services upon request.

3. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond the permittee's control, such as accidents, equipment breakdowns, or labor disputes.

4. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee may be subject under Section 311 of the Federal Act except as are exempted by federal regulations.

5. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Federal Act.

6. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits or approvals from other units of government as may be required by law.

PART II

Section F. Outfalls of the City of Ann Arbor Drainage System

The City of Ann Arbor shall notify the Jackson District Supervisor of any outfalls that are newly identified or newly constructed as part of the City of Ann Arbor's drainage system and are not on the following list:

INDEX MAP NO.	DESIGNATION	DIA. SIZE	RECEIVING WATER	LOCATION DESCRIPTION
G6	OUTFALL	66"	HURON RIVER (STATE)	EAST OF HOLYOKE LANE & SOUTH OF CONSOLIDATED R.R.
G7	OUTFALL	24"	BARTON POND/HURON RIVER (STATE)	NORTHWEST OF INTERSECTION OF WARRINGTON DRIVE & HURON RIVER DRIVE
G8	OUTFALL	12"	DITCH (CITY) TO TRAVER CREEK DRAIN (COUNTY)	SOUTH OF TRAVER BOULEVARD-WEST OF PLACID WAY
G8	OUTFALL	15"	TRAVER CREEK DRAIN (COUNTY)	WEST OF PLACID WAY, NORTH OF TRAVER BLVD., EAST OF A.A.R.R.
G8	OUTFALL	18"	DITCH (CITY) TO TRAVER CREEK DRAIN (COUNTY)	SOUTH OF TRAVER BOULEVARD
G8	OUTFALL	24"	DITCH (CITY) TO TRAVER CREEK DRAIN (COUNTY)	TUEBINGEN
G8	OUTFALL	30"	TRAVER CREEK DRAIN (COUNTY)	MEADOW RIDGE AREA NORTH OF TRAVER CREEK
G8	OUTFALL	30"	TRAVER CREEK DRAIN (COUNTY)	SOUTH OF MEADOWRIDGE COURT & OLMSTEAD DRIVE
G8	OUTFALL	DITCH	TRAVER CREEK DRAIN (COUNTY)	WEST OF A.A.R.R., S OF TRAVER BLVD., N OF PROPOSED HURON PKWY.
G9	OUTFALL	15"	TRAVER CREEK DRAIN (COUNTY)	WEST OF LAKEHURST COURT
G9	OUTFALL	60"	DITCH (CITY) TO TRAVER CREEK DRAIN (COUNTY)	NORTH OF LANCASHIRE - SOUTH OF TRAVER-WEST OF LAKEHURST
G10	OUTFALL	60"	DITCH ALONG U.S.23 (MDOT)	EAST OF BURBANK DRIVE, NORTH OF BOLGOS CIRCLE, WEST OF U.S.23
H5	OUTFALL	66"	DITCH ALONG M-14 (MDOT)	WEST OF INTERSECTION OF RAVENWOOD AVE. & SEQUOIA PARKWAY
H5	OUTFALL	72"	MARSH (CITY) FROM (MDOT)	M-14 - WEST OF SEQUOIA-NORTH OF RAVENWOOD
H6	DISCHARGE TO ENCLOSED	24"	36" (CTY) UNNAMED CREEK TO HURON RIVER (STATE)	FULMER ST. 1/2 WAY BETWEEN FOSS ST. GARDEN HOMES DRIVE
H6	OUTFALL	12"	DITCH ALONG M-14 (MDOT)	NORTH OF SUNSET ROAD, EAST OF POMONA ROAD
H6	OUTFALL	48" X 76"	DITCH ALONG M-14 (MDOT)	NORTH OF FOSS - EAST OF NORTH MAPLE
H7	OUTFALL	(2) 24"	ARGO POND/HURON RIVER (STATE)	SW OF INTERSECTION OF BREDE PL. & BARTON DR., NORTH OF LONGSHORE DR.
H7	OUTFALL	12"	DITCH ALONG M-14 (MDOT)	INTERSECTION OF BEECHWOOD DRIVE & HURON VIEW BLVD.
H7	OUTFALL	12"	DITCH ALONG M-14 (MDOT)	NORTH OF SUNSET, WEST OF BROOKS STREET
H7	OUTFALL	21"	ARGO POND/HURON RIVER (STATE)	WEST OF INTERSECTION OF ARGO DRIVE & LONGSHORE DRIVE
H7	OUTFALL	24"	DITCH ALONG CONS. R.R. TO HURON RIVER (STATE)	WEST OF JUNCTION OF NORTH MAIN & HURON VIEW BOULEVARD
H7	OUTFALL	42"	ARGO POND/HURON RIVER (STATE)	EAST OF CONSOLIDATED R.R., WEST OF ARGO POND
H7	OUTFALL	48"	HURON RIVER (STATE)	SOUTH OF BROOKSIDE DRIVE, WEST OF BARTON DRIVE
H8	OUTFALL	12"	TRAVER CREEK DRAIN (COUNTY)	TO CULVERT BENEATH BARTON DRIVE
H8	OUTFALL	12"	TRAVER CREEK DRAIN (COUNTY)	CULVERT UNDER TRAVER ROAD
H8	OUTFALL	12"	TRAVER CREEK DRAIN (COUNTY)	EAST OF INTERSECTION OF DAVID COURT & TRAVER ROAD
H8	OUTFALL	12"	TRAVER CREEK DRAIN (COUNTY)	SOUTH OF TRAVER COURT
H8	OUTFALL	15"	DITCH ALONG R.R. TO TRAVER CREEK (COUNTY)	NORTH OF POINTE CROSSING, EAST OF A.A.R.R., NORTH OF PLYMOUTH RD., EAST OF LAKE
H8	OUTFALL	15"	TRAVER CREEK DRAIN (COUNTY)	NE OF INTERSECTION OF BARTON DRIVE & TRAVER CREEK
H8	OUTFALL	24"	DITCH ALONG R.R. TO TRAVER CREEK (COUNTY)	NORTHWEST OF INTERSECTION OF PLYMOUTH ROAD & POINTE LANE, EAST OF A.A.R.R.
H8	OUTFALL	36" X 36"	OPEN DITCH TO TRAVER CREEK (COUNTY)	NORTH SIDE OF PLYMOUTH AT BISHOP
H8	OUTFALL	48"	TRAVER CREEK DRAIN(COUNTY)	SOUTH OF TRAVER CREEK, WEST OF PLYMOUTH ROAD & A.A.R.R.
H9	OUTFALL	12"	DITCH TO MILLER'S CREEK DRAIN (CITY)	SOUTH OF PLYMOUTH, UNIVERSITY OF MICHIGAN NORTH CAMPUS
H9	OUTFALL	12"	MARSH/POND TO MILLER'S CREEK (CITY)	SOUTH OF PLYMOUTH - EAST OF MCINTYRE
H9	OUTFALL	12"	MARSH/POND TO MILLER'S CREEK (CITY)	SOUTH OF PLYMOUTH, NORTH OF BEAL OR MCINTYRE
H9	OUTFALL	18"	DITCH TO MILLER'S CREEK DRAIN (CITY)	PLYMOUTH ROAD EAST OF COMMONWEALTH BOULEVARD
H9	OUTFALL	18"	MILLER'S CREEK DRAIN (CITY)	SOUTH OF ARDENNE, WEST OF GEORGETOWN
H9	OUTFALL	21"	MARSH/POND TO MILLER'S CREEK (CITY)	WEST OF GREEN ROAD, NORTH OF PLYMOUTH ROAD
H9	OUTFALL	36"	DITCH TO MILLER'S CREEK DRAIN (CITY)	GREEN ROAD SOUTH OF PLYMOUTH, NORTH OF GREENBRIER

PART II

Section F. Outfalls of the City of Ann Arbor Drainage System

INDEX MAP NO.	DESIGNATION	DIA. SIZE	RECEIVING WATER	LOCATION DESCRIPTION
G6	OUTFALL	66"	HURON RIVER (STATE)	EAST OF HOLYOKE LANE & SOUTH OF CONSOLIDATED R.R.
G7	OUTFALL	24"	BARTON POND/HURON RIVER (STATE)	NORTHWEST OF INTERSECTION OF WARRINGTON DRIVE & HURON RIVER DRIVE
G8	OUTFALL	12"	DITCH (CITY) TO TRAVER CREEK DRAIN (COUNTY)	SOUTH OF TRAVER BOULEVARD-WEST OF PLACID WAY
G8	OUTFALL	15"	TRAVER CREEK DRAIN (COUNTY)	WEST OF PLACID WAY, NORTH OF TRAVER BLVD., EAST OF A.A.R.R.
G8	OUTFALL	18"	DITCH (CITY) TO TRAVER CREEK DRAIN (COUNTY)	SOUTH OF TRAVER BOULEVARD
G8	OUTFALL	24"	DITCH (CITY) TO TRAVER CREEK DRAIN (COUNTY)	TUEBINGEN
G8	OUTFALL	30"	TRAVER CREEK DRAIN (COUNTY)	MEADOW RIDGE AREA NORTH OF TRAVER CREEK
G8	OUTFALL	30"	TRAVER CREEK DRAIN (COUNTY)	SOUTH OF MEADOWRIDGE COURT & OLMSTEAD DRIVE
G8	OUTFALL	DITCH	TRAVER CREEK DRAIN (COUNTY)	WEST OF A.A.R.R., S OF TRAVER BLVD., N OF PROPOSED HURON PKWY.
G9	OUTFALL	15"	TRAVER CREEK DRAIN (COUNTY)	WEST OF LAKEHURST COURT
G9	OUTFALL	60"	DITCH (CITY) TO TRAVER CREEK DRAIN (COUNTY)	NORTH OF LANCASHIRE - SOUTH OF TRAVER-WEST OF LAKEHURST
G10	OUTFALL	60"	DITCH ALONG U.S.23 (MDOT)	EAST OF BURBANK DRIVE, NORTH OF BOLGOS CIRCLE, WEST OF U.S.23
H5	OUTFALL	66"	DITCH ALONG M-14 (MDOT)	WEST OF INTERSECTION OF RAVENWOOD AVE. & SEQUOIA PARKWAY
H5	OUTFALL	72"	MARSH (CITY) FROM (MDOT)	M-14 - WEST OF SEQUOIA-NORTH OF RAVENWOOD
H6	DISCHARGE TO ENCLOSED	24"	36" (CTY) UNNAMED CREEK TO HURON RIVER (STATE)	FULMER ST. 1/2 WAY BETWEEN FOSS ST. GARDEN HOMES DRIVE
H6	OUTFALL	12"	DITCH ALONG M-14 (MDOT)	NORTH OF SUNSET ROAD, EAST OF POMONA ROAD
H6	OUTFALL	48" X 76"	DITCH ALONG M-14 (MDOT)	NORTH OF FOSS - EAST OF NORTH MAPLE
H7	OUTFALL	(2) 24"	ARGO POND/HURON RIVER (STATE)	SW OF INTERSECTION OF BREDE PL. & BARTON DR., NORTH OF LONGSHORE DR.
H7	OUTFALL	12"	DITCH ALONG M-14 (MDOT)	INTERSECTION OF BEECHWOOD DRIVE & HURON VIEW BLVD.
H7	OUTFALL	12"	DITCH ALONG M-14 (MDOT)	NORTH OF SUNSET, WEST OF BROOKS STREET
H7	OUTFALL	21"	ARGO POND/HURON RIVER (STATE)	WEST OF INTERSECTION OF ARGO DRIVE & LONGSHORE DRIVE
H7	OUTFALL	24"	DITCH ALONG CONS. R.R. TO HURON RIVER (STATE)	WEST OF JUNCTION OF NORTH MAIN & HURON VIEW BOULEVARD
H7	OUTFALL	42"	ARGO POND/HURON RIVER (STATE)	EAST OF CONSOLIDATED R.R., WEST OF ARGO POND
H7	OUTFALL	48"	HURON RIVER (STATE)	SOUTH OF BROOKSIDE DRIVE, WEST OF BARTON DRIVE
H8	OUTFALL	12"	TRAVER CREEK DRAIN (COUNTY)	TO CULVERT BENEATH BARTON DRIVE
H8	OUTFALL	12"	TRAVER CREEK DRAIN (COUNTY)	CULVERT UNDER TRAVER ROAD
H8	OUTFALL	12"	TRAVER CREEK DRAIN (COUNTY)	EAST OF INTERSECTION OF DAVID COURT & TRAVER ROAD
H8	OUTFALL	12"	TRAVER CREEK DRAIN (COUNTY)	SOUTH OF TRAVER COURT
H8	OUTFALL	15"	DITCH ALONG R.R. TO TRAVER CREEK (COUNTY)	NORTH OF POINTE CROSSING, EAST OF A.A.R.R., NORTH OF PLYMOUTH RD., EAST OF LAKE
H8	OUTFALL	15"	TRAVER CREEK DRAIN (COUNTY)	NE OF INTERSECTION OF BARTON DRIVE & TRAVER CREEK
H8	OUTFALL	24"	DITCH ALONG R.R. TO TRAVER CREEK (COUNTY)	NORTHWEST OF INTERSECTION OF PLYMOUTH ROAD & POINTE LANE, EAST OF A.A.R.R.
H8	OUTFALL	36" X 36"	OPEN DITCH TO TRAVER CREEK (COUNTY)	NORTH SIDE OF PLYMOUTH AT BISHOP
H8	OUTFALL	48"	TRAVER CREEK DRAIN(COUNTY)	SOUTH OF TRAVER CREEK, WEST OF PLYMOUTH ROAD & A.A.R.R.
H9	OUTFALL	12"	DITCH TO MILLER'S CREEK DRAIN (CITY)	SOUTH OF PLYMOUTH, UNIVERSITY OF MICHIGAN NORTH CAMPUS
H9	OUTFALL	12"	MARSH/POND TO MILLER'S CREEK (CITY)	SOUTH OF PLYMOUTH - EAST OF MCINTYRE
H9	OUTFALL	12"	MARSH/POND TO MILLER'S CREEK (CITY)	SOUTH OF PLYMOUTH, NORTH OF BEAL OR MCINTYRE
H9	OUTFALL	18"	DITCH TO MILLER'S CREEK DRAIN (CITY)	PLYMOUTH ROAD EAST OF COMMONWEALTH BOULEVARD
H9	OUTFALL	18"	MILLER'S CREEK DRAIN (CITY)	SOUTH OF ARDENNE, WEST OF GEORGETOWN
H9	OUTFALL	21"	MARSH/POND TO MILLER'S CREEK (CITY)	WEST OF GREEN ROAD, NORTH OF PLYMOUTH ROAD
H9	OUTFALL	36"	DITCH TO MILLER'S CREEK DRAIN (CITY)	GREEN ROAD SOUTH OF PLYMOUTH, NORTH OF GREENBRIER

PART II

INDEX MAP NO.	DESIGNATION	DIA. SIZE	RECEIVING WATER	LOCATION DESCRIPTION
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
119	OUTFALL	42"	DITCH TO MILLER'S CREEK DRAIN (CITY)	SOUTH OF BAXTER, WEST OF DEAN ROAD
119	OUTFALL	54", 42", 12"	MILLER'S CREEK DRAIN (CITY)	SOUTH OF PLYMOUTH, EAST OF HURON PARKWAY (COUNTY DRAIN)
119	OUTFALL	15"	MARSH/POND TO MILLER'S CREEK DRAIN (CITY)	EAST OF BEAL
1110	OUTFALL	30"	DITCH ALONG U.S.23 (MDOT) TO FLEMING CREEK (CTY.)	NORTH OF GREENBRIER DRIVE AND WEST OF U.S.23
15	OUTFALL	12"	MARSH/POND (CITY) TO FIRST SISTER LAKE (CTY.)	ARCHWOOD DRIVE SOUTH OF SEQUOIA PARKWAY
15	OUTFALL	24"	FIRST SISTER LAKE (COUNTY)	WEST OF INTERSECTION OF LAKEVIEW DRIVE & PARKLAKE AVE.
16	DISCHARGE TO ENCLOSED	(2) 24"	30" WEST PARK FAIRGROUNDS DRAIN (COUNTY) TO ALLEN CREEK	UNDER I-94 AT JACKSON
16	DISCHARGE TO ENCLOSED	12"	36" WEST PARK MILLER DRAIN (COUNTY) TO ALLEN CREEK	INTERSECTION OF REVENA BLVD. AND ARBOR VIEW
16	DISCHARGE TO ENCLOSED	12"	36" WEST PARK MILLER DRAIN (COUNTY) TO ALLEN CREEK	INTERSECTION OF LINDA VISTA AND ARBOR VIEW
16	DISCHARGE TO ENCLOSED	12"	36" WEST PARK MILLER DRAIN (COUNTY) TO ALLEN CREEK	INTERSECTION OF WESLEY STREET AND ARBOR VIEW
16	DISCHARGE TO ENCLOSED	12"	42" WEST PARK FAIRGROUNDS DRAIN TO ALLEN CREEK (COUNTY)	SOUTH OF INTERSECTION OF DOTY AVENUE AND LINWOOD AVENUE
16	DISCHARGE TO ENCLOSED	12"	42" WEST PARK FAIRGROUNDS DRAIN TO ALLEN CREEK (COUNTY)	NORTH OF INTERSECTION OF PINERIDGE AND MARYFIELD
16	DISCHARGE TO ENCLOSED	12"	42" WEST PARK FAIRGROUNDS DRAIN TO ALLEN CREEK (COUNTY)	NORTH OF INTERSECTION OF WESTWOOD AVENUE AND MARYFIELD
16	DISCHARGE TO ENCLOSED	12"	42" WEST PARK FAIRGROUNDS DRAIN TO ALLEN CREEK (COUNTY)	SOUTH OF INTERSECTION OF BRIARWOOD STREET AND LINWOOD AVENUE
16	DISCHARGE TO ENCLOSED	12"	42" WEST PARK MILLER DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF PAUL STREET AND ARBOR VIEW
16	DISCHARGE TO ENCLOSED	12"	42" WEST PARK MILLER DRAIN BRANCH #1 TO ALLEN CREEK (COUNTY)	INTERSECTION OF LINWOOD AND WILDWOOD
16	DISCHARGE TO ENCLOSED	12"	48" WEST PARK MILLER DRAIN BRANCH #1 TO ALLEN CREEK (COUNTY)	SOUTH OF INTERSECTION OF MARK HANNAH DRIVE AND LINWOOD AVENUE
16	DISCHARGE TO ENCLOSED	12"	54" WEST PARK FAIRGROUNDS DRAIN TO ALLEN CREEK (COUNTY)	EAST OF NORTH MAPLE 1/2 WAY BETWEEN DEXTER & JACKSON
16	DISCHARGE TO ENCLOSED	12"	24" WEST PARK MILLER DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF DOTY AND ARBORVIEW
16	DISCHARGE TO ENCLOSED	15"	48" WEST PARK MILLER DRAIN BRANCH #1 TO ALLEN CREEK (COUNTY)	SOUTH OF INTERSECTION OF ARBANA DRIVE AND LINWOOD AVENUE
16	DISCHARGE TO ENCLOSED	22"	48" WEST PARK MILLER DRAIN BRANCH #1 TO ALLEN CREEK (COUNTY)	SOUTH OF INTERSECTION LINWOOD AVENUE & REVENA BLVD.
16	DISCHARGE TO ENCLOSED	24"	24" WEST PARK MILLER DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF WILTON STREET AND ARBOR VIEW
16	DISCHARGE TO ENCLOSED	24"	42" WEST PARK FAIRGROUNDS DRAIN TO ALLEN CREEK (COUNTY)	SOUTH OF LINWOOD AVENUE BETWEEN DOTY AVENUE & WESTWOOD AVENUE
16	DISCHARGE TO ENCLOSED	24"	66" WEST PARK FAIRGROUNDS DRAIN TO ALLEN CREEK (COUNTY)	AT DEXTER, SOUTH OF LEONA DRIVE
16	DISCHARGE TO ENCLOSED	36"	72" WEST PARK FAIRGROUNDS DRAIN TO ALLEN CREEK (COUNTY)	AT DEXTER, SOUTH OF LEONA DRIVE
16	DISCHARGE TO ENCLOSED	36"	WEST PARK FAIRGROUNDS DRAIN TO ALLEN CREEK (COUNTY)	NORTHWEST OF INTERSECTION OF JACKSON & MAPLE
16	DISCHARGE TO ENCLOSED	42"	36" WEST PARK MILLER DRAIN (COUNTY) TO ALLEN CREEK	INTERSECTION OF REVENA BLVD. AND ARBOR VIEW
16	OUTFALL	12"	MARSH/POND (CITY) TO ALLEN CREEK (COUNTY)	NORTH MAPLE SOUTH OF DEXTER
17	DISCHARGE TO ENCLOSED	12"	36" WEST PARK MILLER DRAIN BRANCH #2 TO ALLEN CREEK (COUNTY)	INTERSECTION OF LOIS COURT AND RED OAK ROAD
17	DISCHARGE TO ENCLOSED	12"	36" WEST PARK MILLER DRAIN BRANCH #2 TO ALLEN CREEK (COUNTY)	NORTH OF INTERSECTION OF RED OAK ROAD AND MILLER AVENUE
17	DISCHARGE TO ENCLOSED	12"	54" WEST PARK MILLER DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF ARBOR VIEW AND MAPLE RIDGE
17	DISCHARGE TO ENCLOSED	12"	54" WEST PARK MILLER DRAIN TO ALLEN CREEK (COUNTY)	NORTH OF INTERSECTION OF WILLOW STREET AND NORTH SEVENTH STREET
17	DISCHARGE TO ENCLOSED	12"	66" WEST PARK MILLER DRAIN TO ALLEN CREEK (COUNTY)	SOUTH OF INTERSECTION OF CHAPIN STREET AND MILLER AVENUE
17	DISCHARGE TO ENCLOSED	15"	ALLEN CREEK DRAIN (COUNTY)	WEST OF INTERSECTION OF ASHLEY AND FELCH STREET
17	DISCHARGE TO ENCLOSED	15"	ALLEN CREEK DRAIN (COUNTY)	INTERSECTION OF SUMMIT AND NORTH MAIN
17	DISCHARGE TO ENCLOSED	18"	ALLEN CREEK DRAIN (COUNTY)	CORNER OF NORTH FIRST AND WEST KINGSLEY
17	DISCHARGE TO ENCLOSED	22"	ALLEN CREEK DRAIN (COUNTY)	WEST OF INTERSECTION OF ASHLEY AND FELCH STREET
17	DISCHARGE TO ENCLOSED	24"	36" WEST PARK MILLER DRAIN BRANCH #2 TO ALLEN CREEK (COUNTY)	INTERSECTION OF MAPLE RIDGE AND MILLER AVENUE
17	DISCHARGE TO ENCLOSED	30"	ALLEN CREEK DRAIN (COUNTY)	NORTH OF INTERSECTION OF ASHLEY & FELCH STREET
17	DISCHARGE TO ENCLOSED	36"	36" WEST PARK MILLER DRAIN BRANCH #2 TO ALLEN CREEK (COUNTY)	INTERSECTION OF LOIS COURT AND RED OAK ROAD
17	DISCHARGE TO ENCLOSED	36"	ALLEN CREEK DRAIN (COUNTY)	EAST OF A.A.R.R., NORTH OF MILLER

PART II

INDEX MAP NO.	DESIGNATION	DIA. SIZE	RECEIVING WATER	LOCATION DESCRIPTION
17	DISCHARGE TO ENCLOSED	36"	ALLEN CREEK DRAIN (COUNTY)	MILLER & SPRING STREET
17	DISCHARGE TO ENCLOSED	36"	ALLEN CREEK DRAIN (COUNTY)	DEPOT STREET AND NORTH MAIN
17	OUTFALL	12"	HURON RIVER (STATE)	AT BRIDGE FOR BROADWAY OVER HURON RIVER ON EAST BANK
17	OUTFALL	18"	ARGO POND/HURON RIVER (STATE)	WEST OF LONGSHORE DRIVE, EAST OF ARGO POND
17	OUTFALL	24"	HURON RIVER (STATE)	WEST BANK, SOUTH OF BROADWAY
17	OUTFALL	24"	HURON RIVER (STATE)	WEST BANK, NORTH OF BROADWAY
17	OUTFALL	24"	HURON RIVER (STATE)	WEST BANK, NORTHEAST OF INTERSECTION OF NORTH STATE AND FULLER ROAD
18	OUTFALL	12"	DITCH ALONG A.A. R.R. TO TRAVER CREEK (COUNTY)	NORTHWESTERLY OF ANN ARBOR RAILROAD & PLYMOUTH ROAD
18	OUTFALL	24"	HURON RIVER (STATE)	INTERSECTION OF ISLAND DRIVE COURT & ISLAND DRIVE
18	OUTFALL	30"	HURON RIVER (STATE)	EAST OF NICHOLS DRIVE, SOUTH OF CONSOLIDATED RAILROAD
18	OUTFALL	30"	HURON RIVER (STATE)	INTERSECTION OF WALL STREET AND ISLAND DRIVE
18	OUTFALL	48"	HURON RIVER (STATE)	FULLER ROAD BRIDGE
18	OUTFALL	12"	TRAVER CREEK DRAIN (COUNTY)	NORTHWEST OF INTERSECTION OF JONES DRIVE AND BROADWAY
18	OUTFALL	15"	TRAVER CREEK DRAIN (COUNTY)	CULVERT AT BROADWAY
18	OUTFALL	18"	TRAVER CREEK DRAIN (COUNTY)	NORTH OF MAIDEN LANE COURT, WEST OF ISLAND DRIVE COURT
18	OUTFALL	20"	TRAVER CREEK DRAIN (COUNTY)	CULVERT AT BROADWAY
19	DISCHARGE TO ENCLOSED	30"	MILLER'S CREEK DRAIN (CITY)	GLAZIER WAY EAST OF HURON PARKWAY
19	OUTFALL	12"	MARSH/POND TO MILLER'S CREEK (CITY)	SOUTHERLY INTERSECTION OF SOUTH GREEN ROAD AND FOX HUNT DRIVE
19	OUTFALL	12"	MILLER'S CREEK DRAIN (CITY)	HURON PARKWAY - NORTH OF GLAZIER WAY
19	OUTFALL	12"	MILLER'S CREEK DRAIN (CITY)	SOUTH OF HUBBARD ON HURON PARKWAY
19	OUTFALL	12"	MILLER'S CREEK DRAIN (CITY)	NE CORNER OF GLAZIER WAY AND HURON PARKWAY
19	OUTFALL	12"	MILLER'S CREEK DRAIN (CITY)	HURON PARKWAY SOUTH OF GLAZIER WAY
19	OUTFALL	15"	MILLER'S CREEK DRAIN (CITY)	SOUTH OF HUBBARD ON HURON PARKWAY
19	OUTFALL	15"	MILLER'S CREEK DRAIN (CITY)	SOUTH OF HUBBARD ON HURON PARKWAY
19	OUTFALL	18"	DITCH TO MILLER'S CREEK DRAIN (CITY)	PEPPER PIKE ROAD SOUTH OF ANDOVER ROAD
19	OUTFALL	18"	MILLER'S CREEK DRAIN (CITY)	HUBBARD EAST OF HURON PARKWAY
19	OUTFALL	18"	MILLER'S CREEK DRAIN (CITY)	HURON PARKWAY SOUTH OF GLAZIER WAY
19	OUTFALL	18"	MILLER'S CREEK DRAIN (CITY)	HURON PARKWAY SOUTH OF GLAZIER WAY
19	OUTFALL	24"	MARSH/POND TO MILLER'S CREEK (CITY)	INTERSECTION OF WATERSHED DRIVE & SOUTH GREEN ROAD
19	OUTFALL	24"	MILLER'S CREEK DRAIN (CITY)	HURON PARKWAY - NORTH OF GLAZIER WAY
19	OUTFALL	36"	DITCH TO MILLER'S CREEK DRAIN (CITY)	PEPPER PIKE ROAD SOUTH OF ANDOVER ROAD
19	OUTFALL	36"	MARSH/POND TO MILLER'S CREEK (CITY)	SOUTH OF LAKEHAVEN DRIVE BETWEEN PENINSULA COURT & WATERSEDGE DRIVE
19	OUTFALL	36"	MILLER'S CREEK DRAIN (CITY)	SOUTH OF HUBBARD ON HURON PARKWAY
I 10	OUTFALL	36"	MARSH/POND TO MILLER'S CREEK (CITY)	WEST OF WALDENWOOD
I 10	OUTFALL	36"	MARSH/POND (CITY) TO FLEMING CREEK (COUNTY	WEST OF EARHART ROAD, SOUTH OF RIDGMAAR SQUARE DRIVE
I 10	OUTFALL	15"	DITCH ALONG U.S.23 (MDOT) TO FLEMING CREEK (COUNTY)	INTERSECTION OF KIPLING AND EARHART ROAD
I 10	OUTFALL	24"	DITCH ALONG U.S.23 (MDOT) TO FLEMING CREEK (COUNTY)	NORTH OF INTERSECTION OF EARHART AND GLAZIER WAY
I 10	OUTFALL	30"	DITCH ALONG U.S.23 (MDOT) TO FLEMING CREEK (COUNTY)	INTERSECTION OF KIPLING AND EARHART ROAD
I 10	OUTFALL	30"	DITCH ALONG U.S.23 (MDOT) TO FLEMING CREEK (COUNTY)	EAST OF GREENHILLS DRIVE
J5	OUTFALL	21"	SECOND SISTER LAKE (COUNTY)	INTERSECTION OF LAKEWOOD AND PARKLAKE
J5	OUTFALL	36"	SISTER LAKES DRAIN (COUNTY)	WEST OF TREGO CIRCLE, NORTH OF LIBERTY ROAD

PART II

INDEX MAP NO.	DESIGNATION	DIA. SIZE	RECEIVING WATER	LOCATION DESCRIPTION
J5	OUTFALL	36" X 60"	SECOND SISTER LAKE (COUNTY)	INTERSECTION OF SUNNY-DOLPH DRIVE AND PARKLAKE
J6	DISCHARGE TO ENCLOSED	12	30" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF STADIUM BOULEVARD AND SHELBY
J6	DISCHARGE TO ENCLOSED	12"	30" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF STADIUM BOULEVARD AND SHELBY
J6	DISCHARGE TO ENCLOSED	12"	54" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF BEMIDJI ROAD AND VIRGINIA
J6	DISCHARGE TO ENCLOSED	12"	54" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF CREST AND BEMIDJI
J6	DISCHARGE TO ENCLOSED	12"	60" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	SOUTH OF CORNER OF BUENA VISTA
J6	DISCHARGE TO ENCLOSED	12"	66" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	PEPPERMILL AND DARTMOOR ROAD
J6	DISCHARGE TO ENCLOSED	12"	60" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF IVYWOOD & DARTMOOR ROAD
J6	DISCHARGE TO ENCLOSED	12"	60" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF PEPPERMILL AND DARTMOOR ROAD
J6	DISCHARGE TO ENCLOSED	15"	36" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF THALER AND CAROLINA
J6	DISCHARGE TO ENCLOSED	18"	36" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	EAST OF STADIUM BOULEVARD, SOUTH OF LIBERTY
J6	DISCHARGE TO ENCLOSED	18"	54" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF ARBORDALE & IVYDALE
J6	DISCHARGE TO ENCLOSED	21"	30" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF STADIUM BOULEVARD AND WINEWOOD
J6	DISCHARGE TO ENCLOSED	21"	36" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF STADIUM & ARBORDALE
J6	DISCHARGE TO ENCLOSED	24"	30" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF STADIUM BOULEVARD AND SHELBY
J6	DISCHARGE TO ENCLOSED	24"	54" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF BEMIDJI ROAD AND VIRGINIA
J6	DISCHARGE TO ENCLOSED	30"	54" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	INTERSECTION OF BEMIDJI AND MONTGOMERY
J6	DISCHARGE TO ENCLOSED	66"	72" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	SOUTH OF GLENDALE, NORTH OF WEST LIBERTY
J6	OUTFALL	21" TO OPEN DITCH	MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	THALER EAST OF GARDEN CIRCLE
J6	OUTFALL	24"	MARSHPOND (CITY) TO ALLEN CREEK (COUNTY)	SOUTH OF WEST LIBERTY, WEST OF HICKORY
J6	OUTFALL	24"	MARSHPOND (CITY) TO ALLEN CREEK (COUNTY)	SOUTH OF WEST LIBERTY, WEST OF HICKORY
J6	OUTFALL	24"	MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	DRAINING INTO OPEN AREA NORTHEAST CORNER OF JACKSON AND MAPLE
J6	OUTFALL	24"	MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	EAST OF MAPLE ROAD, SOUTH OF WEST LIBERTY
J6	OUTFALL	30"	MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	EAST OF MAPLE ROAD, SOUTH OF WEST LIBERTY
J6	OUTFALL	36" TO OPEN DITCH	MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	THALER EAST OF GARDEN CIRCLE
J7	DISCHARGE TO ENCLOSED	12"	66" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	THIRD STREET 1/2 WAY BETWEEN HURON STREET AND WASHINGTON STREET
J7	DISCHARGE TO ENCLOSED	12"	66" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	WASHINGTON STREET EAST OF MURRAY STREET
J7	DISCHARGE TO ENCLOSED	12"	66" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	HURON STREET, EAST OF THIRD STREET, WEST OF ALLEN CREEK
J7	DISCHARGE TO ENCLOSED	12"	ALLEN CREEK DRAIN (COUNTY)	JEFFERSON STREET, EAST OF ASHLEY
J7	DISCHARGE TO ENCLOSED	15"	ALLEN CREEK DRAIN (COUNTY)	INTERSECTION OF SOUTH MAIN AND MADISON
J7	DISCHARGE TO ENCLOSED	15"	ALLEN CREEK DRAIN (COUNTY)	SOUTH MAIN, JUST NORTH OF ANN ARBOR RAILROAD
J7	DISCHARGE TO ENCLOSED	18"	60" MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	SEVENTH STREET AND MURRAY COURT
J7	DISCHARGE TO ENCLOSED	24"	ALLEN CREEK DRAIN (COUNTY)	WASHINGTON STREET, EAST OF THIRD STREET, WEST OF A.A.R.R.
J7	DISCHARGE TO ENCLOSED	24"	ALLEN CREEK DRAIN (COUNTY)	HURON STREET, EAST OF THIRD STREET, WEST OF A.A.R.R.
J7	DISCHARGE TO ENCLOSED	24"	ALLEN CREEK DRAIN (COUNTY)	WILLIAM STREET BETWEEN ASHLEY STREET AND FIRST
J7	DISCHARGE TO ENCLOSED	24"	ALLEN CREEK DRAIN (COUNTY)	INTERSECTION OF FIRST AND LIBERTY
J7	DISCHARGE TO ENCLOSED	27"	ALLEN CREEK DRAIN (COUNTY)	JEFFERSON STREET, EAST OF ASHLEY
J7	DISCHARGE TO ENCLOSED	36"	ALLEN CREEK DRAIN (COUNTY)	INTERSECTION OF SOUTH MAIN AND MADISON
J7	DISCHARGE TO ENCLOSED	36"	ALLEN CREEK DRAIN (COUNTY)	INTERSECTION OF HILL AND GREEN
J7	DISCHARGE TO ENCLOSED	39"	ALLEN CREEK DRAIN (COUNTY)	INTERSECTION OF SOUTH MAIN AND MADISON
J7	DISCHARGE TO ENCLOSED	48"	ALLEN CREEK DRAIN (COUNTY)	INTERSECTION OF HILL AND GREEN, EAST OF A.A.R.R.

PART II

INDEX MAP NO.	DESIGNATION	DIA. SIZE	RECEIVING WATER	LOCATION DESCRIPTION
J7	DISCHARGE TO ENCLOSED	54"	ALLEN CREEK DRAIN (COUNTY)	FROM EBERWHITE DRAIN, NORTH OF LIBERTY STREET, WEST OF A.A.R.R.
J8		18"	24" GEDDES AVENUE DRAIN TO HURON RIVER (STATE)	INTERSECTION OF GEDDES, HILL, AND AWIXA
J8	DISCHARGE TO ENCLOSED	15"	24" GEDDES AVENUE DRAIN TO HURON RIVER (STATE)	INTERSECTION OF GEDDES, HILL, AND AWIXA
J8	DISCHARGE TO ENCLOSED	15"	24" GEDDES AVENUE DRAIN TO HURON PIVER (STATE)	INTERSECTION OF AWIXA AND ORCHARD HILLS DRIVE
J8	OUTFALL	12"	MARSH/DITCH TO HURON RIVER (STATE)	EAST OF WASHINGTON HEIGHTS
J8	OUTFALL	12"	MARSH/DITCH TO HURON RIVER (STATE)	NORTHEAST OF RIDGEWAY
J8	OUTFALL	12"	MARSH/DITCH TO HURON RIVER (STATE)	EAST OF NICHOLS DRIVE
J8	OUTFALL	18"	MARSH/DITCH TO HURON RIVER (STATE)	NORTH OF HARVARD
J9	DISCHARGE TO ENCLOSED	12"	MILLER'S CREEK DRAIN (CITY)	HURON PARKWAY NEAR HERITAGE DRIVE
J9	DISCHARGE TO ENCLOSED	12"	MILLER'S CREEK DRAIN (CITY)	HURON PARKWAY NORTH OF HERITAGE DRIVE
J9	OUTFALL	12"	MARSH/POND (CITY)TO HURON RIVER (STATE)	SOUTH OFF ONAWAY PLACE
J9	OUTFALL	15"	MARSH/POND TO MILLER'S CREEK (CITY)	FOX HUNT DRIVE
J9	OUTFALL	15"	MILLER'S CREEK DRAIN (CITY)	INTERSECTION OF HURON PARKWAY AND GEDDES ROAD
J9	OUTFALL	18"	MILLER'S CREEK DRAIN (CITY)	NORTH AND EAST OF GEDDES OFF HURON PARKWAY
J9	OUTFALL	42"	DITCH TO MILLER'S CREEK DRAIN (CITY)	EAST OF HURON PARKWAY
J9	OUTFALL	DITCH	HURON RIVER (STATE)	EAST OF HURON PARKWAY, NORTH OF GEDDES POND, SOUTH OF GEDDES ROAD
J9	OUTFALL	15"	DITCH ALONG PENN CENTRAL RAILROAD TO HURON RIVER (STATE)	RIVERVIEW DRIVE, NORTH OF AUSABLE PLACE
J9	OUTFALL	15"	DITCH ALONG PENN CENTRAL RAILROAD TO HURON RIVER (STATE)	INDIAN RIVER AND RIVERVIEW DRIVE
J9	OUTFALL	DEVONSHIRE OUTLET 54"	HURON RIVER (STATE)	HURON RIVER DRIVE, EAST OF GEDDES ROAD
J9	OUTFALL	DITCH FROM 36" OUTLET S OF ARBORCREST CEMETERY	HURON RIVER (STATE)	AT FULLER ROAD CULVERT, NORTHWEST CORNER OF GEDDES POND
J9	OUTFALL	NORTH CAMPUS DRAIN	HURON RIVER (STATE)	SOUTH OF GEDDES ROAD, 1/2 WAY BETWEEN HURON PARKWAY AND SUMAC LANE
J9	OUTFALL	VINEWOOD OUTLET	HURON RIVER (STATE)	NORTHEAST OF RIVERVIEW DRIVE AND HUNTINGTON PLACE
J10	OUTFALL	15"	MARSH/POND (CITY) TO FLEMING CREEK (COUNTY)	EARHART (WESTSIDE) JUST SOUTH OF PINE BRAE
J10	OUTFALL	36"	MARSH/POND (CITY)TO HURON RIVER (STATE)	WEST AND NORTH OF INTERSECTION OF GREENHILLS AND EARHART
J10	OUTFALL	24"	DITCH ALONG U.S.23 (MDOT) TO FLEMING CREEK (COUNTY)	EAST OF PINEBRAE COURT
J10	OUTFALL	42"	DITCH ALONG U.S.23 (MDOT) TO FLEMING CREEK (COUNTY)	INTERSECTION OF WALDENWOOD AND EARHART
K6	DISCHARGE TO ENCLOSED	12"	48" MURRAY WASHINGTON TO ALLEN CREEK (COUNTY)	WEST OF INTERSECTION OF STADIUM AND PAULINE
K6	DISCHARGE TO ENCLOSED	12"	54" MURRAY WASHINGTON TO ALLEN CREEK (COUNTY)	GOES INTO 54" ON STADIUM BOULEVARD BETWEEN PAULINE BOULEVARD AND ARBORDALE
K6	DISCHARGE TO ENCLOSED	12"	54" MURRAY WASHINGTON TO ALLEN CREEK (COUNTY)	GOES INTO 54" ON STADIUM BOULEVARD BETWEEN PAULINE BOULEVARD AND ARBORDALE
K6	DISCHARGE TO ENCLOSED	24"	42" MURRAY WASHINGTON TO ALLEN CREEK (COUNTY)	WEST OF INTERSECTION OF STADIUM AND PAULINE
K6	OUTFALL	12"	DITCH TO MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	NORTHWEST OFF STEPHEN TERRACE
K6	OUTFALL	12"	DITCH TO MALLET'S CREEK (COUNTY)	WEST END OF CAROL DRIVE
K6	OUTFALL	15"	DITCH TO MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	NORTH OFF RUNNYMEDE
K6	OUTFALL	15"	DITCH TO MURRAY WASHINGTON DRAIN TO ALLEN CREEK (COUNTY)	WEST END OF SUFFOLK AVENUE
K7	DISCHARGE TO ENCLOSED	12"	MALLET'S CREEK (COUNTY)	INTERSECTION OF STADIUM AND GOLDEN
K7	DISCHARGE TO ENCLOSED	15"	MALLET'S CREEK (COUNTY)	INTERSECTION OF STADIUM AND GOLDEN
K7	DISCHARGE TO ENCLOSED	18"	MALLET'S CREEK (COUNTY)	INTERSECTION OF HENRY AND GOLDEN
K7	DISCHARGE TO ENCLOSED	18"	MALLET'S CREEK (COUNTY)	INTERSECTION OF BROOKLYN AND GOLDEN
K7	DISCHARGE TO ENCLOSED	20"	MALLET'S CREEK (COUNTY)	INTERSECTION OF ROSE AND GOLDEN AVENUE
K7	DISCHARGE TO ENCLOSED	22"	MALLET'S CREEK (COUNTY)	INTERSECTION OF GRANGER AND GOLDEN AVENUE

PART II

INDEX MAP NO.	DESIGNATION	DIA. SIZE	RECEIVING WATER	LOCATION DESCRIPTION
K7	DISCHARGE TO ENCLOSED	24"	ALLEN CREEK DRAIN (COUNTY)	SOUTH OF INTERSECTION OF HOOVER AVENUE & ANN ARBOR RAILROAD
K7	DISCHARGE TO ENCLOSED	24"	ALLEN CREEK DRAIN (COUNTY)	INTERSECTION OF HOOVER AVENUE AND ANN ARBOR RAILROAD
K7	DISCHARGE TO ENCLOSED	30"	MALLETS CREEK (COUNTY)	INTERSECTION OF HENRY AND GOLDEN
K7	DISCHARGE TO ENCLOSED	39"	MALLETS CREEK (COUNTY)	INTERSECTION OF GRANGER AND GOLDEN AVENUE
K7	DISCHARGE TO ENCLOSED	42"	MALLETS CREEK (COUNTY)	INTERSECTION OF GRANGER AND GOLDEN AVENUE
K7	DISCHARGE TO ENCLOSED	48"	ALLEN CREEK DRAIN (COUNTY)	EAST OF U OF M BUS GARAGE & ANN ARBOR RAILROAD
K7	DISCHARGE TO ENCLOSED	53 X 83"	ALLEN CREEK DRAIN (COUNTY)	INTERSECTION OF HOOVER AVENUE AND ANN ARBOR RAILROAD
K7	DISCHARGE TO ENCLOSED	OPEN DITCH FROM 60"	ALLEN CREEK DRAIN (COUNTY)	INTERSECTION OF ANN ARBOR RAILROAD & STADIUM BLVD.
K9	DISCHARGE TO ENCLOSED	15"	CULVERT/DITCH TO HURON RIVER (STATE)	HURON PARKWAY WEST OF WOODLAND DRIVE
K9	OUTFALL	12"	CULVERT TO MARSH/POND (CITY) TO MALLETS CREEK (COUNTY)	HURON PARKWAY WEST OF MALLORY DRIVE
K9	OUTFALL	15"	MARSH/POND (CITY) TO MALLETS CREEK (COUNTY)	HURON PARKWAY EAST OF MILLS COURT
K9	OUTFALL	30"	MARSH/POND (CITY) TO THE HURON RIVER (STATE)	EAST OF PROVINCIAL DRIVE
K9	OUTFALL	36"	DITCH TO HURON RIVER (STATE)	NORTH SIDE OF HURON RIVER DRIVE EAST OF ELMWOOD
K9	OUTFALL	42"	MARSH/POND (CITY) TO THE HURON RIVER (STATE)	EAST OF HUNTING VALLEY
K9	OUTFALL	12"	MALLETS CREEK (COUNTY)	EAST OF STONEHAVEN COURT
K9	OUTFALL	15"	MALLETS CREEK (COUNTY)	EAST OF MILLS COURT
K9	OUTFALL	18"	MALLETS CREEK (COUNTY)	EAST OF STONEHAVEN COURT
L8	DISCHARGE TO ENCLOSED	12"	MALLETS CREEK (COUNTY)	SOUTH OF WILTSHIRE DRIVE ON BLANEY DRIVE
L8	DISCHARGE TO ENCLOSED	12"	MALLETS CREEK (COUNTY)	ON CHURCHILL BETWEEN AMESBURY AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	12"	MALLETS CREEK (COUNTY)	SOUTH OF WILTSHIRE DRIVE ON BLANEY DRIVE
L8	DISCHARGE TO ENCLOSED	12"	MALLETS CREEK (COUNTY)	BROOKFIELD DRIVE SOUTH OF NEWBURY COURT
L8	DISCHARGE TO ENCLOSED	15"	MALLETS CREEK (COUNTY)	SOUTH OF WILTSHIRE DRIVE ON STEEPLECHASE DRIVE
L8	DISCHARGE TO ENCLOSED	15"	MALLETS CREEK (COUNTY)	SOUTH OF WILTSHIRE DRIVE ON STEEPLECHASE DRIVE
L8	DISCHARGE TO ENCLOSED	15"	MALLETS CREEK (COUNTY)	NORTH OF NEWBURY COURT BETWEEN DELAWARE AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	15"	MALLETS CREEK (COUNTY)	NORTH OF NEWBURY COURT BETWEEN DELAWARE AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	15"	MALLETS CREEK (COUNTY)	SOUTH SEVENTH BETWEEN DELAWARE AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	15"	MALLETS CREEK (COUNTY)	ON CHURCHILL BETWEEN AMESBURY AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	15"	MALLETS CREEK (COUNTY)	SOUTH SEVENTH BETWEEN DELAWARE AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	15"	MALLETS CREEK (COUNTY)	NORTH OF PICADILLY COURT BETWEEN DELAWARE AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	15"	MALLETS CREEK (COUNTY)	NORTHBROOK DRIVE SOUTH OF SOUTH SEVENTH
L8	DISCHARGE TO ENCLOSED	18"	MALLETS CREEK (COUNTY)	EAST OF MERSHON DRIVE BETWEEN DELAWARE AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	18"	MALLETS CREEK (COUNTY)	MERSHON DRIVE BETWEEN DELAWARE AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	18"	MALLETS CREEK (COUNTY)	EAST OF CHURCHILL BETWEEN AMESBURY AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	18"	MALLETS CREEK (COUNTY)	NORTHBROOK DRIVE SOUTH OF SOUTH SEVENTH
L8	DISCHARGE TO ENCLOSED	42"	MALLETS CREEK (COUNTY)	MERSHON DRIVE BETWEEN DELAWARE AND MOREHEAD
L8	DISCHARGE TO ENCLOSED	66"	MALLETS CREEK (COUNTY)	SOUTH OF WILTSHIRE, EAST OF BLANEY, WEST OF CHURCHILL
L8	DISCHARGE TO ENCLOSED	DITCH	MALLETS CREEK (COUNTY)	WEST OF WILTSHIRE COURT
L8	OUTFALL	12" (PRIVATE)	DITCH ALONG I-94 (MDOT) TO MALLETS CREEK (COUNTY)	INTERSECTION OF ANN ARBOR-SALINE ROAD AND BROOKFIELD DRIVE
L8	OUTFALL	24"	DITCH ALONG I-94 (MDOT) TO MALLETS CREEK (COUNTY)	MAPLE ROAD SOUTH OF TUDOR DRIVE
L8	OUTFALL	48"	DITCH ALONG I-94 (MDOT) TO MALLETS CREEK (COUNTY)	MAPLE ROAD NORTH OF TUDOR DRIVE
L8	OUTFALL	60"	DITCH ALONG I-94 (MDOT) TO MALLETS CREEK (COUNTY)	SCIO CHURCH WEST OF WALTHAM DRIVE

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INDEX MAP NO.	DESIGNATION	DIA. SIZE	RECEIVING WATER	LOCATION DESCRIPTION
L6	OUTFALL	12"	MALLET'S CREEK (COUNTY)	SOUTH OF WORTHINGTON PLACE BETWEEN DELAWARE AND MOREHEAD COURT
L6	OUTFALL	12"	MALLET'S CREEK (COUNTY)	SOUTH OF TILSBY COURT BETWEEN DELAWARE AND MOREHEAD COURT
L6	OUTFALL	15"	MALLET'S CREEK (COUNTY)	NORTH OF THE END OF MOREHEAD COURT
L6	OUTFALL	42"	MALLET'S CREEK (COUNTY)	SOUTH OF INTERSECTION OF LANSWAY & DELAWARE DRIVE
L7	DISCHARGE TO ENCLOSED	36"	COOCH DRAIN TO MALLET'S CREEK (COUNTY)	NORTH OF INTERSECTION OF SOUTH INDUSTRIAL AND ASTOR DRIVE
L7	DISCHARGE TO ENCLOSED	36"	MALLET'S CREEK (COUNTY)	INTERSECTION OF WOODBURY AND ASTOR DRIVE
L7	OUTFALL	15"	MARSH/POND (CITY) TO MALLET'S CREEK (COUNTY)	SOUTHWEST CORNER OF INTERSECTION OF ANN ARBOR SALINE ROAD AND OAKBROOK DR
L7	OUTFALL	15"	MARSH/POND (CITY) TO MALLET'S CREEK (COUNTY)	EAST OF SOUTH STATE STREET AND NORTH OF BOARDWALK DRIVE
L7	OUTFALL	42"	MARSH/POND (CITY) TO MALLET'S CREEK (COUNTY)	SOUTH OF INTERSECTION OF LANS WAY AND DELAWARE COURT
L7	OUTFALL	15"	MALLET'S CREEK (COUNTY)	SOUTH OF END OF DELAWARE COURT
L7	OUTFALL	18"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF ANN ARBOR SALINE ROAD AND OAKBROOK
L7	OUTFALL	24"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF ANN ARBOR SALINE ROAD AND OAKBROOK
L8	DISCHARGE TO ENCLOSED	12"	MALLET'S CREEK (COUNTY)	WEST SIDE OF WEST END OF ROSEWOOD STREET
L8	DISCHARGE TO ENCLOSED	12"	MALLET'S CREEK (COUNTY)	NORTHWEST OF INTERSECTION OF PINE AND ESCH AVENUE
L8	DISCHARGE TO ENCLOSED	12"	MALLET'S CREEK (COUNTY)	WEST SIDE OF WEST END OF JEWETT AVENUE
L8	DISCHARGE TO ENCLOSED	12"	MALLET'S CREEK (COUNTY)	BETWEEN ASTOR DRIVE AND HARPST STREET
L8	DISCHARGE TO ENCLOSED	12"	MALLET'S CREEK (COUNTY)	BETWEEN ASTOR DRIVE AND HARPST STREET
L8	DISCHARGE TO ENCLOSED	15"	MALLET'S CREEK (COUNTY)	SOUTH OF ASTOR DRIVE
L8	DISCHARGE TO ENCLOSED	15"	MALLET'S CREEK (COUNTY)	SOUTH OF ASTOR DRIVE
L8	DISCHARGE TO ENCLOSED	15"	MALLET'S CREEK (COUNTY)	SOUTH OF ASTOR DRIVE
L8	DISCHARGE TO ENCLOSED	18"	MALLET'S CREEK (COUNTY)	WEST OF ESCH AVENUE
L8	DISCHARGE TO ENCLOSED	27"	MALLET'S CREEK (COUNTY)	INTERSECTION OF PINE AND ESCH AVENUE
L8	DISCHARGE TO ENCLOSED	36"	MALLET'S CREEK (COUNTY)	WEST END OF KENSINGTON DRIVE
L8	DISCHARGE TO ENCLOSED	48"	MALLET'S CREEK (COUNTY)	SOUTH OF ASTOR DRIVE
L8	DISCHARGE TO ENCLOSED	60"	MALLET'S CREEK (COUNTY)	WEST END OF HARPST STREET
L8	DISCHARGE TO ENCLOSED	90"	MALLET'S CREEK (COUNTY)	WEST OF INTERSECTION OF TREMMEL AND MARLBOROUGH
L8	OUTFALL	12"	MARSH/POND (CITY) TO MALLET'S CREEK (COUNTY)	EAST OF ST. FRANCIS DRIVE NORTH OF AMELIA PLACE
L9	DISCHARGE TO ENCLOSED	12"	COUNTY FARM DRAIN TO MALLET'S CREEK (COUNTY)	INTERSECTION OF HURON PARKWAY AND WASHTENAW AVENUE
L9	DISCHARGE TO ENCLOSED	12"	COUNTY FARM DRAIN TO MALLET'S CREEK (COUNTY)	INTERSECTION OF HURON PARKWAY AND WASHTENAW AVENUE
L9	DISCHARGE TO ENCLOSED	12"	COUNTY FARM DRAIN TO MALLET'S CREEK (COUNTY)	PLATT ROAD
L9	DISCHARGE TO ENCLOSED	12"	COUNTY FARM DRAIN TO MALLET'S CREEK (COUNTY)	PLATT ROAD
L9	DISCHARGE TO ENCLOSED	15"	COUNTY FARM DRAIN TO MALLET'S CREEK (COUNTY)	INTERSECTION OF HURON PARKWAY AND WASHTENAW AVENUE
L9	DISCHARGE TO ENCLOSED	18"	COUNTY FARM DRAIN TO MALLET'S CREEK (COUNTY)	WEST OF HURON PARKWAY BETWEEN WASHTENAW AND PROFESSIONAL DRIVE
L9	DISCHARGE TO ENCLOSED	21"	COUNTY FARM DRAIN TO MALLET'S CREEK (COUNTY)	INTERSECTION OF HURON PARKWAY AND WASHTENAW AVENUE
L9	OUTFALL	12"	MALLET'S CREEK (COUNTY)	OPPOSITE SIDE OF CREEK - SOUTHEAST OF INTERSECTION OF BEACON HILL & HAMPSHIRE
L9	OUTFALL	12"	MALLET'S CREEK (COUNTY)	EAST OF STONEHAVEN ROAD
L9	OUTFALL	12"	MALLET'S CREEK (COUNTY)	HURON PARKWAY
L9	OUTFALL	12"	MALLET'S CREEK (COUNTY)	HURON PARKWAY
L9	OUTFALL	12"	SWIFT RUN DRAIN (COUNTY)	NORTH OF INTERSECTION OF ELI AND YOST BLVD.
L9	OUTFALL	12"	SWIFT RUN DRAIN (COUNTY)	WEST OF ELI ROAD
L9	OUTFALL	12"	SWIFT RUN DRAIN (COUNTY)	WEST OF ELI ROAD

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INDEX MAP NO.	DESIGNATION	DIA. SIZE	RECEIVING WATER	LOCATION DESCRIPTION
L9	OUTFALL	15"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF CUMBERLAND AVENUE AND HAMPSHIRE ROAD
L9	OUTFALL	15"	SWIFT RUN DRAIN (COUNTY)	EAST OF SALEM COURT
L9	OUTFALL	15"	SWIFT RUN DRAIN (COUNTY)	EAST OF SALEM COURT
L9	OUTFALL	15"	SWIFT RUN DRAIN (COUNTY)	NORTH OF INTERSECTION OF ELI AND YOST BLVD.
L9	OUTFALL	18"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF CANTERBURY AND PLATT
L9	OUTFALL	18"	MALLET'S CREEK (COUNTY)	WEST OF PARKWOOD AVENUE
L9	OUTFALL	18"	MALLET'S CREEK (COUNTY)	WEST OF PARKWOOD AVENUE
L9	OUTFALL	18"	SWIFT RUN DRAIN (COUNTY)	SOUTH OF PINECREST AVENUE
L9	OUTFALL	24"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF CANTERBURY AND PLATT
L9	OUTFALL	24"	MALLET'S CREEK (COUNTY)	SOUTHEAST OF INTERSECTION OF BEACON HILL AND HAMPSHIRE
L9	OUTFALL	24"	MALLET'S CREEK (COUNTY)	EAST OF EXMOOR ROAD
L9	OUTFALL	4' X 4' CULVERT	COUNTY FARM DRAIN TO MALLET'S CREEK (COUNTY)	SOUTH OF INTERSECTION OF ARLINGTON AND WASHTENAW
L9	OUTFALL	42"	MALLET'S CREEK (COUNTY)	WEST OF INTERSECTION OF STRATMOOR AND CHALMERS DRIVE
L9	OUTFALL	42"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF PLATT AND EDGEWOOD DRIVE
L9	OUTFALL	48"	COUNTY FARM DRAIN TO MALLET'S CREEK (COUNTY)	SOUTH OF INTERSECTION OF WASHTENAW AND SHERIDAN
L9	OUTFALL	54"	COUNTY FARM DRAIN TO MALLET'S CREEK (COUNTY)	SOUTH OF WASHTENAW BETWEEN SHERIDAN AND ARLINGTON BLVD.
M6	DISCHARGE TO ENCLOSED	12"	MALLET'S CREEK (COUNTY)	EISENHOWER PARKWAY WEST OF LOHR ROAD
M6	OUTFALL	15"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF EISENHOWER PARKWAY AND LOHR ROAD
M6	OUTFALL	24"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF EISENHOWER PARKWAY AND LOHR ROAD
M7	DISCHARGE TO ENCLOSED	15"	MALLET'S CREEK (COUNTY)	EISENHOWER PARKWAY NORTH OF BRIARWOOD POND 5
M7	DISCHARGE TO ENCLOSED	18"	MALLET'S CREEK (COUNTY)	EISENHOWER PARKWAY NORTH OF BRIARWOOD POND 5
M7	DISCHARGE TO ENCLOSED	21"	MALLET'S CREEK (COUNTY)	BETWEEN BRIARWOOD POND 2 AND POND 3
M7	DISCHARGE TO ENCLOSED	42"	MALLET'S CREEK (COUNTY)	BETWEEN BRIARWOOD POND 2 AND POND 3
M7	OUTFALL	15"	MALLET'S CREEK (COUNTY)	BOARDWALK DRIVE 1/2 WAY BETWEEN EISENHOWER AND VICTORS WAY
M7	OUTFALL	15"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF WAYMARKET AND EISENHOWER
M7	OUTFALL	15"	MALLET'S CREEK (COUNTY)	NORTHWEST OF INTERSECTION OF WAYMARKET AND EISENHOWER
M7	OUTFALL	24"	MALLET'S CREEK (COUNTY)	WEST OF STATE STREET NORTH OF HILTON BLVD.
M7	OUTFALL	24"	MALLET'S CREEK (COUNTY)	NORTH OF INTERSECTION OF MAIN STREET AND OAKBROOK DRIVE
M7	OUTFALL	24"	MALLET'S CREEK (COUNTY)	NORTH OF BRIARWOOD POND 6
M7	OUTFALL	24"	MALLET'S CREEK (COUNTY)	NORTHWEST OF INTERSECTION OF WAYMARKET AND EISENHOWER
M7	OUTFALL	24"	MALLET'S CREEK (COUNTY)	BRIARWOOD POND 2
M7	OUTFALL	30"	MALLET'S CREEK (COUNTY)	BOARDWALK DRIVE 1/2 WAY BETWEEN EISENHOWER AND VICTORS WAY
M7	OUTFALL	30"	MALLET'S CREEK (COUNTY)	NORTH OF INTERSECTION OF MAIN STREET AND OAKBROOK DRIVE
M7	OUTFALL	30"	MALLET'S CREEK (COUNTY)	BRIARWOOD POND 1
M7	OUTFALL	34"	MALLET'S CREEK (COUNTY)	BRIARWOOD POND 1
M7	OUTFALL	38" X 60"	MALLET'S CREEK (COUNTY)	BRIARWOOD POND 1
M7	OUTFALL	38" X 60"	MALLET'S CREEK (COUNTY)	BRIARWOOD POND 4
M7	OUTFALL	48"	MALLET'S CREEK (COUNTY)	NORTH OF INTERSECTION OF SIGNATURE BLVD AND EISENHOWER
M8	DISCHARGE TO ENCLOSED	12"	MALLET'S CREEK (COUNTY)	INTERSECTION OF STONE SCHOOL AND EISENHOWER PARKWAY
M8	DISCHARGE TO ENCLOSED	12"	MALLET'S CREEK (COUNTY)	SOUTH INDUSTRIAL HIGHWAY AND EISENHOWER PARKWAY

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INDEX MAP NO.	DESIGNATION	DIA. SIZE	RECEIVING WATER	LOCATION DESCRIPTION
M8	DISCHARGE TO ENCLOSED	12"	MALLET'S CREEK (COUNTY)	INTERSECTION OF EISENHOWER AND HAYES COURT
M8	DISCHARGE TO ENCLOSED	15"	MALLET'S CREEK (COUNTY)	INTERSECTION OF FARMBROOK COURT AND EISENHOWER PARKWAY
M8	DISCHARGE TO ENCLOSED	18"	MALLET'S CREEK (COUNTY)	INTERSECTION OF LOCKRIDGE DRIVE AND EISENHOWER PARKWAY
M8	DISCHARGE TO ENCLOSED	21"	MALLET'S CREEK (COUNTY)	SOUTH INDUSTRIAL HIGHWAY AND EISENHOWER PARKWAY
M8	DISCHARGE TO ENCLOSED	21"	MALLET'S CREEK (COUNTY)	EISENHOWER PARKWAY 1/2 WAY BETWEEN SOUTH INDUSTRIAL AND HAYES COURT
M8	DISCHARGE TO ENCLOSED	24"	MALLET'S CREEK (COUNTY)	NORTH OF INTERSECTION OF BAYLIS AND DWIGHT
M8	DISCHARGE TO ENCLOSED	42"	MALLET'S CREEK (COUNTY)	INTERSECTION OF STONE SCHOOL AND EISENHOWER PARKWAY
M8	DISCHARGE TO ENCLOSED	42"	MALLET'S CREEK (COUNTY)	INTERSECTION OF KING GEORGE BOULEVARD & EISENHOWER PARKWAY
M8	OUTFALL	15"	MALLET'S CREEK (COUNTY)	SOUTH OF WOODMANOR COURT
M8	OUTFALL	42"	MALLET'S CREEK (COUNTY)	EAST OF HOMESTEAD COMMONS DRIVE
M9	DISCHARGE TO ENCLOSED	18"	SWIFT RUN DRAIN (COUNTY)	EAST OF INTERSECTION OF WHITEWOOD STREET AND NORWOOD
M9	DISCHARGE TO ENCLOSED	24"	SWIFT RUN DRAIN (COUNTY)	WEST OF INTERSECTION OF PITTSVIEW AND PACKARD ROAD
M9	DISCHARGE TO ENCLOSED	24"	SWIFT RUN DRAIN (COUNTY)	NORTH OF PACKARD BETWEEN PITTSFIELD BOULEVARD AND WHITEWOOD STREET
M9	DISCHARGE TO ENCLOSED	48"	SWIFT RUN DRAIN (COUNTY)	WEST OF INTERSECTION OF PITTSVIEW AND PACKARD ROAD
M9	OUTFALL	12"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF RADCLIFFE AND HAMPSHIRE ROAD
M9	OUTFALL	12"	MALLET'S CREEK (COUNTY)	WEST OF REVERE COURT
M9	OUTFALL	12"	SWIFT RUN DRAIN (COUNTY)	LASALLE DRIVE AND SWIFT RUN DRAIN
M9	OUTFALL	12"	SWIFT RUN DRAIN (COUNTY)	CREEK DRIVE AND SWIFT RUN DRAIN
M9	OUTFALL	15"	MALLET'S CREEK (COUNTY)	PACKARD BETWEEN CHESTERFIELD AND NORDMAN
M9	OUTFALL	15"	MALLET'S CREEK (COUNTY)	WEST OF LOOKOUT CIRCLE
M9	OUTFALL	15"	SWIFT RUN DRAIN (COUNTY)	LASALLE DRIVE AND SWIFT RUN DRAIN
M9	OUTFALL	15"	SWIFT RUN DRAIN (COUNTY)	WEST OF BELVIDERE AND CREEK DRIVE
M9	OUTFALL	18"	SWIFT RUN DRAIN (COUNTY)	CREEK DRIVE AND SWIFT RUN DRAIN
M9	OUTFALL	24"	SWIFT RUN DRAIN (COUNTY)	WEST OF BELVIDERE AND CREEK DRIVE
M9	OUTFALL	24"	SWIFT RUN DRAIN (COUNTY)	FERNWOOD AVENUE AND SWIFT RUN DRAIN
M9	OUTFALL	30"	SWIFT RUN DRAIN (COUNTY)	WEST OF BRANDYWINE DRIVE BETWEEN DONEGAL COURT AND GALLAWAY COURT
M9	OUTFALL	36"	MALLET'S CREEK (COUNTY)	PACKARD BETWEEN CHESTERFIELD AND NORDMAN
M9	OUTFALL	36"	SWIFT RUN DRAIN (COUNTY)	INTERSECTION OF PLATT AND VERLE
M9	OUTFALL	36"	SWIFT RUN DRAIN (COUNTY)	EAST OF INTERSECTION OF MARSHALL STREET AND VERLE AVENUE
M9	OUTFALL	42"	MALLET'S CREEK (COUNTY)	PACKARD BETWEEN CHESTERFIELD AND NORDMAN
M9	OUTFALL	48"	SWIFT RUN DRAIN (COUNTY)	INTERSECTION OF PLATT AND VERLE
M9	OUTFALL	54"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF TOWNER BOULEVARD & HAMPSHIRE ROAD
N8	DISCHARGE TO ENCLOSED	21"	MALLET'S CREEK (COUNTY)	SOUTH OF INTERSECTION OF NORTH RESEARCH PARK DRIVE AND RESEARCH PARK DRIVE
N8	OUTFALL	18"	MALLET'S CREEK (COUNTY)	PHOENIX DRIVE AND PITTSFIELD ANN ARBOR DRAIN BRANCH C
N8	OUTFALL	18"	MALLET'S CREEK (COUNTY)	PHOENIX DRIVE AND PITTSFIELD ANN ARBOR DRAIN BRANCH C
N8	OUTFALL	22" X 34"	MALLET'S CREEK (COUNTY)	WEST OF STONE SCHOOL ROAD SOUTH OF PARTRIDGE PATH
N8	OUTFALL	30"	MALLET'S CREEK (COUNTY)	VARSITY DRIVE AND PITTSFIELD ANN ARBOR DRAIN BRANCH C
N8	OUTFALL	30"	MALLET'S CREEK (COUNTY)	EAST OF INTERSECTION OF PHOENIX AND VARSITY DRIVE
N8	OUTFALL	48"	MALLET'S CREEK (COUNTY)	AT ANN ARBOR RAILROAD BETWEEN RESEARCH PARK DRIVE AND PHOENIX DRIVE
N9	OUTFALL	21"	SWIFT RUN DRAIN (COUNTY)	ELLSWORTH CULVERT
N9	OUTFALL	36"	SWIFT RUN DRAIN (COUNTY)	SOUTH OF INTERSECTION OF BRAEBURN CIRCLE AND ELLSWORTH
N9	OUTFALL	54"	SWIFT RUN DRAIN (COUNTY)	EAST OF BRAEBURN CIRCLE SOUTH OF I-94

HURON RIVER 2013 SRF PROJECT PLAN

PREPARED FOR

Huron River Green Infrastructure Drainage District

APPENDIX E
TMDLs

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER DIVISION
SEPTEMBER 2004

TOTAL MAXIMUM DAILY LOAD FOR PHOSPHORUS IN FORD AND BELLEVILLE LAKES

Location:

Ford and Belleville Lakes are impoundments of the Huron River, located in Washtenaw and Wayne Counties (see Figure 2 in Kosek, 1996 [attached]; and Figure 4 in Brenner and Rentschler, 1996 [attached]).

Pollutant:

Total Phosphorus.

Summary:

These lakes receive high nutrient loadings, causing severe water quality problems, most notably nuisance algae blooms. In 1991, Ford Lake suffered a September algae bloom so severe that a hazardous material response team was summoned to investigate the "green paint spill." At the September 1987 meeting of the Water Resources Commission, the state of Michigan established a goal of 30 micrograms per liter (µg/L) phosphorus concentration for Belleville Lake as part of an effort to restore designated uses of the lake. The Michigan Department of Environmental Quality (MDEQ) has determined that a 50 µg/L phosphorus concentration must be met going into Ford Lake during the period of April-September (the algae growing season) in order to achieve the 30 µg/L goal for Belleville Lake. Other impoundments along this section of the Huron River watershed are expected to benefit from the reduced phosphorus as well.

The MDEQ has developed the loading capacity for both lakes based on the phosphorus concentration goal established for Belleville Lake (Kosek, 1996). This loading capacity will be used to determine the Total Maximum Daily Load (TMDL) and associated National Pollutant Discharge Elimination System (NPDES) permit limits for all involved point source dischargers, and also to determine the magnitude of the phosphorus reductions necessary from other sources. As part of a watershed 104(b)(3) grant from the United States Environmental Protection Agency (USEPA), the local communities have been involved in the process of developing an implementation plan for these reductions (Brenner and Rentschler, 1996).

TMDL Development:

The phosphorus concentration is the critical variable in this system, since it is the limiting nutrient for algae growth in these short retention time lakes. If the total phosphorus concentration going into Ford Lake can be kept at or below 50 µg/L in April-September, then the lakes should respond by decreasing the algae growth to nonnuisance levels and Belleville Lake should meet its 30 µg/L goal. Therefore, the loading capacity is expressed as a phosphorus concentration of 50 µg/L at the Michigan Avenue bridge on the Huron River (just upstream of Ford Lake) for the months of April through September (see Table 13 in Kosek, 1996).

Phosphorus load, though related to the concentration, will vary with flow. Figure 1 shows graphically how the load varies with flow, with the monthly average loads indicated on the line. In order to decrease present loadings (represented by 1995 data in Figures 1 and 2) to the

loading capacity levels, it will be necessary to reduce phosphorus loads from both point and nonpoint sources. The wasteload allocations (WLAs) and load allocations (LAs) were calculated for each month (Table 1).

Table 1. WLAs and LAs for the Ford and Belleville Lakes TMDL for Phosphorus.

	WLA/LA by Month (lb/d)					
	APR	MAY	JUN	JUL	AUG	SEP
TMDL	304	214	139	88	74	103
Ann Arbor WWTP	150	60	60	50	50	60
Chelsea WWTP	9.5	2.2	2.2	1.8	1.8	2.2
Dexter WWTP	3.0	0.9	0.9	0.8	0.8	0.9
Loch Alpine WWTP	1.5	0.6	0.6	0.5	0.5	0.6
Chrysler-Chelsea	0.5	0.3	0.3	0.3	0.3	0.3
Other Point Sources[a]	1.5	1.7	1.7	1.7	1.7	1.7
Total Point Source WLA	166	66	66	55	55	66
Nonpoint Source LA	91	100	61	29	19	37
Remaining	47	48	12	4	0	0

[a]There are 12 minor point source dischargers in the watershed area of interest. For more details, see Brenner and Rentschler, 1996.

TMDL implementation consists of reducing point and nonpoint source loads to the levels presented in Table 1. Communities would gradually implement phosphorus reduction activities over a five-year period. A Section 319 grant proposal has been submitted to provide funding for the implementation of a local information and education campaign, which has been developed. Lake and river sampling will continue in order to monitor how well the reductions are being achieved.

Calculations:

LA:

Due to the highly variable nature of nonpoint source loads, the development of the LA was complex. The general concept used to develop the LA for the nonpoint sources was to subtract the amount of reduction from watershed-specific best management practices from the current nonpoint source loads. A detailed land use study was performed to determine the maximum reductions possible through extensive use of best management practices tailored to the land uses in the middle Huron River watershed. Best management practices based on the specific area and type of land use in each subwatershed basin would reduce the nonpoint source load by as much as 58% (Brenner and Rentschler, 1996). The maximum usage of the most effective best management practices is recommended.

Since the TMDL corresponds to a constant concentration at various flows, allowable loads are best expressed as a linear equation (Figure 1). The average flows for the period of record for each month were used to calculate the TMDL loads by month. Several of the critical months in 1995 deviated from the average flows for the period of record. Rather than use the unusually high or low loadings that were calculated for these months in 1995, "expected" nonpoint source

loads under current point and nonpoint source management practices were calculated for each month (except April) based on the average flow for the period of record. These calculations were based on a linear regression of the measured loads and flow conditions for each month in 1995 (Figure 2). A summary of the nonpoint source load calculations is presented in Table 2. Current "expected" conditions are highlighted in bold in Table 2.

The nonpoint source load allocations are equal to a 57% reduction from current "expected" nonpoint source loads in April and a 58% reduction from current "expected" nonpoint source loads in May-September.

WLA:

Phosphorus load restrictions are not needed to protect these lakes during the months of October through March, since algae growth does not occur at those times and the water will be flushed out of the lakes before the algae growing season starts. The limit of 1 milligram per liter (mg/L) would be retained in the point source permits during the months of October through March for the purposes of Great Lakes protection.

The critical algae growing season begins in May. Therefore, allowing some time of passage and cycling of phosphorus through the system, reductions in the phosphorus loadings need to begin in April. The point sources will be expected to operate in such a manner so as not to exceed the allocated waste loads. Options to meeting the allocated waste loads will include permit requirements to 1) meet the individual WLA in Table 1; 2) meet the aggregate total point source WLA in Table 1; or 3) enter into a Cooperative Agreement to meet the point source WLA in Table 1 for phosphorus. It is left to each facility to determine the exact dynamics of the concentration and flow rates used to meet these loadings at the respective plants.

Late snowmelt and spring rains usually cause high flow conditions in April, so the phosphorus concentrations remain relatively low despite higher loading rates. Therefore, the point source WLA for April incorporates larger loadings (166 lb/d) and serves as a transitional period between the unrestricted winter loads and the stringent summer loads. The loading rate of 166 lb/d approximates concentrations of 0.6 mg/L phosphorus at the design flows of the point sources. For the months of May, June, and September, the WLA among the point sources drops to 66 lb/d (Table 2), which approximates concentrations of 0.4 mg/L phosphorus at the current flows of the wastewater treatment plants. For the months of July and August, the WLA among the point sources is reduced to 55 lb/d (Table 2). Please note that the loads for July and August are less than those proposed in the phosphorus reduction strategy developed by the local stakeholders (see Table 14 in Brenner and Rentschler, 1996).

Table 2. Information Used to Calculate WLAs and LAs.

	LA by Month (lb/d)					
	APR	MAY	JUN	JUL	AUG	SEP
TMDL	304	214	139	88	74	103
1995 Total Load	246	319	244	211	331	85
"Expected" Load	304	336	223	145	123	168
1995 Point Sources	92	97	77	78	86	80
Ann Arbor WWTP	150	60	60	50	50	60
Chelsea WWTP	9.5	2.2	2.2	1.8	1.8	2.2
Dexter WWTP	3.0	0.9	0.9	0.8	0.8	0.9
Loch Alpine WWTP	1.5	0.6	0.6	0.5	0.5	0.6
Chrysler-Chelsea	0.5	0.3	0.3	0.3	0.3	0.3
Other Point Sources[a]	1.5	1.7	1.7	1.7	1.7	1.7
Total Point Source WLA	166	66	66	55	55	66
1995 Nonpoint Sources	155	223	159	99	122	46
"Expected" Nonpoint Sources[b]	212	239	146	68	46	87
Nonpoint Source LA	91	100	61	29	19	38
Remaining	47	48	12	4	0	0

[a]There are 12 minor dischargers in the watershed area of interest. For more details, see Brenner and Rentschler, 1996.

[b]For April-June, using respective 1995 point source loads. For July-September, using 77 lb/d point source load. For all months, using "expected" loads as totals.

References:

Kosek, S. 1996. A Phosphorus Loading Analysis and Proposed TMDL for Ford and Belleville Lakes, Washtenaw and Wayne Counties, December 1994-November 1995. MDEQ Report No. MI/DEQ/SWQ-96/005.

Brenner, A. and P. Rentschler. 1996. The Middle Huron Initiative: A Total Maximum Daily Load Analysis for the Middle Portion of the Huron River Watershed. Huron River Watershed Council.

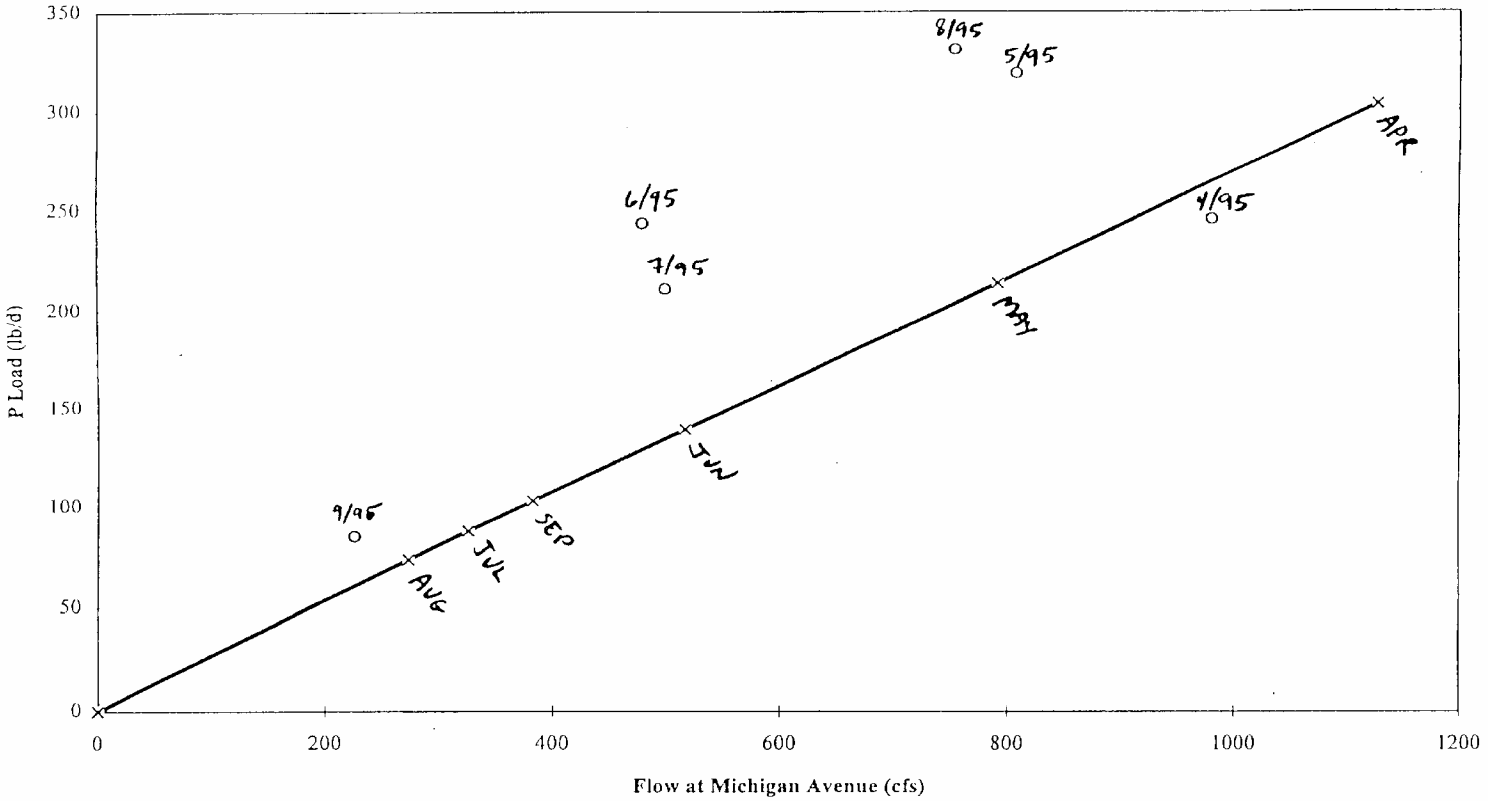

Figure 1: HRWI TMDL and 1995 data relative to average flow.

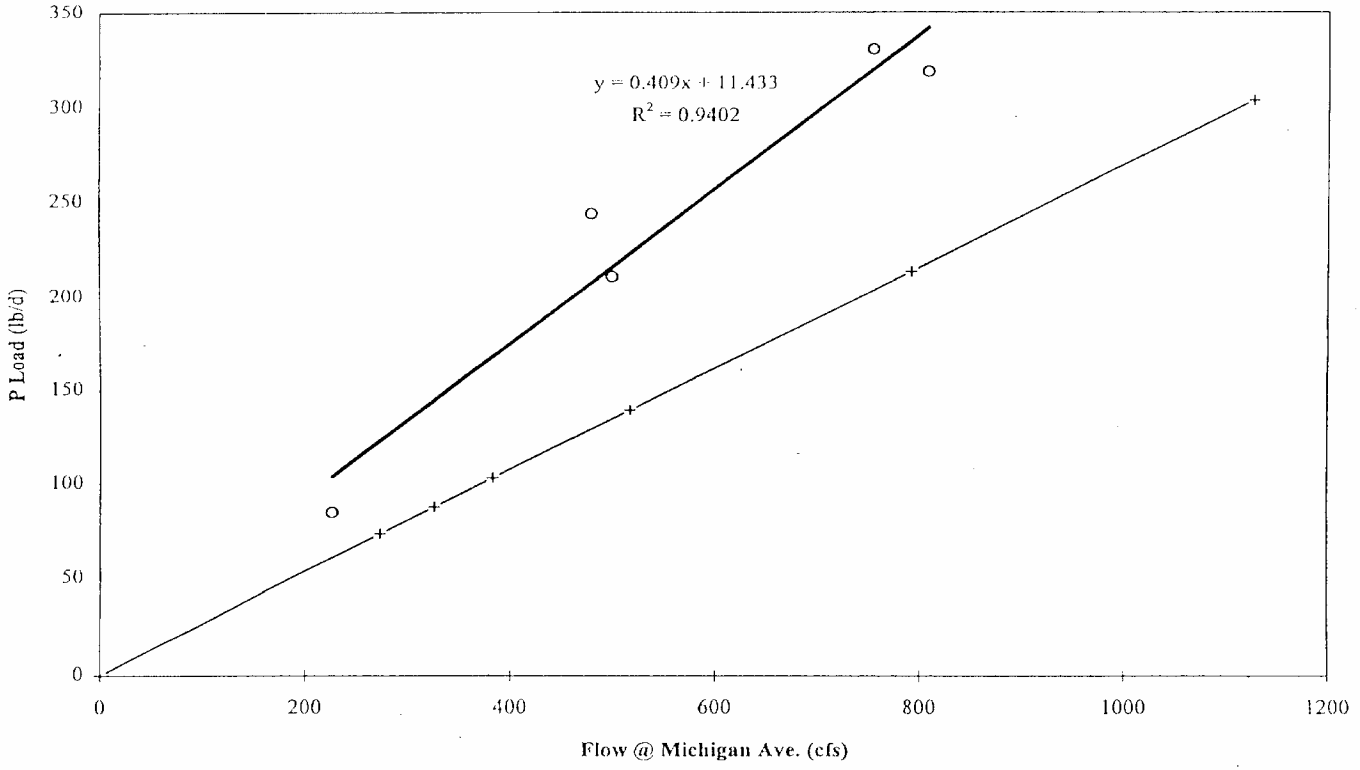

Figure 2: Huron River TMDL and 1995 data relative to average flow. Linear regression line and equation for calculation of "expected" total load.

HRWILOAD.XLS

Michigan Department of Environmental Quality
Surface Water Quality Division
August 2001

Total Maximum Daily Load for *Escherichia Coli* in Geddes Pond, Huron River, Washtenaw County

INTRODUCTION

Section 303(d) of the federal Clean Water Act and the United States Environmental Protection Agency's (USEPA's) Water Quality Planning and Management Regulations (40 Code of Federal Regulations Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for waterbodies that are not meeting Water Quality Standards (WQS). The TMDL process establishes the allowable loadings of pollutants for a water body based on the relationship between pollution sources and in-stream water quality conditions. TMDLs provide states a basis for determining the pollutant reductions necessary from both point and nonpoint sources to restore then maintain the quality of their water resources. This TMDL follows the phased approach due to inherent uncertainties in estimating loading from nonpoint sources. Under the phased approach, load allocations and wasteload allocations are calculated using the best available data and information, recognizing the need for additional monitoring data to determine if the load reductions required by the TMDL lead to attainment of WQS. The phased approach provides for the implementation of the TMDL while additional data are collected to reduce uncertainty.

As part of the TMDL development, a support document was developed (Limno-Tech, Inc., 2000). This document contains background information about the listed waterbody, known water quality data, and source assessment. The TMDL was developed based on this support document and additional information, including a site visit by the Michigan Department of Environmental Quality (MDEQ) in December 2000 (Thelen, 2001).

PROBLEM STATEMENT

This TMDL addresses approximately five miles of the Huron River near Ann Arbor where recreational uses are impaired by elevated levels of pathogens. Michigan's Section 303(d) list (Creal and Wuycheck, 2000) cites the upstream terminus as Geddes Avenue and the downstream terminus as the Geddes Dam at Dixboro Road. However, based on a December 19, 2000 site visit by the MDEQ (Thelen, 2001), the upstream boundary was extended to Argo Dam (Figure 1) for TMDL development to include an important recreational area at the confluence of Allen Creek with the Huron River. The TMDL reach is on the Section 303(d) list as:

Waterbody: **Huron River (Geddes Pond)** WBID#: **061203B**
County: Washtenaw RF3RchID: 4090005 9 Size: 2 M
Location: Geddes Pond Dam u/s to Geddes Avenue.
Status: **2** Problem: **Pathogens (Rule 100).**
TMDL YEAR(s): 2000

The Huron River (Geddes Pond) was placed on the Section 303(d) list due to impairment of recreational uses by the presence of elevated levels of pathogens. Most of the data collection efforts in the listed reach were made in the early to middle 1980s. More than 500 samples were collected in Lower Geddes Pond for fecal coliform analysis in the1980s, but less than 100 samples were collected in the 1990s. Samples for *Escherichia coli (E. coli)*, the pathogen of concern, were collected in the 1980s, but not in the 1990s. Despite the sparse data available,

some general trends in bacterial concentration can be made over time. Lower Geddes Pond has consistently exhibited the highest bacteria concentrations among all Huron River reaches in the Ann Arbor area. Historical exceedances of state standards and high bacteria counts were common in the 1970s, 1980s, and 1990s, although improvements have been made since the peaks of the 1980s (Limno-Tech, Inc., 2000).

NUMERIC TARGETS

The impaired designated use for the Huron River at this location is total body contact. Rule 100 of the Michigan WQS requires that this waterbody be protected for total body contact recreation from May 1 to October 31. The target levels for this designated use are the ambient *E. coli* standards established in Rule 62 of the WQS as follows:

> R 323.1062 Microorganisms.
> Rule 62. (1) All waters of the state protected for total body contact recreation shall not contain more than 130 *Escherichia coli (E. coli)* per 100 milliliters, as a 30-day geometric mean. Compliance shall be based on the geometric mean of all individual samples taken during 5 or more sampling events representatively spread over a 30-day period. Each sampling event shall consist of 3 or more samples taken at representative locations within a defined sampling area. At no time shall the waters of the state protected for total body contact recreation contain more than a maximum of 300 *E. coli* per 100 milliliters. Compliance shall be based on the geometric mean of 3 or more samples taken during the same sampling event at representative locations within a defined sampling area.

For this TMDL, the WQS of 130 per 100 milliliters (ml) as a 30-day geometric mean is the target level for the TMDL reach from May 1 to October 31. Wet and dry weather geometric mean concentrations from the 1980s show *E. coli* concentrations higher for Geddes Pond than for any part of the Huron River immediately upstream. Wet weather fecal coliform data for three decades of sampling in Geddes Pond showed the geometric mean concentration at 436 per 100 ml in the 1980s, with an observed maximum of 110,000 per 100 ml. For dry weather, the fecal coliform geometric mean peaked at 104 per 100 ml, with an observed maximum of 120,000 per 100 ml. Geddes Pond is also the receiving water for three direct tributaries (Millers Creek, Malletts Creek and Swift Run Creek), plus Traver Creek and Allen Drain immediately upstream. Observed fecal coliform counts in these tributaries in the 1980s ranged from 1,515 per 100 ml to 19,840 per 100 ml as a wet weather geometric mean. Maximum wet weather counts in the 1980s for Malletts Creek were 740,000 per 100 ml (Limno-Tech, Inc., 2000).

SOURCE ASSESSMENT

Potential pathogen sources for this waterbody include sources typically associated with urban and suburban runoff because the immediate watershed is primarily comprised of these land types.

Municipalities in the Huron River watershed include the city of Ann Arbor, the University of Michigan (U-M), Ann Arbor Township, Northfield Township, Pittsfield Township, Lodi Township, Scio Township, Ypsilanti Township, and Superior Township. Table 1 shows the distribution of land for each subwatershed in the listed reach of the Huron River.

Table 1. Distribution of land for each subwatershed in the listed reach of the Huron River.

	Subwatershed Area (sq. mi)	Percentage of Land Area in Subwatershed	Percentage of Immediate Watershed
Allen Creek			
City of Ann Arbor	4.0	90	
University of Michigan	0.43	10	
Total area	4.43	100	13
Traver Creek			
City of Ann Arbor	3.3	45	
University of Michigan	0.072	1	
Ann Arbor Township	3.8	52	
Northfield Township	0.17	2	
Total area	7.342	100	22
Millers Creek			
City of Ann Arbor	2.4	67	
University of Michigan	1.2	33	
Ann Arbor Township	0.0028	0.0007	
Total area	3.6028	100	11
Mallets Creek			
City of Ann Arbor	7.6	68	
University of Michigan	0.42	3.7	
Pittsfield Township	2.5	23	
Ann Arbor Township	0.017	0.2	
Lodi Township	0.43	3.8	
Scio Township	0.1403	1.3	
Total area	11.1073	100	32
Swift Run			
City of Ann Arbor	1.9	35	
Pittsfield Township	2.7	50	
Ann Arbor Township	0.69	13	
Superior Township	0.09	1.6	
Ypsilanti Township	0.021	0.4	
Total area	5.401	100	16
Direct Drainage			
City of Ann Arbor	1.8	82	
University of Michigan	0.39	18	
Total area	2.19	100	6
TOTAL	**34.0731**		**100**

Further source evaluation indicates that bacteria loads from a large part of Ann Arbor enter Geddes Pond via the storm water system. Bacteria loads are also delivered to Geddes Pond by tributaries that drain a large portion of Ann Arbor. Other potential pathogen sources for Geddes Pond include upstream inputs, illicit sewer connections, pet and wildlife feces, and a small number of on-site wastewater treatment systems (septic systems) (Limno-Tech, Inc., 2000).

LINKAGE ANALYSIS

The link between the *E. coli* concentration in the Huron River and the identified sources on the tributaries is the basis for the development of the TMDL. The linkage is defined as the cause and effect relationship between the selected indicators and the identified sources. This provides the basis for estimating the total assimilative capacity of the river and any needed load reductions. For this TMDL, the primary loading of pathogens enters the Huron River directly through the tributaries and storm sewers within the listed reach. Given the low level of *E. coli* in the Huron River upstream of the listed reach, the guiding water quality management principle used to develop the TMDL was that compliance with the numeric pathogen target in the Huron River depended on pathogen control in the tributaries and storm sewers. If the pathogen inputs to the tributaries and storm sewers could be controlled, then total body contact recreation in the Huron River would be protected.

TMDL DEVELOPMENT

The TMDL represents the maximum loading that can be assimilated by the waterbody while still achieving WQS. As indicated in the Numeric Targets section, the target for this pathogen TMDL is the WQS of 130 *E. coli* per 100 ml. Concurrent with the selection of a numeric concentration endpoint, TMDL development also defines the environmental conditions that will be used when defining allowable levels. Many TMDLs are designed around the concept of a "critical condition." The critical condition is defined as the set of environmental conditions that, if controls are designed to protect, will ensure attainment of objectives for all other conditions. For example, the critical conditions for the control of point sources in Michigan are given in R 323.1090. In general, the lowest monthly 95% exceedance flow is used to address aquatic life concerns. However, bacteria sources to the Huron River in the listed reach arise from a mixture of dry and wet weather-driven sources, and there is no single critical condition that is protective for all other conditions. In addition, for most pollutants, TMDLs are expressed on a mass loading basis (e.g., pounds per day). For *E. coli* indicators, however, mass is not an appropriate measure, and the USEPA allows pathogen TMDLs to be expressed in terms of organism counts (or resulting concentration). Therefore, this pathogen TMDL is concentration-based consistent with R 323.1062 and the TMDL is equal to the target concentration of 130 *E. coli* per 100 ml.

The majority of the land (67%) in the Geddes Pond watershed falls under the jurisdictions of the city of Ann Arbor and the University of Michigan (U-M) (Table 2). These entities now have National Pollutant Discharge Elimination System (NPDES) required storm water permits. Other municipalities in the watershed will soon be considered to have permits in Phase 2 of the storm water permitting program. These storm water permits provide a mechanism for controlling bacterial loads to Geddes Pond and a structure for source characterization efforts. Therefore, this TMDL categorizes allowable loads by subwatershed and storm water permit holders, where applicable.

Table 2. Distribution of land in immediate Geddes Pond Watershed by Government Entity.

Government Entity	Number of Sq. Miles	Percent of Total Watershed
Ann Arbor	21	62.0
Pittsfield Township	5.2	15.3
Ann Arbor Township	4.5	13.3
University of Michigan	2.5	7.4
Lodi Township	0.43	1.3
Scio Township	0.14	0.4
Superior Township	0.09	0.2
Ypsilanti Township	0.021	0.1
TOTAL	**33.881**	**100.0**

Because bacteria loads originate from a number of different locations, there is not a single unique loading capacity that will ensure compliance with WQS. Rather, there are a large number of different allowable levels that will all ensure compliance, as long as they are distributed properly throughout space.

For this TMDL, an allocation strategy has been selected that assumes equal bacteria loads per unit area for all lands within the watershed. The allocation process for each month of the recreational season (May through October) is outlined below.

1. This TMDL is concentration-based so the TMDL is equal to the pathogen WQS of 130 *E. coli* per 100 ml.

2. All surface tributaries (not enclosed) are required to comply with the WQS of 130 *E. coli* per 100 milliliter (ml) as a monthly average. This requirement applies to Traver Creek, Millers Creek, Malletts Creek, and Swift Run Creek.

3. For the enclosed tributaries, the daily maximum WQS of 300 *E. coli* per 100 ml shall apply as a monthly average. The enclosed tributaries of the watershed are Allen Creek and the direct drainage area. Based on a December 19, 2000 MDEQ site visit (Thelen, 2001), it was determined that the confluence of Allen Creek with the Huron River represents an important recreational area. By maintaining the concentration of 300 *E. coli* per 100 ml in Allen Creek, any area of WQS exceedance in the Huron River will be minimized.

4. The average *E. coli* concentration in Barton Pond was determined to be 10 *E. coli* per 100 ml and was used as background. To confirm the background concentration, a sampling station was added upstream of Argo Dam. This station is downstream of Barton Pond, but upstream of the listed reach of the Huron River.

5. If surface tributaries meet the monthly average of 130 *E. coli* per 100 ml, the enclosed tributaries meet a monthly average of 300 *E. coli* per 100 ml and background levels do not significantly increase, then total body contact recreation for the Huron River will be met.

Consistent with the allocation strategy, Table 3 shows the allowable concentrations for each of the subwatersheds of the listed reach of the Huron River.

Table 3. Allowable *E. coli* Concentrations for the Subwatersheds of the Huron River.

	May	June	July	August	September	October
	Monthly Average *E. coli* Concentration (per 100 ml)					
Allen Creek	300	300	300	300	300	300
Traver Creek	130	130	130	130	130	130
Millers Creek	130	130	130	130	130	130
Malletts Creek	130	130	130	130	130	130
Swift Run Creek	130	130	130	130	130	130
Direct drainage	300	300	300	300	300	300

ALLOCATIONS

TMDLs are comprised of the sum of individual wasteload allocations (WLAs) for point sources, and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, that accounts for uncertainty in the relation between pollutant loads and the quality of the receiving water body. Conceptually, this definition is denoted by the equation:

$$TMDL = \sum WLAs + \sum LAs + MOS$$

The term TMDL represents the maximum loading that can be assimilated by the receiving water while still achieving WQS. The overall loading capacity is subsequently allocated into the TMDL components of WLAs for point sources, LAs for nonpoint sources, and the MOS. As previously indicated, this pathogen TMDL will not be expressed on a mass loading basis and is concentration-based consistent with EPA regulations at 40 CFR 130.2(1).

WLAs

There are about 10 permitted non-storm water point source discharges within the listed reach. However, none of these have applied for or reported discharges of *E. coli.* Therefore, the WLA for this TMDL is equal to zero.

LAs

The primary sources of bacteria in the watershed consist of urban runoff from lands under the jurisdiction of two entities that have municipal storm water permits, the city of Ann Arbor and the U-M (see Figure 1 and Table 2). Runoff from lands in Pittsfield Township is also included and the township will soon be required to have a permit in Phase 2 of the storm water permitting program. While runoff from these entities is or will be covered by NPDES permits, it was still considered under the LA category because of the diffuse nature of the sources.

A small portion of land in the watershed does not fall under the jurisdiction of existing (or soon to be developed) storm water permits. This includes lands in Ann Arbor, Northfield, Lodi, Scio, Superior, and Ypsilanti Townships. Runoff from these lands is also included in the LA category.

Because this TMDL is concentration-based, the determination of individual LAs will be based on the assumption of equal bacteria loads per unit area for all lands within the watershed. Therefore, the relative responsibility for achieving the necessary reductions of bacteria and maintaining acceptable conditions in the subwatersheds will be determined by the amount of land under the jurisdiction of the various local units of governments within each of the subwatersheds. Table 1 gives the relative LAs by subwatershed for each of the local entities. The percentage of land within the subwatersheds for each of the local units of government gives a clear indication of the relative amount of effort that will be required by each entity to restore and maintain the total body contact designated use to this reach of the Huron River.

The government entity with the largest percent land area in the Geddes Pond watershed is Ann Arbor. The City of Ann Arbor makes up a majority of the Allen Creek, Millers Creek, Malletts Creek and Direct Drainage subwatersheds and is the second largest government entity in the Traver Creek subwatershed next to Ann Arbor Township. Pittsfield Township contains the largest percentage of land area in the Swift Run Creek subwatershed (see Tables 1 and 2).

The upstream sources of *E. coli* entering the listed reach must also be included in the LA category. Measurements of *E. coli* have been made in Barton Pond. The average concentration determined from these measurements was 10 *E. coli* per 100 ml. The TMDL assumes that the upstream boundary concentration will remain consistent at all river flows.

MOS

This section addresses the incorporation of a MOS in the TMDL analysis. The MOS accounts for any uncertainty or lack of knowledge concerning the relationship between pollutant loading, water quality and knowledge of continuous point sources of *E. coli*. The MOS can be either implicit (i.e., incorporated into the TMDL analysis thorough conservative assumptions) or explicit (i.e., expressed in the TMDL as a portion of the loadings). This TMDL uses an implicit MOS through the establishment of a substantial reserved allocation in the Huron River. Conservative assumptions in the development of the TMDL included the surface tributaries meeting the monthly average WQS of 130 *E. coli* per 100 ml; the enclosed tributaries meeting a monthly average of 300 *E. coli* per 100 ml; and the background conditions equaling 10 *E. coli* per 100 ml. Given these assumptions and the much larger flow in the Huron River compared to the tributaries, the pathogen WQS will be met in the listed reach with a substantial MOS or reserved allocation. The example loading assessment, given below, demonstrates that the magnitude of the MOS can also be estimated under any chosen flow scenario.

Example Loading Assessment

Although this TMDL is concentration-based, an example calculation using counts per day was used to simulate a loading assessment. The TMDL, on a loading basis, can be calculated as a function of stream flow using the following equation:

$$TMDL = Q_{riv,x} \times C_{WQS}$$

Where:

TMDL = Loading capacity in the river (counts per time).
$Q_{riv,x}$ = River flow (volume of water per time).
C_{WQS} = WQS concentration (counts per volume of water).

The loading capacity defined in the above equation applies to all river flows for which WQS apply. It must be noted that the loading capacity in the TMDL reach is directly dependent upon the upstream loads (because they directly affect C_x).

The monthly average flows for the Huron River and tributaries from May through October are given in Table 4 and were used to demonstrate the relative magnitude of allowable loads from the various units of government for one flow scenario.

Table 4. Huron River and Tributary Average Flows (cfs) Used to Calculate Loading.

Waterbody	May	June	July	August	September	October
Huron River	606	403	243	183	216	268
Allen Creek	4.45	3.49	1.78	1.34	1.58	1.97
Traver Creek	1.87	1.25	0.75	0.57	0.67	0.83
Millers Creek	2.92	1.94	1.17	0.88	1.04	1.29
Mallets Creek	6.55	4.35	2.62	1.98	2.33	2.89
Swift Run Creek	1.01	0.67	0.4	0.31	0.36	0.45
direct drainage	1.31	1.15	0.53	0.4	0.47	0.58

Using the previously stated conditions from the allocation strategy, the allocations based on average flow conditions were determined using the following process:

1. For the Huron River and each tributary, the allowable concentrations were converted to allowable loads.

2. LAs were determined for each local entity based on the relative areas of jurisdiction within each subwatershed. These results are given in Table 5.

3. The background levels of *E. coli* for the Huron River were converted to loads and are given in Table 6.

4. The Huron River flows used in the calculations were based on United States Geological Survey gage data of statistical monthly means for the years 1915-1997. The gage is located 4.2 miles upstream of Geddes Dam on the Huron River at Wall Street in Ann Arbor, Michigan.

The results of the loading assessment for the listed reach of the Huron River under average flow conditions are given in Table 7. The assessment shows that if the LAs are met, the TMDL will not be exceeded in the Huron River for each month of the recreational season. It also demonstrates the relative magnitude of the reserved allocation or MOS for each month.

Table 5. Load Allocations for Huron River Tributaries for Average Flow (relative loading units*)

	Watershed Area (sq. mi)	May	June	July	August	September	October
****Allen Creek**							
City of Ann Arbor	4.0	29.7	23.4	11.7	8.9	10.4	13.0
University of Michigan	0.43	3.3	2.6	1.3	1.0	1.2	1.4
Total LA	4.43	33.0	26.0	13.0	9.8	11.6	14.4
Traver Creek							
City of Ann Arbor	3.3	2.65	1.80	1.08	0.81	0.94	1.17
University of Michigan	0.072	0.06	0.04	0.02	0.02	0.02	0.03
Ann Arbor Township	3.8	3.05	2.07	1.24	0.93	1.09	1.35
Northfield Township	0.17	0.14	0.09	0.06	0.04	0.05	0.06
Total LA	7.342	5.9	4.0	2.4	1.8	2.1	2.6
Millers Creek							
City of Ann Arbor	2.4	6.20	4.13	2.46	1.86	2.19	2.73
University of Michigan	1.2	3.10	2.06	1.23	0.93	1.10	1.36
Ann Arbor Township	0.0028	0.01	0.01	0.01	0.01	0.01	0.01
Total LA	3.6028	9.3	6.2	3.7	2.8	3.3	4.1
Mallets Creek							
City of Ann Arbor	7.6	14.23	9.44	5.68	4.31	5.06	6.29
University of Michigan	0.42	0.79	0.52	0.31	0.24	0.28	0.35
Pittsfield Township	2.5	4.68	3.11	1.87	1.42	1.67	2.07
Ann Arbor Township	0.017	0.03	0.02	0.01	0.01	0.01	0.01
Lodi Township	0.43	0.81	0.53	0.32	0.24	0.29	0.36
Scio Township	0.1403	0.26	0.17	0.10	0.08	0.09	0.12
Total LA	11.1073	20.8	13.8	8.3	6.3	7.4	9.2
Swift Run							
City of Ann Arbor	1.9	1.13	0.74	0.46	0.35	0.39	0.49
Pittsfield Township	2.7	1.60	1.05	0.65	0.50	0.54	0.70
Ann Arbor Township	0.69	0.41	0.27	0.17	0.13	0.14	0.18
Superior Township	0.09	0.05	0.03	0.02	0.01	0.02	0.02
Ypsilanti Township	0.021	0.01	0.01	0.01	0.01	0.01	0.01
Total LA	5.401	3.2	2.1	1.3	1.0	1.1	1.4
****Direct Drainage**							
City of Ann Arbor	1.8	7.89	6.90	3.21	2.38	2.79	3.53
University of Michigan	0.39	1.71	1.50	0.69	0.52	0.61	0.77
Total LA	2.19	9.6	8.4	3.9	2.9	3.4	4.3
TOTAL LA		**81.8**	**60.5**	**32.6**	**24.6**	**28.9**	**36.0**

* Relative Loading Units = *E. coli* concentration (130 counts/100 ml) x River flow (cfs) x (10 x .646 x 3.785) / 10^3
** Allen creek and Direct Drainage use *E. coli* concentration of 300 counts/100 ml

Table 6. Background Loads of *E. coli* for the Huron River (relative loading units)*.

May	June	July	August	September	October
150	99	59	45	53	66

*relative loading unit = *E. coli* concentration (10 cts/100ml) x River flow (cfs) x (10 x .646 x 3.785)/10^3

Table 7. TMDL including LAs, WLAs, and MOS for the Huron River, May to October 31 (relative loading units).*

	May	June	July	August	September	October
WLA	0	0	0	0	0	0
LA	231.8	159.5	91.6	69.6	81.9	102
MOS (reserved allocation)	1694.2	1121.5	680.4	512.4	605.1	750
TOTAL LOAD	1926	1281	772	582	687	852

*relative loading unit = *E. coli* concentration (130 cts/100ml) x River flow (cfs) x (10 x .646 x 3.785)/10^3

SEASONALITY

Seasonality in the TMDL is addressed by expressing the TMDL in terms of a total body contact recreation season that is defined as May 1 through October 31 by Rule 100 of the WQS. There is no total body contact during the remainder of the year primarily due to cold weather. In addition, because this is a concentration based TMDL, WQS will be met regardless of flow conditions in the applicable season.

MONITORING

As previously discussed, this TMDL was developed following a phased approach. First, needed reductions of pollutant loads were estimated. Next, water quality will be monitored to determine the effectiveness of reductions. Recommended monitoring includes sample collection from all five tributaries (Swift Run Creek, Mallets Creek, Millers Creek, Traver Creek, and Allen Creek) at stations 1, 2, 3, 5, and 6 (Figure 1). One upstream location (station 7, Figure 1), as well as one location in Geddes Pond (station 4, Figure 1) will be sampled. Sampling will also include one wet and dry weather event. Initially, in May 2001 each station will be sampled five times. Subsequent sampling from June through September will be based on data collected in May. If sampling in May 2001 indicates WQS are exceeded, sampling will be oriented toward source identification. If sampling indicates WQS are met, sampling frequency will be increased to determine if WQS are met.

In future years, assuming WQS are not met immediately, sampling frequency will be once per month from May through September at all seven locations. Sampling will be adjusted as needed to assist in continued source identification and elimination. When these results indicate that the waterbody may be meeting WQS, sampling will be conducted at the appropriate frequency to determine if the 30-day geometric mean value of 130 *E. coli* per 100 ml is being met.

REASONABLE ASSURANCE ACTIVITIES

Urban storm water runoff is likely the dominant source of *E. coli* to Geddes Pond. Implementation activities to meet the TMDL require measures to reduce *E. coli* sources and loads. These measures will include activities that are already required of the NPDES municipal storm water permitees within the watershed. These permits have been in place since 1996, allowing the permittees several years to initiate quality programs. Currently, the city of Ann Arbor, Michigan Department of Transportation, and the U-M hold NPDES municipal storm water permits.

The city of Ann Arbor's NPDES municipal storm water permit contains several general requirements that, when implemented, could help reduce the delivery of pathogens to Geddes Pond. The permit requires a plan for effective elimination of illicit discharges and prohibition of illicit discharges. The permit requires that all catch basins be mapped and regularly cleaned. Effective storm water management in areas of redevelopment and new development is required. A public education program on storm water management and impacts of storm water pollution is also required.

The city of Ann Arbor is actively pursuing all of the above requirements and has an ongoing storm drain examination program that includes cross-connection searches. Some ordinances have been changed to require more storm water management in new developments. They have an active public education program that has been developed in cooperation with the Huron River Watershed Council.

The Ann Arbor campus of U-M also has an NPDES storm water permit. The U-M has developed the required storm water management program that contains several elements that could help reduce the delivery of pathogens to local waters and eventually to Geddes Pond on the Huron River. The U-M's permit essentially requires the same management activities as the city of Ann Arbor's NPDES permit, including illicit discharge elimination, pollution prevention, and public education.he U-M is actively meeting the permit requirements. For example, for illicit connections, the U-M campus is divided into a grid system and each grid is routinely tested for illicit connections.

When the Phase 2 storm water requirements are applicable, other municipalities in the watershed will also be considered for an NPDES municipal storm water permit. These permits will likely require activities that reduce pathogen inputs, similar to those in the city of Ann Arbor and U-M storm water permits.

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August 10, 2001

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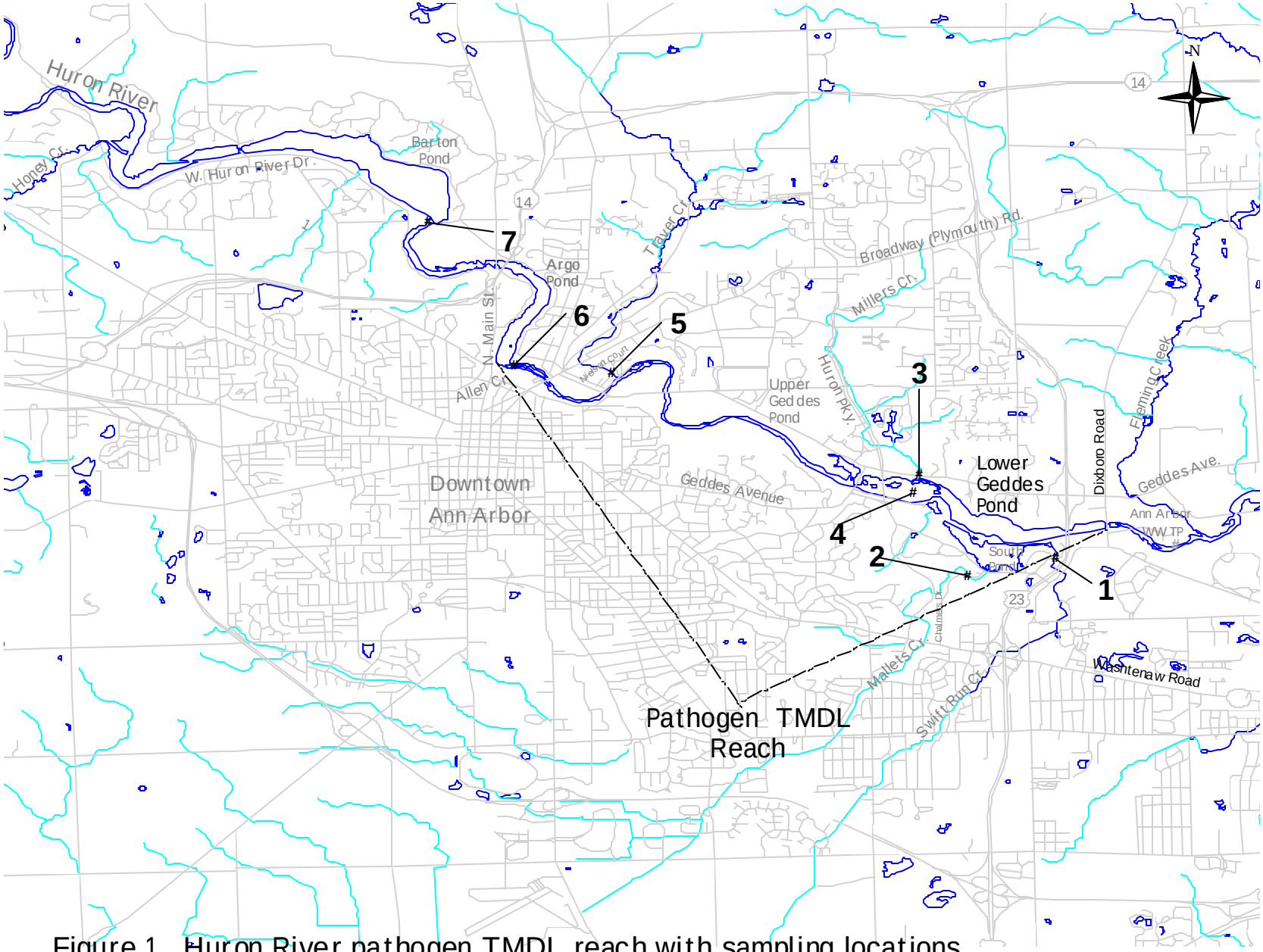
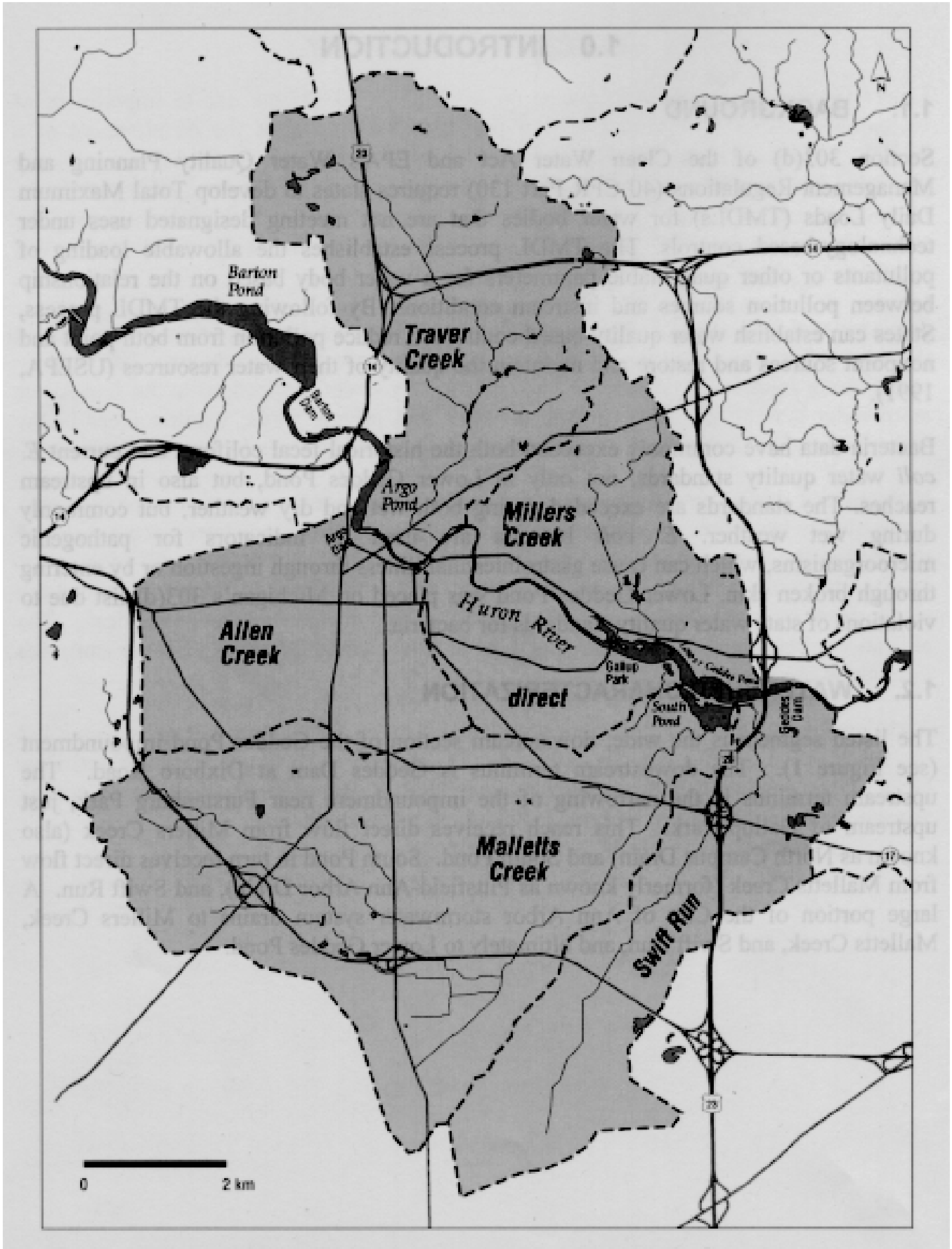


Figure 1. Huron River pathogen TMDL reach with sampling locations.

Figure 2. Subwatersheds in the Huron River TMDL listed reach.



Michigan Department of Environmental Quality

Water Division

August 2004

Total Maximum Daily Load for Biota for Malletts Creek
Washtenaw County

INTRODUCTION

Section 303(d) of the federal Clean Water Act (CWA) and the United States Environmental Protection Agency's (USEPA's) Water Quality Planning and Management Regulations (Title 40 of the Code of Federal Regulations, Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for water bodies that are not meeting Michigan's Water Quality Standards (WQS). The TMDL process establishes the allowable loads of a pollutant to a water body based on the relationship between pollutant sources and in-stream water quality conditions. TMDLs provide states a basis for determining the pollutant reduction necessary from both point and nonpoint sources (NPS) to restore and maintain the quality of their water resources. The purpose of this TMDL is to identify appropriate actions to achieve the fish and macroinvertebrate community targets and habitat quality targets, specifically a reduction in sediment loadings from sources in the Malletts Creek watershed that will result in WQS attainment. This TMDL follows the phased approach, due to inherent uncertainties in deriving numeric targets and estimating loading from NPS. Under the phased approach, load allocations (LAs) and waste load allocations (WLAs) are calculated using the best available data and information, recognizing the need for additional monitoring data to determine if the load reductions required by the TMDL lead to attainment of the WQS. The phased approach provides for the implementation of the TMDL while additional data are collected to reduce uncertainty.

PROBLEM STATEMENT

The TMDL reach of Malletts Creek, a warmwater designated water body tributary to the Huron River at South Pond Park, is located in Washtenaw County in the vicinity of Ann Arbor (Figure 1). The impaired designated uses (Rule 100 of the Michigan WQS) include the lack of support of acceptable communities of warmwater fish and other aquatic life (macroinvertebrate) communities. This condition served as the basis for placing Malletts Creek on Michigan's Section 303(d) list of impaired water bodies requiring the development of a TMDL. The TMDL reach is about two miles in length and is identified on the Section 303(d) list (Creal and Wuycheck, 2002) as follows:

MALLETTS CREEK WBID#: **061203I**
County: WASHTENAW HUC: 04090005 Size: 2 M
Location: Huron River confluence u/s to Packard Road.
Problem: **Fish and macroinvertebrate communities rated poor.**
TMDL YEAR(s): 2004 RF3RchID: 4090005 499

This document represents the basis for the development of a biota TMDL that focuses on the

restoration of the biological communities of the impacted perennial reach of Malletts Creek in order to meet Michigan's WQS.

The headwater reach of Malletts Creek upstream of the Brown Park Pond dam is classified by the United States Geological Survey (USGS) as intermittent. Malletts Creek is classified by the USGS as perennial from Brown Park Pond Dam downstream to the Huron River confluence. Within the two-mile biota TMDL reach, habitat impairment is attributed to unstable flow regimes, reduced bank stability, bank erosion, sedimentation, and reduced stream quality due to excessive runoff/washoff throughout this highly urbanized watershed.

The TMDL reach was based on the August 1997, Michigan Department of Environmental Quality's (MDEQ's) Procedure 51, biological community assessment findings for Malletts Creek (Wuycheck, 2003). The Procedure 51 fish community assessments involve the evaluation of ten metrics with a score and rating system as follows: a score range of 5 to 10 is rated excellent; a score range of 4 to -4 is rated acceptable; and a score range of -5 to -10 is rated poor. The macroinvertebrate community assessments involve the evaluation of nine metrics with a score and rating system as follows: a score range of 5 to 9 is rated excellent; a score range of 4 to -4 is rated acceptable; and a score range of -5 to -9 is rated poor. A poor-rated macroinvertebrate community characterized the stream at Packard Road and a poor-rated fish community characterized the community upstream of Chalmers Road (Figure 1). The fish community was rated acceptable (-2) at East Eisenhower Parkway in the headwaters of the watershed, but poor (-7) at Chalmers Road located approximately 0.1 mile upstream of the Huron River confluence at South Pond Park. Additional Procedure 51 macroinvertebrate community assessments conducted in August 2002 and September 2003, at Scheffler Park (located between Platt Road and Washtenaw Road off Edgewood Drive) and Chalmers Road, indicated acceptable macroinvertebrate community scores of -3 and -1; and -3 and -2, respectively.

Procedure 51 habitat quality assessments involve the evaluation of ten metrics with a scoring and rating system as follows: a habitat score less than 56 is rated poor, 56 to 104 is rated marginal, 105 to 154 is rated good and a score greater than 154 (with a maximum of 200 points) is rated excellent. Habitats at two stations (Packard Road and Chalmers Road) in August 1997, were rated good (slightly impaired) based on scores of 83 and 93, respectively, based on the 1997 version of Procedure 51. The August 2002 and September 2003, habitat scores and ratings, using the May 2002, updated Procedure 51 habitat assessment protocol for sites at Scheffler Park (Edgewood Drive) and Chalmers Road were 141 and 150 in 2002; and 131 and 135 in 2003, respectively. This indicates that, overall, the habitats assessed were rated good. However, scores for the individual metric categories of flow stability and bank stability were generally 50 percent or less than their maximum potential scores indicating unstable habitat conditions in Malletts Creek. Similar scores were recorded for these same metrics during the August 2002, biological assessments of Malletts Creek at Scheffler Park (downstream of Platt Road) and Chalmers Road.

Biological community assessments by the Huron River Watershed Council (HRWC) volunteers characterized the macroinvertebrate communities at Scheffler Park and Chalmers Road as poor in the spring of 2003 (HRWC, 2003). The differences between the MDEQ and HRWC biological community assessment results may be attributed to assessment procedure used and/or seasonal differences.

Total suspended solids (TSS) monitoring in the Malletts Creek watershed was conducted during

the months of June, July, and August 2003, by Limno-Tech, Incorporated (LTI), as part of a Clean Michigan Initiative (CMI)-funded monitoring program. The assessment was prompted by MDEQ staff concern about the impact of excessive sedimentation on habitat quality and, therefore, the biological community. The project, requested by the MDEQ, required monitoring at least twice during the survey period to characterize background TSS concentrations during dry weather, stable flow conditions and to monitor at least three wet weather runoff events to assess increases in stream TSS during these events. Effort was directed towards sampling TSS during the rise and fall of the Malletts Creek hydrograph in response to a rainfall/runoff event of 0.1 inches or greater. Survey results (LTI, 2003b) indicated average background, stable, base flow TSS concentrations at Chalmers Road of 5 to 10 milligrams per liter (mg/l). Precipitation events of 1.22, 0.61, and 1.02 inches on June 21, August 1 through August 2, and August 12, 2003, resulted in maximum (average) in-stream TSS concentrations of 460 mg/l (257mg/l), 130 mg/l (95 mg/l), and 1276 mg/l (572 mg/l), respectively. This information indicates that precipitation runoff/washoff events in the watershed substantially increase the amount of TSS in transport in Malletts Creek. In-stream flows measured at the USGS gage (#04174518) during the three wet weather event monitoring dates show increases from 1.6 to 178 cubic feet per second (cfs); 1.7 to 60 cfs, and 2 to 205 cfs, respectively, demonstrating substantial flow responses to precipitation events observed.

Municipal and commercial site storm water runoff/washoff associated with the numerous storm water outfalls within the Malletts Creek watershed are considered the most probable sources of unstable habitat conditions and associated impacts to aquatic life. The primary contributors to poor stream quality include excessive runoff/washoff, stream bank erosion, elevated runoff volumes, flow extremes (both lows and highs), and runoff rates from substantial areas of impervious surfaces in this highly urbanized/commercialized watershed that cause flashy, unstable flow conditions. These factors result in severe stream bank erosion; sediment induced erosivity of both habitat and colonizing organisms; and siltation and sedimentation of biologically important and desirable habitat. Reductions in storm sewer runoff rates and solids loads from both commercial and municipal storm water runoff sites, along with reduced stream bank erosion through more stable flow management are necessary to reduce impacts on the aquatic life.

NUMERIC TARGETS

The impaired designated use for Malletts Creek is aquatic life. Michigan's WQS require, as a minimum, the protection of a variety of designated uses, including aquatic life (Rule 100(1)(f)). The fish and macroinvertebrate communities of Malletts Creek are impacted due to habitat impairment and instability due to excessive bank erosion, sedimentation, and unstable flow extremes. Achievement of WQS for the aquatic life designated use is to be demonstrated via assessments of the integrity of the fish and macroinvertebrate community and habitat quality.

The primary numeric targets involve the use of Michigan's biological community and habitat quality assessment Procedure 51 (MDEQ, 1997 and 1998). The biota TMDL target is to establish both a fish community and macroinvertebrate community with acceptable, reproducible scores, each equal to or greater than -4 (acceptable). Both fish and macroinvertebrate communities will be evaluated based on a minimum of two Procedure 51 biological assessments to be conducted in successive years. The assessments would follow the implementation of Best Management Practices (BMPs) intended to stabilize flow extremes, bank erosion, and sediment loadings to the subject TMDL reach.

The Procedure 51 stream habitat quality assessment procedure has been revised and will also be used (MDEQ, 2002). A target habitat score equal to or greater than 130 is provided to assure protection of habitat conditions and minimized impairment to habitat. This is consistent with current acceptable scores for the habitats assessed at Scheffler Park and Chalmers Road. This level of conservation is appropriately high enough to minimize both temporal and spatial variability within the watershed and provide a buffer for the variability within the macroinvertebrate and habitat assessment protocol.

A secondary numeric target established to improve habitat conditions is for TSS. TSS measurements will be used to further assess improvements in Malletts Creek. The secondary goal is represented by a mean annual, in-stream TSS concentration target of 80 mg/l to characterize wet weather runoff/washoff events. This secondary numeric target may be overridden by achievement of the biological and habitat numeric targets. However, if the TSS numeric target is achieved, but the biota or habitat numeric targets are not achieved, then the TSS target may have to be reevaluated. Achievement of the secondary numeric target will help guide proper control over NPS of excessive suspended solids loads from runoff, as well as the runoff discharge rates and instantaneous runoff volumes that affect increased stream flow instability, stream bank erosion, and increased suspended solids concentrations.

The mean annual target concentration of 80 mg/l TSS is based on a review of existing conditions and published literature on the effects of TSS. Vohs et al., (1993) indicated that chemically inert TSS of 100 mg/l appears to separate those streams with a fish population from those without. The European Inland Fisheries Advisory Commission stated that in the absence of other pollution, a fishery would not be harmed at suspended solids concentrations less than 25 mg/l. Good to moderate fisheries can be found at 25 to 80 mg/l TSS; good fisheries were unlikely to be found at 80 to 400 mg/l, while only poor fisheries are typically found at 400 mg/l (Alabaster, 1972). Decreases were demonstrated in the standing crop of both fishes and macroinvertebrates in an area receiving suspended solids loadings of no more than 40 mg/l (Gammon, 1970).

Water quality 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 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 target for wet weather events was chosen for Malletts Creek.

Overall, the secondary target of 80 mg/l TSS (as a mean annual value) is intended to evaluate solids loading influences and assist in orienting and focusing corrective actions for source reductions. Additional TSS targets based on flow related considerations may be developed as additional data on Malletts Creek become available.

The Washtenaw County Drain Commissioner's office has focused on reducing total phosphorus loads, including those from Malletts Creek, to the Huron River in response to the Huron River nutrient TMDLs for Ford and Belleville Lakes (Kosek, 1996). Current, local pollutant reduction and implementation plans for Malletts Creek involve the phosphorus TMDL to reduce the

occurrence of nuisance algal blooms in both Ford and Belleville Lakes. The Malletts Creek Restoration Plan targets a 50% reduction in total phosphorus, which is characterized as "…functionally equivalent to the mean TSS concentration of 80 mg/l…" (Malletts Creek Restoration Plan, 2000). Therefore, adherence to either the 80 mg/l TSS secondary target and/or the 50% total phosphorus reduction target will, presumably, equally effect desired reductions in both the TSS and/or total phosphorus loads, the latter targeted in the existing Malletts Creek Restoration Plan.

SOURCE ASSESSMENT

From the Huron River confluence upstream, land use in the watershed is dominated by residential, commercial, and industrial development. The estimated impervious surface area in the Malletts Creek watershed is 37% or 2478 acres (Malletts Creek Restoration Plan, 2000). Increasing the percent of impervious surface within a watershed can severely affect the extremes in a stream's hydrologic and hydraulic characteristics. Such increases cause rapid precipitation runoff and washoff of suspended solids and contaminant loads to the receiving waters (Fonger and Fulcher, 2001; Schueler and Holland, 2000). Substantial reductions in vegetative riparian zones and pervious areas throughout the watershed of Malletts Creek and the extensive use of structural features, including paved impervious surface areas (e.g., roads and parking lots), curb and gutter, and numerous direct storm sewer discharges, dominate the landscape and serve to increase the rate of precipitation runoff to Malletts Creek.

Existing stream flow conditions of Malletts Creek can best be described as unstable and flashy in response to storm events as characterized by the flow extremes recorded at the USGS Malletts Creek (#04174518) stream flow gage (Figure 2). Note in this August 2003 example, the extremes in flow fluctuation from low flows of 2 cfs to highs of over 400 cfs occurred within a three to six-hour period. The hydrograph demonstrates the very flashy and unstable stream flow conditions that occur during wet weather runoff/washoff events. This condition results in excessive stream bank erosion, sedimentation, and erosivity of otherwise stable, inhabitable substrate suitable for macroinvertebrate colonization and fish community development. Therefore, the sources of sediment loadings to Malletts Creek are primarily attributable to periodic erosion and storm water runoff/washoff from impervious surfaces associated with residential, industrial, and commercial-dominated land uses in the watershed.

There are five National Pollutant Discharge Elimination System (NPDES) permitted dischargers in the Malletts Creek watershed that have general permits (Table 1 and Figure 3). Two facilities discharge treated groundwater and the other three discharge non-contact cooling water. Collectively, none of the five NPDES permitted point source facilities is required to monitor TSS in its effluent discharged to Malletts Creek since TSS limits are not commonly required or needed for these types of discharges. The combined maximum design discharge total of 1.673 million gallons/day or 610 million gallons/year applies to the five dischargers. Therefore, a worst-case estimate of TSS load for each of these five facilities was made assuming a TSS monthly average concentration of 25 mg/l; a typical monthly average permit limit provided in NPDES permits. The estimated TSS load from the five general permitted facilities is 349 pounds/day or 127,396 pounds/year.

There are at least 161 storm water outfalls to Malletts Creek watershed covered by the NPDES Phase I MS4 storm water runoff permit program (Figure 4). These outfalls are overseen by the city of Ann Arbor (137 outfalls), University of Michigan (11 outfalls), and Michigan Department of Transportation (2 outfalls - from Business Route 23 to Malletts Creek). Washtenaw County has at least 11 identified outfalls that are covered under the Phase II MS4 program.

The derivation of current annual TSS loads to the Malletts Creek watershed from the various land use categories, involved estimates of the acres of each land use category (LTI, 2003a), a mean annual rainfall of 34 inches, and the use of the USEPA's Simple Method model approach (USEPA, 2001). The estimated current, annual TSS load from the NPDES permitted storm water sources (WLA component) versus the remaining NPS land use categories (LA component) in the Malletts Creek watershed is approximately 1,173,788 pounds and 102,662 pounds, respectively (Table 2). The overall total estimated annual TSS load to the Malletts Creek from NPDES point sources, NPDES storm water, and NPS is approximately 1,403,846 pounds, representing 9%, 84%, and 7% of the total load, respectively.

In summary, excessive sedimentation and flashy flow conditions in Malletts Creek occur due to elevated wet weather event runoff/washoff volumes, associated TSS loads from the impervious urban areas in the watershed, and in-stream bank erosion and resuspension. The presence of substantial areas of impervious surfaces in the watershed has disrupted the natural hydrology of Malletts Creek, especially during wet weather runoff/washoff events. These alterations to the Malletts Creek watershed have destabilized stream banks, increased solids loads, shortened the runoff/washoff rate of delivery to the stream, modified extremes in stream flows (both high and low flows), and reduced or eliminated desirable fish and macroinvertebrate habitat. Approximately 2478 acres or 37% of the Malletts Creek watershed (6696 acres) is estimated to be impervious (Malletts Creek Restoration Plan, 2000). Stream degradation has been demonstrated to occur in watersheds containing as little as 10% to 20% impervious surface areas because of associated direct runoff discharges to a water body (Center for Watershed Protection, 1994). However, local studies within the Huron River watershed indicate a threshold range for impairment of 8% to 10% (Wiley and Martin, 1999).

LINKAGE ANALYSIS

A suitable method used to develop a TMDL that addresses the severity of the impacts of sedimentation to a biological community is to measure sediment impacts on stable, colonizable substrates in the stream channel and the associated changes in the biological community.

Increased siltation and embeddedness of colonizable substrates resulting from excessive bank erosion and sedimentation has been demonstrated to impair the biological integrity of rivers (Waters, 1995) by obscuring or reducing the suitability of colonizable or useable substrate by stream biota. With improved habitat through the reduction in sedimentation, both fish and macroinvertebrate communities respond with an increase in species diversity and an increase in the number of individuals of each species. As a result, the Procedure 51 assessment scores and ratings for quality of the fish and macroinvertebrate communities and habitat are expected to increase as sedimentation rates decline, embeddedness decreases, and habitat diversity increases. These latter characteristics will serve to demonstrate improvement in habitat conditions, WQS attainment, and overall stream quality as expressed through an acceptably rated biological community.

TMDL DEVELOPMENT

The TMDL represents the maximum loading that can be assimilated by a water body while still achieving WQS. The Malletts Creek biotic community has been impaired by unstable flow conditions, bank erosion, and excessive sedimentation. Therefore, this TMDL is focused on reducing sediment loads throughout the watershed to a level that supports a biological community that meets WQS. Using the metrics from Procedure 51, a numeric score of -4 for

both fish and macroinvertebrate communities and a habitat score of 130 or greater, will serve as primary targets for this biota TMDL.

Concurrent with the selection of numeric endpoints, this TMDL also defines the environmental conditions that will be used when defining allowable levels. Some TMDLs are designed around the concept of critical condition. A critical condition is defined as the set of environmental conditions that, if controls are designed to protect, will ensure attainment of objectives for all other important conditions. For example, the critical conditions for the control of point sources in Michigan are provided in Rules 323.1082 and 323.1090 of Michigan's WQS. In general, the lowest monthly 95% exceedance flow for a stream is used to establish effluent limits for point sources. However, the primary sediment inputs to Malletts Creek are attributable to wet weather-driven discharges and resulting in-stream conditions. As such, there is no single condition that is protective for all conditions, but efforts are directed towards wet weather runoff/washoff events.

The target of 80 mg/l TSS is used to develop a secondary TMDL loading goal for TSS during wet weather runoff/washoff events, especially from storm water discharges from the area (3875 acres) of urban/industrial/built-up land use category that represents about 58% of the land use area in the Malletts Creek watershed.

ALLOCATIONS

TMDLs are comprised of the sum of individual WLAs for point sources, LAs for NPS, and natural background levels. The TMDL must include a margin of safety (MOS), either implicitly within the WLA and/or LA, or explicitly, that accounts for uncertainty in the relation between pollutant loads and the quality of the receiving water body. This definition is denoted by the equation:

$$TMDL = \Sigma^{WLAs} + \Sigma^{LAs} + MOS$$

The TMDL represents a maximum load of a pollutant or stressor that can be discharged to a receiving water and still meet WQS. The overall TMDL load capacity is allocated among the three TMDL components: WLA for NPDES permitted point sources, LA for NPS and background loads, and the MOS.

WLAs

Presently, the estimated total annual TSS load from all point sources is approximately 1,301,184 pounds. The combined individual/general NPDES permitted point source TSS load to Malletts Creek is estimated at 127,396 pounds/year (Table 1). Based on land use category TSS export coefficients (Cave et al., 1994), a total annual TSS load estimate of approximately 1,173,788 pounds is attributable to NPDES permitted storm water runoff/washoff discharges to the Malletts Creek watershed associated with the urban/industrial/built-up sources (Table 2). The projected annual TSS load (127,396 pounds) from the individual/general NPDES permitted point sources is considered acceptable. However, the combined effect on Malletts Creek by runoff/washoff loads of TSS from the urban/industrial/built-up storm water source should be reduced in order to achieve an in-stream mean annual wet weather TSS concentration goal of 80 mg/l or less by reducing runoff/washoff delivery rates to Malletts Creek. If the goal of 80 mg/l TSS were achieved, this would represent a 16% reduction in TSS load to Malletts Creek, resulting in a projected annual WLA of 1,113,249 pounds of TSS. Reduced runoff/washoff

delivery rates to Malletts Creek will play an important role in achieving the 80 mg/l goal by reducing TSS loads from upland sources, stream bank erosion, and re-suspension of in-place TSS.

For developing water quality-based effluent limits for the individual/general NPDES permitted point source discharges, the receiving stream design flow equals the lowest 95% exceedance flow. However, it is proposed that any TSS limits in NPDES point source permits be established at the target of 25 mg/l or less, as a monthly maximum average, which then makes it unnecessary to consider mixing zone scenarios. The point source contributions to the WLA are considered controllable through the existing NPDES individual/general permit requirements and storm water through the Phase I and Phase II MS4 storm water program requirements.

LAs

The LA component defines the load capacity for a pollutant that is nonpoint in origin that includes the following land use categories: agriculture, forested/shrub/open land, wetland, and water bodies (Table 2). An estimated annual TSS load of 102,662 pounds is attributed to these land use categories of NPS in the watershed. All but the agricultural land use are considered as background load sources. Therefore, the only targeted TSS load reduction source is from agricultural sources. A 45% annual reduction (from 53,822 to 29,695 pounds) from cropland areas in the watershed is recommended, resulting in the annual LA, TSS load target of 78,535 pounds, based on achieving the 80 mg/l TSS target concentration during wet weather runoff/washoff events.

In summary, the proposed reduction in the total annual TSS load to Malletts Creek (WLA + LA) to meet the annual average target of 80 mg/l is 1,191,784 pounds/year, an overall 15% reduction. Eleven percent (127,396 pounds/year) is allocated to the general NPDES permitted point source component of the WLA, along with 83% (985,853 pounds/year) to the NPDES permitted industrial and municipal storm water outfalls covered under the Phase I and Phase II MS4 storm water program, and the remainder of 7% (78,535 pounds/year) is attributed to the LA. To achieve the WLA, a reduction in the storm water runoff/washoff of the TSS load is recommended, especially, in the urban/industrial/built-up land use categories. The percent reduction in the TSS load is based on the reduction of wet weather runoff event TSS loads with a goal of an annual average in-stream target of 80 mg/l TSS during wet weather runoff/washoff events.

MOS

The MOS in a TMDL is used, in part, to account for variability of source inputs to the system and is either implicit or explicit. An MOS is implicit for a biota TMDL because the quality of the biological community, its integrity, and overall composition represent an integration of the effects of the spatial and temporal variability in sediment loadings to the aquatic environment.

The habitat target score of 130 or greater will be used, so as to maintain habitat conditions and demonstrate acceptable stream quality conditions that provide adequate control of anthropogenic sediment sources to assure improved habitat quality and the biological communities. This targeted score is closely associated with macroinvertebrate community scores of -3 or greater, potentially providing better results than a minimally acceptable value of -4.

For comparison of survey assessment results from 1997, 2002, and 2003, follow-up biological and habitat quality assessments will be conducted during stable flow conditions within the months of June through September. The results will best reflect an MOS that is implicit and express an integration of the effects of the variability in sediment loads in the aquatic environment and minimize seasonal variability.

SEASONALITY

Seasonality is addressed in the TMDL in terms of sampling periods for fish and macroinvertebrate communities. To minimize temporal variability in the biological community, sampling will be conducted during June through September of each year during stable flow conditions. For assessing TSS loads to Malletts Creek, seasonal event monitoring will be conducted to define and characterize both hydraulic and TSS loads from the Malletts Creek watershed that influences the biota TMDL reach.

MONITORING PLAN

Monitoring will be conducted by the MDEQ to assess progress towards meeting the biota TMDL targets, following implementation of applicable BMPs and control measures. Subsequently, annual sampling of the macroinvertebrate community and habitat quality at locations in the vicinity of Chalmers Road, Washtenaw Road, Packard Road, and immediately downstream of the Brown Park Pond dam, as a minimum, will be conducted until assessment results from two consecutive years, demonstrate attainment of TMDL targets at these sites. For best comparative purposes, follow-up biological and habitat assessments will be conducted in a June to August time frame during stable flow conditions. Every effort will be made to sample during similar stream conditions and assess the same sampling locations.

In-stream monitoring of TSS, stream flow, and representative land use runoff/washoff characteristics for a variety of stable flow and wet weather events will be necessary to refine the TSS loadings estimates for the Malletts Creek watershed. This information will further define the level of TSS load reduction necessary; seasonally, climatologically, and annually.

Once the BMPs are in place to minimize the effects of runoff and flashy conditions that exist in Malletts Creek, stream flow and TSS sampling can be implemented so as to measure progress towards the secondary numeric target of 80 mg/l as a mean annual TSS value during wet weather runoff events. Multiple sampling during critical high flow events, as well as low flow events, needs to be assessed to estimate future TSS loads in Malletts Creek.

REASONABLE ASSURANCE

The focus of the actions to protect Malletts Creek is directed towards installing BMPs and other control measures to reduce and minimize solids loads and excessive runoff/washoff discharge rates to the TMDL reach. The former action is to reduce sedimentation impacts, the latter to minimize stream bank erosion associated with the erosive effects of flashy flow extremes. Overall, control measures include: NPDES individual/general and storm water permit limits and approved BMPs for areas currently not under any permit.

For the WLA, existing general NPDES permit requirements for these sources will be adequate to meet the target.

NPDES storm water permits are issued to the various dischargers within a watershed. The permittees are required to collectively develop a watershed management plan that includes the detailing of short- and long-term goals and attainment actions, public education plans, illicit discharge elimination plans, and the development (by each local unit of government within the Malletts Creek watershed) of their individual storm water prevention plans.

The MDEQ district staff will continue to work with and assist interest groups in the Malletts Creek watershed. The purpose is to assist in defining and designing approvable actions and programs that assess, develop, plan, and implement BMPs and control measures that best minimize or prevent soil erosion and excessive runoff rates to the Malletts Creek watershed.

- Upgrade and maintain the current vegetative riparian zone to reduce soil erosion and loadings to the Malletts Creek from sources within the watershed. BMPs need to be employed within the riparian zone adjacent to the urbanized, residential, industrialized, and commercial areas to minimize the loss through erosion and direct runoff/washoff, thereby minimizing habitat impairment of the Malletts Creek.

- Implementation of BMPs in the storm water permits program that reduces sediment loadings and moderate runoff release rates and excessive runoff/washoff to the Malletts Creek watershed are expected to improve and protect designated use support throughout the watershed. The goals are for reduced solids loadings and greater flow stability throughout the watershed so that WQS are restored and protected. Available guidance regarding runoff detention and stream protection is provided by Fongers and Fulcher, 2001; Schueler and Holland, 2000; and Purdue, 2003.

The MDEQ approval of BMPs and implementation plans is required prior to implementation of proposed structural improvements.

A Quality Assurance Project Plan (QAPP) is being designed for the Washtenaw County Drain Commissioner, for a Malletts Creek Regional Detention Facility site, involving the Brown Park Pond area (CDM, 2003). The facility is intended to help stabilize stream conditions due to wet weather runoff/washoff events. This QAPP may well enhance and reduce current impacts to the hydrology of Malletts Creek and foster improved habitat and biological communities.

Also, the Ann Arbor City Planning Commission’s resolution regarding development in the Malletts Creek watershed requires the incorporation of the following BMPs into any proposal for development:

- Minimize impervious surfaces by efficient parking and drive design, shared parking, parking deferral, and use of multiple-story building design wherever possible.
- Provide detention facilities that meet or exceed the Washtenaw County Drain Commissioner's rules.
- In the case of redevelopment sites, provide detention for all added impervious surfaces and, if feasible, as much of the existing development as possible.
- Incorporate techniques from the MDEQ’s "Guidebook of Best Management Practices for Michigan Watersheds (Peterson et al., 1993)."
- Avoid placing detention facilities in the Malletts Creek floodplain.

Since the inception of the Malletts Creek Restoration Plan (2000), the city of Ann Arbor and the Washtenaw County Drain Commissioner have partnered with the MDEQ to implement illicit

connection discharge elimination and retrofit regional detention within the basin using CMI and USEPA Section 319 Grant funding (Bobrin, 2003). Also, the 2000 plan indicates that updates of local ordinances and development standards affecting physical, biological, and chemical integrity of Malletts Creek have been made. To date, the total local public commitment for plan implementation exceeds $2 million.

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Water Division
Michigan Department of Environmental Quality
August 6, 2004

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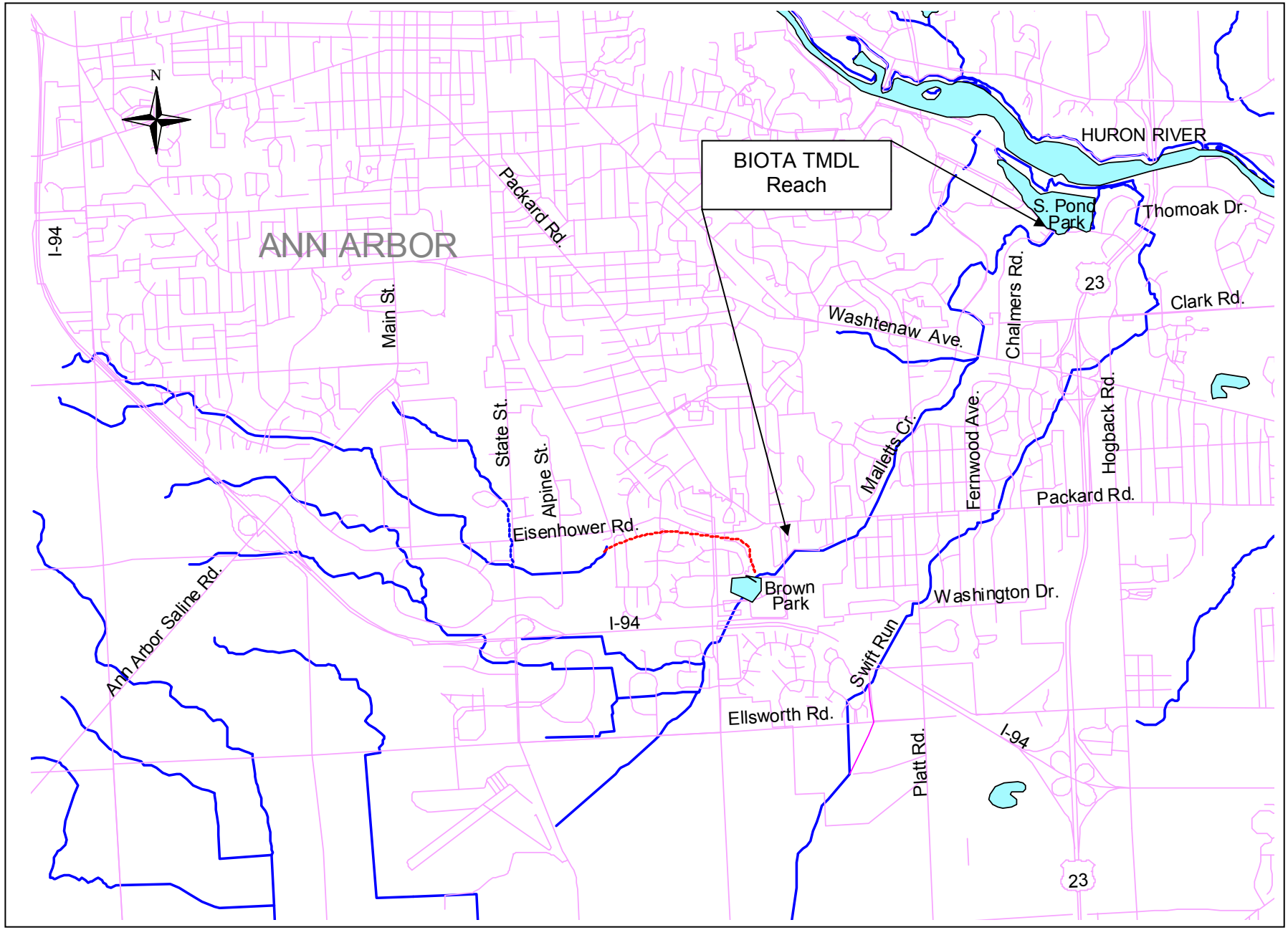
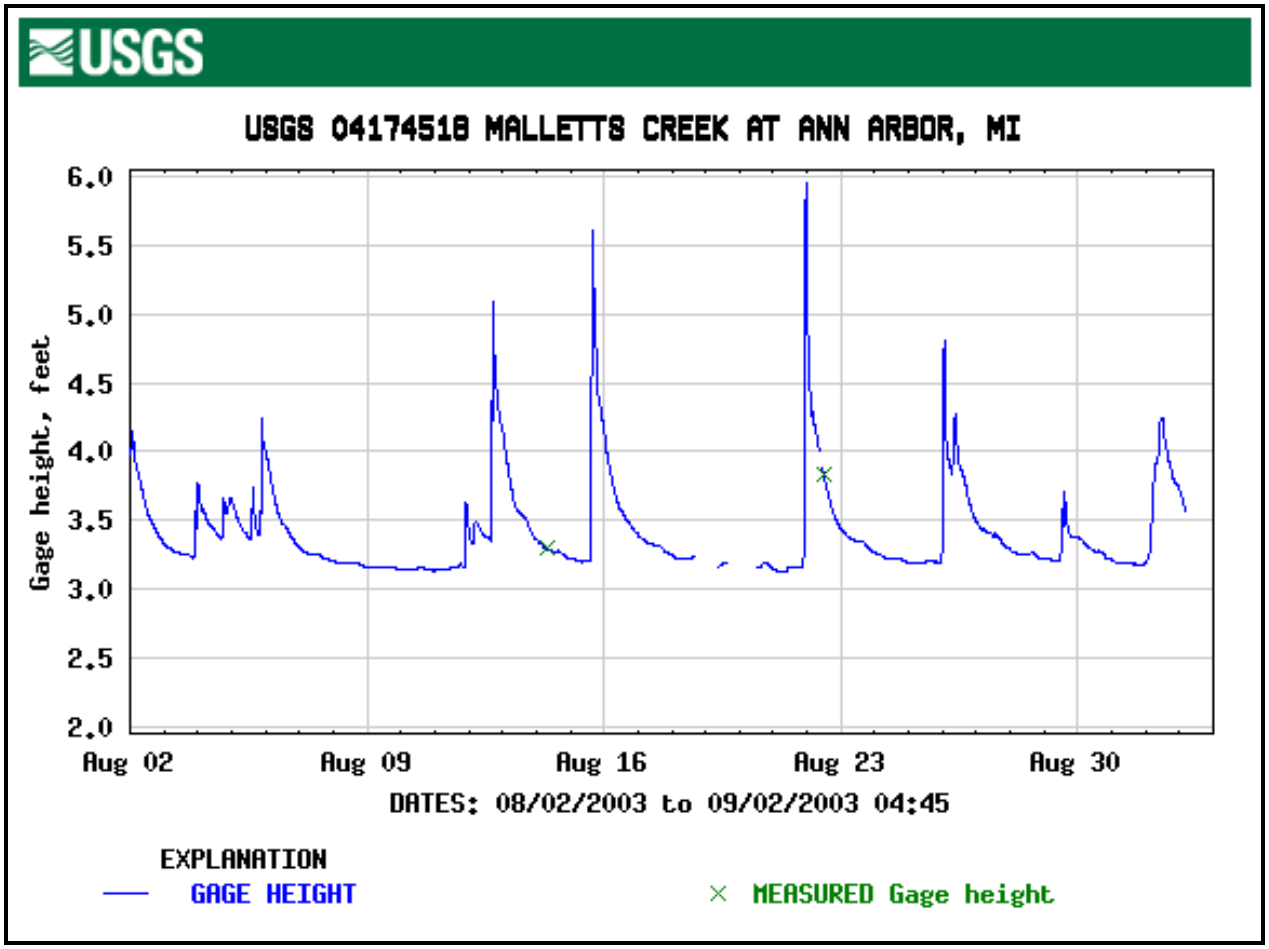


Figure 1. Malletts Creek biota TMDL reach, Washtenaw County, Michigan.



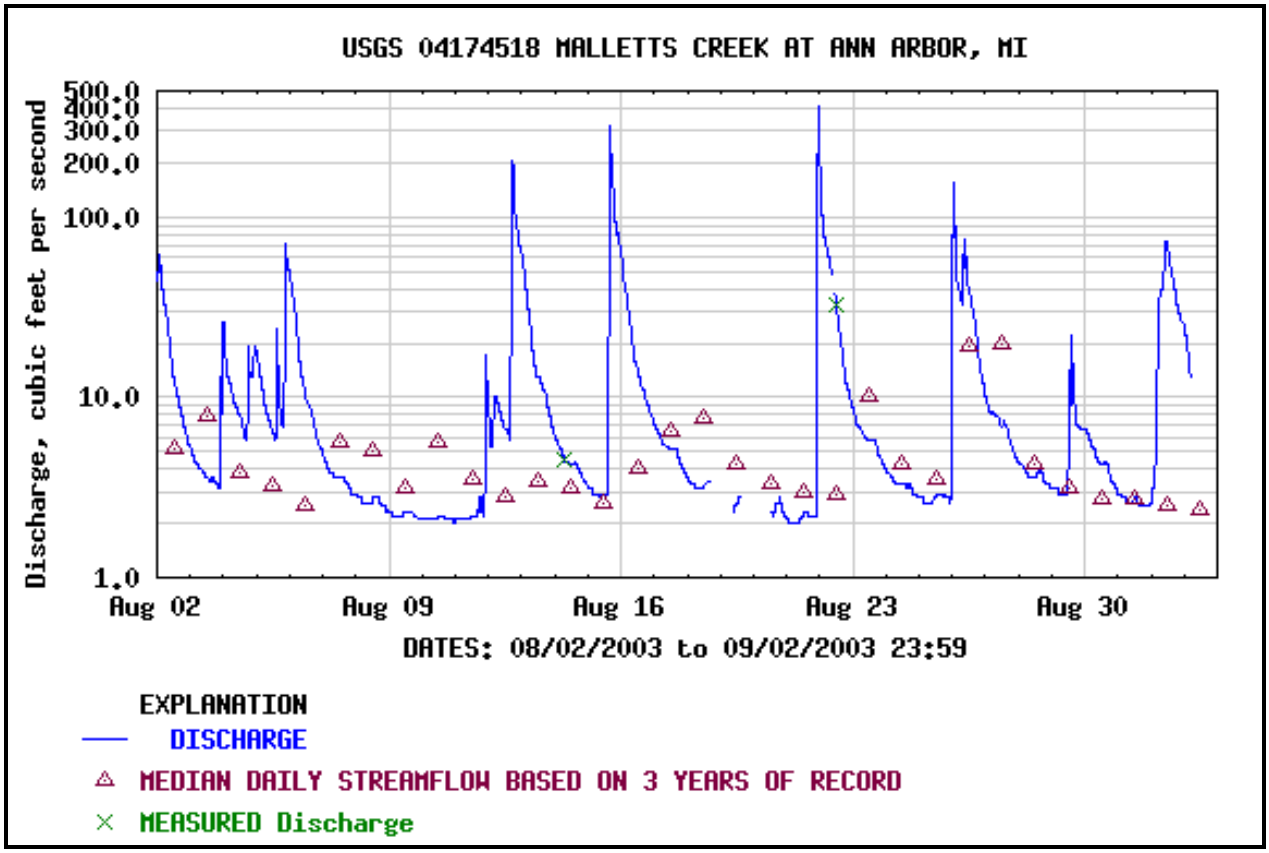


Figure 2. Malletts Creek storm event response in height and flow at the USGS gage.

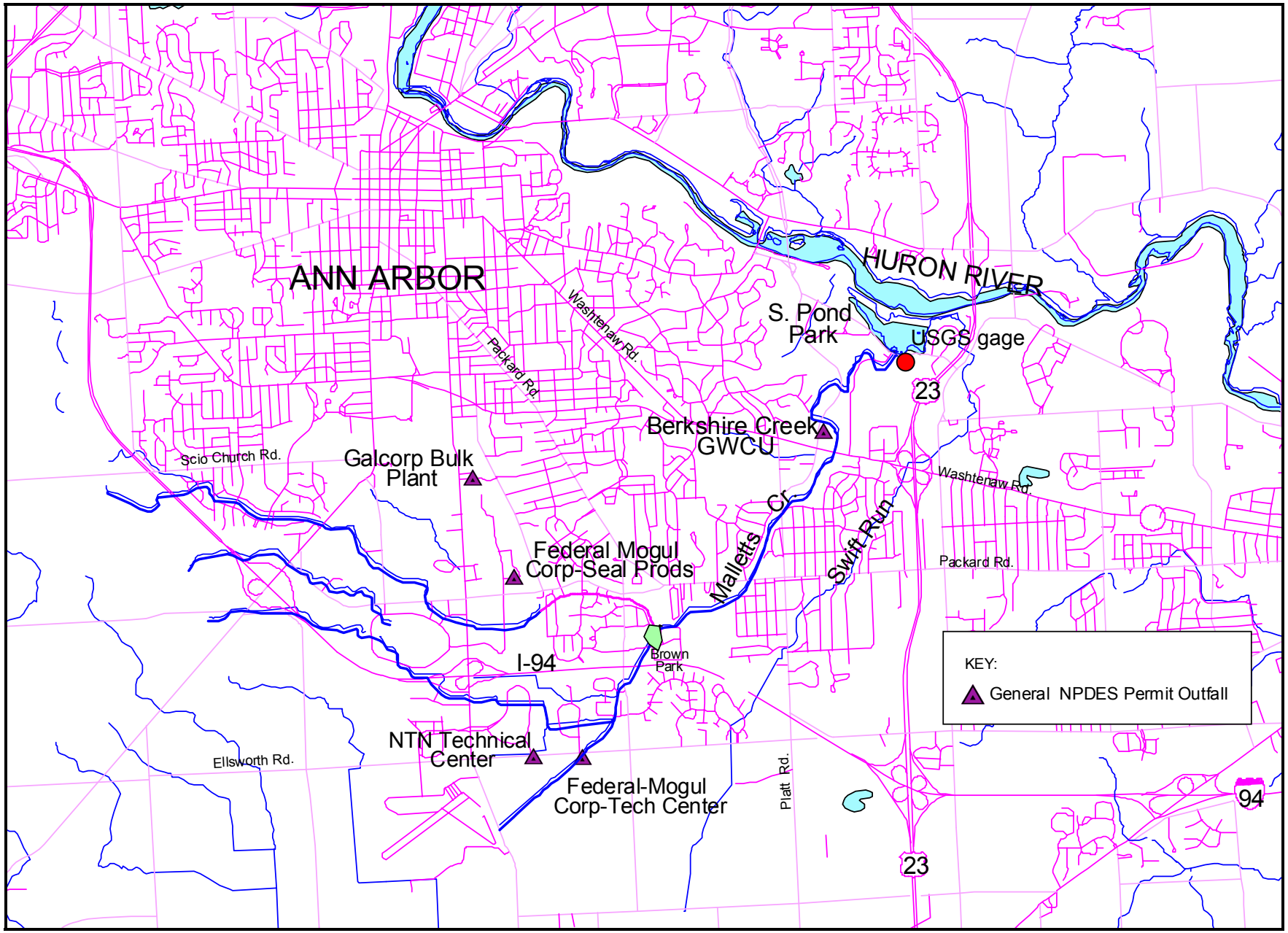


Figure 3. NPDES permitted (individual, general, and industrial storm water) facility outfalls to Malletts Creek watershed, Washtenaw County, Michigan.

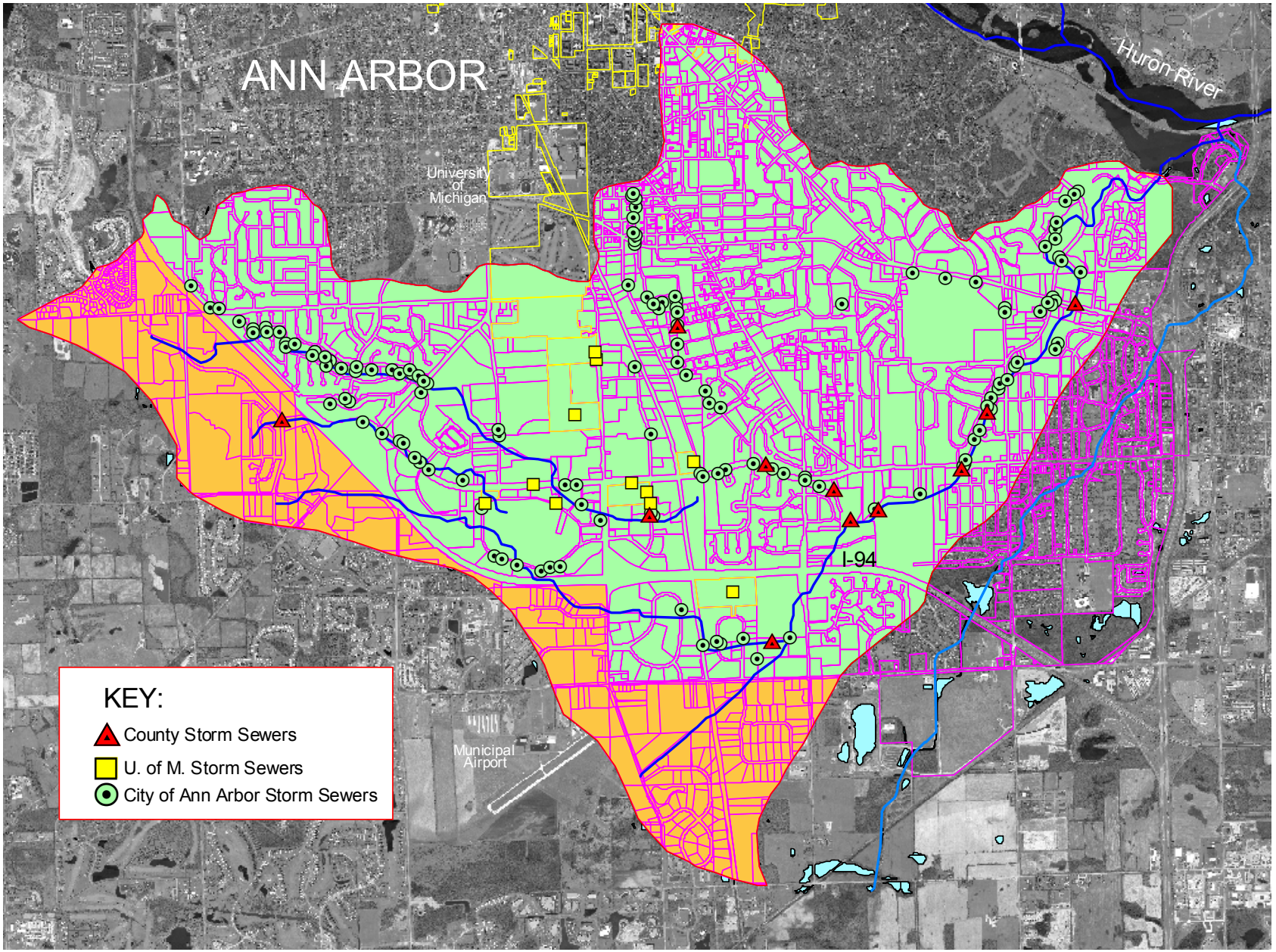


Figure 4. Washtenaw County Phase I and II storm sewer outfalls in the Malletts Creek watershed managed by the city of Ann Arbor, University of Michigan, and Washtenaw County. Source: Scott Wade – (LTI, 2003).

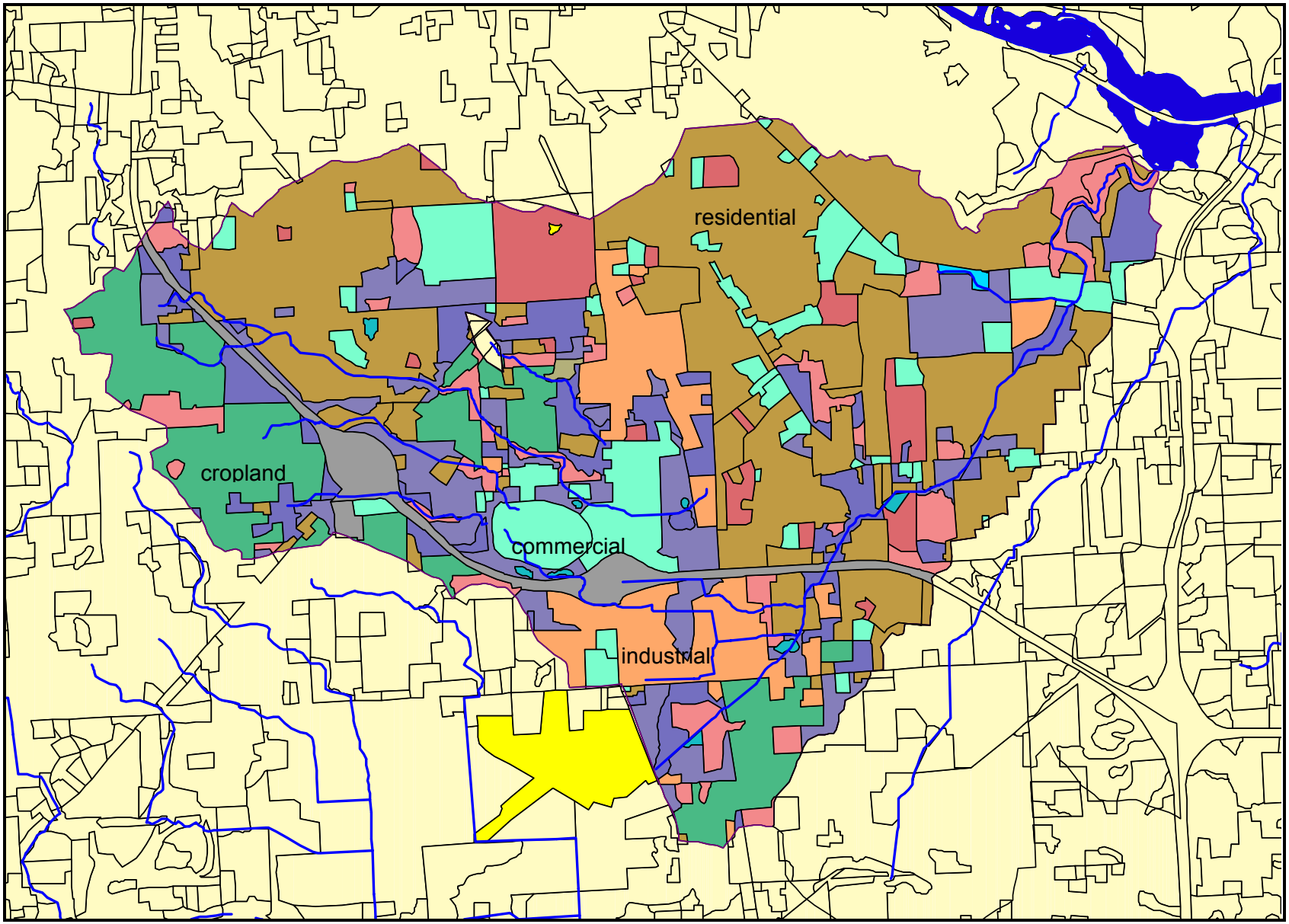


Figure 5. Land use categories in the Malletts Creek watershed, Washtenaw County, Michigan.
(Source: Scott Wade – (LTI, 2003 using 2002 (Ann Arbor) and 1998 (township) land use coverages).

Table 1. Individual, general, and industrial storm water NPDES permitted outfalls tributary to the Malletts Creek watershed and estimated TSS loads for non-storm water outfalls. (Source: MDEQ/WD NPDES permit Management System. *mgd = million gallons per day.

PERMIT NUMBER	FACILITY	DESIGN FLOW (mgd*)	Latitude (decimal degrees)	Longitude (decimal degrees)	Annual TSS Load at 25 mg/l (pounds)
General NPDES Permits:					
MIG080756	Galcorp Bulk Plant	0.043	42.255	-83.73855	3,274
MIG081010	Berkshire Creek GWCU	0.01	42.258333	-83.695	761
MIG250419	NTN Technical Center	0.33	42.22944	-83.73167	25,129
MIG250420	Federal-Mogul Corp-Tech. Center	0.09	42.917	-83.72556	6,853
MIG250421	Federal-Mogul Corp-SealProducts	1.2	42.245833	-83.73333	91,378
	Total Daily Design Flow (mgd):	**1.673**			**127,396**
Storm Water NPDES Permits (Phase I – MS4 Program):					
MI0053856	City of Ann Arbor				
MI0053902	University of Michigan				
MI0053911	Michigan Depart. of Transportation				
Storm Water NPDES Permits (Phase II – MS4 Program):					
	Washtenaw County				
(eleven outfalls)					

Table 2. 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	Estimated Current TSS (Pounds/Year)*	TMDL TSS Target Load TSS (Pounds/Year)
WLA Components:			
NPDES Individual/General Permitted Point Source TSS Load:		127,396	127,396
NPDES Permitted Storm Water TSS Load:			
Residential	2422	496,343	
Industrial	535	202,971	
Commercial and Service	686	405,831	
Transportation/Comm/Util.	232	68,643	
Subtotal:		1,173,788	985,853 (16% reduction)
WLA Total:	3875	1,301,184	1,113,249 (**WLA)**
LA Components:			
Agricultural Land			
Cropland	787	53,822	29,695 (45% reduction)
(Background Sources)			
Forested/Shrub/Open Land			
Deciduous Forest	437	10,512	10,512
Openland/Shrub/Rangeland	1559	37,500	37,500
Confier Forest	8	192	192
Wetland			
Forested	9	191	191
Water Body			
Lake/Reservoir	21	445	445
LA Subtotal:	2821	102,662	78,535 (**LA**)
Overall Totals:	6696	1,403,846	1,191,784 (overall 15% reduction)

**Load estimates based on PLoad Version 3 model (USEPA, 2001), land use acres derived from 2002 (Ann Arbor) and 1998 (township) land use coverages and a mean annual rainfall value of 34 inches.*

Michigan Department of Environmental Quality

Water Bureau

November 2004

Total Maximum Daily Load for Biota for Swift Run Creek
Washtenaw County

INTRODUCTION

Section 303(d) of the federal Clean Water Act and the United States Environmental Protection Agency's (USEPA's) Water Quality Planning and Management Regulations (Title 40 of the Code of Federal Regulations, Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for water bodies that are not meeting water quality standards (WQS). The TMDL process establishes the allowable loadings of a pollutant to a water body based on the relationship between pollutant sources and in-stream water quality conditions. TMDLs provide states a basis for determining the pollutant reduction necessary from both point and nonpoint sources (NPS) to restore and maintain the quality of their water resources. The purpose of this TMDL is to identify appropriate actions to achieve the fish and macroinvertebrate community targets and habitat quality targets, specifically a reduction in sediment loadings from sources in the Swift Run Creek watershed that will result in WQS attainment. This TMDL follows the phased approach due to inherent uncertainties in deriving numeric targets and estimating loading from NPS. Under the phased approach, load allocations (LAs) and waste load allocations (WLAs) are calculated using the best available data and information, recognizing the need for additional monitoring data to determine if the load reductions required by the TMDL lead to attainment of WQS. The phased approach provides for the implementation of the TMDL while additional data are collected to reduce uncertainty.

PROBLEM STATEMENT

The TMDL reach of Swift Run Creek, a warmwater designated water body tributary to the Huron River at South Pond Park, is located in Washtenaw County in the vicinity of Ann Arbor (Figure 1). The watershed drains portions of Pittsfield Township, the city of Ann Arbor and Ann Arbor Township. The designated use (Michigan's WQS Rule 100) identified as impaired was the support of indigenous aquatic life, in this case, the macroinvertebrate communities. This condition served as the original basis for placing Swift Run Creek on Michigan's Section 303(d) list of impaired water bodies requiring the development of a TMDL. The TMDL reach is about 3.7 miles in length and is identified on the Section 303(d) list (MDEQ, 2004) as follows:

SWIFT RUN CREEK WBID#: **061203IL**
County: WASHTENAW HUC: 04090005 Size: 3.7 M
Location: Huron River confluence u/s to Ellsworth Road. Southeast of Ann Arbor.
Problem: **Macroinvertebrate community rated poor.**
TMDL YEAR(s): 2004 RF3RchID: 4090005 25

This document represents the basis for the development of a biota TMDL that focuses on the restoration of the biological communities within the impacted perennial reach of Swift Run Creek to meet Michigan's WQS designated uses.

Within the approximately 2994-acre watershed, the flow in the headwater reach of Swift Run Creek upstream of Creek Drive (Pittsfield Township - Section 11, R6E, and T3S) is classified by the United States Geological Survey (USGS) as intermittent. Flow in the Swift Run Creek TMDL reach is classified by the USGS as perennial from Creek Drive downstream (Figure 1) to the Huron River confluence. Within the 3.7-mile perennial reach, impairment is attributed to degraded water quality, unstable and flashy flow regimes, reduced bank stability (bank erosion), sedimentation, and reduced stream habitat quality. Excessive runoff/washoff sources throughout this highly urbanized watershed (from headwaters downstream) results in an impaired biological community.

The determination of impairment within the TMDL reach was based on the August 1997 Michigan Department of Environmental Quality (MDEQ) Procedure 51 biological community assessment findings for Swift Run Creek (unpublished). A Procedure 51 macroinvertebrate community assessment involves the collection of representative taxa from each available habitat type in the stream survey reach (woody debris, cobble, gravel, sand, etc.). Of the numbers of organisms collected and representative of a given survey reach, the relative percent of each taxon is derived. The Procedure 51 scoring and rating of macroinvertebrate communities is based on the assessment of 9 metrics with total score ranges of 5 to 9, 4 to -4, and -5 to -9 that have corresponding ratings of excellent, acceptable, and poor, respectively. A poor (score of -8) macroinvertebrate community characterized the lower reach of the stream at Hogback Road in August 1997 (Wuycheck, 2003). An additional assessment conducted in September 2003 at Shetland Drive (located north of Clark Road) also indicated poor macroinvertebrate communities based on the Procedure 51 community assessment score of -6 (Wuycheck, 2003).

Habitat quality was assessed in August 1997 at Hogback Road and in September 2003 at Shetland Drive, using Procedure 51 protocols (Figure 2). The Hogback Road site was assessed in August 1997 using the MDEQ (1997) habitat assessment protocol, and the September 2003 habitat assessment used the updated MDEQ (2002) protocol. The Procedure 51 habitat assessment protocol used in August 1997 involved score ranges of less than 35, 35 to 70, 71 to 106, and 107 to a maximum of 135 points representing habitat quality ratings of poor, fair, good, and excellent, respectively. The August 1997 habitat score and rating at the Hogback Road site was 66 (out of a possible score of 135) indicating overall fair (moderately impaired) conditions. The total point score ranges using the updated MDEQ (2002) habitat assessment protocol are less than 56, 56 to 104, 105 to 154, and greater than 154 to a maximum of 200 points with ratings of poor, marginal, good, and excellent, respectively. The September 2003 habitat score and rating at the Shetland Drive site (using the May 2002 updated Procedure 51 habitat assessment protocol) was 114 (out of a possible score of 200) indicating overall good conditions. However, scores for the individual metric categories of Embeddedness, Flow Stability, and Bank Stability of both the August 1997 and September 2003 assessments indicated 50% or less than their maximum potential scores. These scores indicate unstable habitat conditions in Swift Run Creek.

Volunteer biological community assessments by the Huron River Watershed Council characterize the macroinvertebrate communities as stable but poor (Huron River Watershed Council, 2003).

Total suspended solids (TSS) and flow monitoring in the Swift Run Creek watershed was conducted during the months of June, July, and August 2003 by Limno-Tech, Incorporated (LTI) as part of a Clean Michigan Initiative (Contract 071B1001643) funded monitoring program. The project, requested by the MDEQ, required monitoring three times (two completed) during the

survey period to characterize background TSS concentrations during dry-weather, stable flow conditions and to monitor at least three wet-weather runoff events to assess increases in stream TSS and flow during a response to wet-weather events of 0.1 inches or greater. Effort was directed towards sampling TSS and flow during the rise and fall of the Swift Run Creek hydrograph. Results from the study indicated an average background TSS concentration of 13.0 milligrams per liter (mg/l) and 14.5 mg/l during stable, base flow conditions of June 23, 2003, and August 1, 2003, respectively (LTI, 2003b).

Wet-weather event monitoring at the most downstream site at Thornoak Road, during 24-hour precipitation accumulations of 1.22, 0.61, and 1.02 inches on July 21, August 1-2, and August 12, 2003, showed in event maximum (event average) TSS concentrations of 1,115 mg/l (662 mg/l), 689 mg/l (211 mg/l), and 1,032 mg/l (378 mg/l), respectively. This information indicates that precipitation runoff/washoff events in the watershed substantially increase the amount of TSS in transport in Swift Run Creek. In-stream flows measured at the most downstream station at Huron River Drive, vicinity of Thornoak Drive, during the three wet-weather event monitoring dates of July 21, August 1-2, and August 12 showed increases from 11 to 127 cubic feet per second (cfs), <0.1 to 19 cfs, and 5 to 14 cfs, respectively, demonstrating substantial flow responses to precipitation events.

Excessive storm water runoff to Swift Run Creek from the municipal and commercial sites in the watershed is considered the most probable cause of the biological community impairment. There are a minimum of 26 National Pollutant Discharge Elimination System (NPDES) permitted storm water outfalls throughout the Swift Run Creek watershed, the flow from which contributes to unstable habitat conditions. Approximately 425 acres or 14.5% of the Swift Run Creek watershed (2,994 acres) is impervious; e.g., parking lots and buildings (Purdue, 2003). Such areas are commonly designed to divert and direct precipitation directly to nearby water bodies to facilitate rapid drainage. Substantial degradation in biological communities has been demonstrated to occur in watersheds containing 10% to 20% impervious surface areas that directly discharge to a water body (WPT, 1994).

The primary contributor to poor stream quality is excessive runoff/washoff volumes resulting in flashy, destabilizing extremes in stream flow conditions in this highly urbanized/commercialized watershed. This condition results in substantial stream bank erosion and sediment induced erosivity of both habitat and colonizing organisms, siltation, and sedimentation impacts on biologically important and desirable habitat. Reductions in storm sewer runoff rates, resulting flashy stream conditions, and reduced stream bank erosion through more stable flow management are necessary to reduce impacts on the aquatic life and meet WQS.

NUMERIC TARGETS

The impaired designated use for Swift Run Creek relates to indigenous aquatic life. Michigan's WQS require, as a minimum, the protection of a variety of designated uses, including indigenous aquatic life [Rule 100(1)(f)]. Attainment of WQS for the indigenous aquatic life designated use will be demonstrated based on assessments of macroinvertebrate community integrity and habitat quality.

The primary numeric targets are based upon Michigan's biological community and habitat quality assessment Procedure 51 (MDEQ, 1997, 1998, and 2002). The biota TMDL target is to establish a macroinvertebrate community with acceptable, reproducible scores equal to or greater than -4. Macroinvertebrate communities will be evaluated based on a minimum of two Procedure 51 biological assessments conducted in successive years, following the implementation of Best Management Practices (BMPs) to stabilize runoff/washoff discharges

and extremes in stream flow conditions, minimize bank erosion, and sediment loadings to the subject TMDL reach.

A target habitat score of equal to or greater than 110 will be used to demonstrate restoration of acceptable habitat quality. This score is consistent with the most recent habitat assessment score (114 for September 2003) for the acceptable habitats assessed at Shetland Drive. This level of conservation is appropriately high enough to account for both temporal and spatial variability within the watershed and provide a buffer for the variability within the macroinvertebrate and habitat assessment protocol.

A secondary numeric target based on TSS will be used to further assess improvements in Swift Run Creek. The secondary target goal is a mean annual, in-stream TSS concentration of 80 mg/l for wet-weather runoff/washoff events. This secondary numeric target may be overridden by achievement of the biological and habitat numeric targets. However, if the TSS numeric target is achieved but the biota or habitat numeric targets are not achieved, then the TSS target may have to be reevaluated. The secondary numeric target is intended to help guide proper control over NPS of excessive suspended solids loads from runoff, as well as the runoff discharge rates and instantaneous runoff volumes that affect increased stream flow instability, stream bank erosion, and increased suspended solids concentrations.

The mean annual target concentration of 80 mg/l TSS is based on a review of existing conditions and published literature on the effects of TSS to aquatic life. Vohs et al. (1993) indicated that a chemically inert suspended solids concentration of 100 mg/l appears to separate those streams with a fish population from those without. Gammon (1970) demonstrated decreases in the standing crop of both fishes and macroinvertebrates in river reaches continuously receiving suspended solids loadings of less than 40 mg/l. The European Inland Fisheries Advisory Commission stated that in the absence of other pollution, a fishery would not be harmed at suspended solids concentrations less than 25 mg/l. Good to moderate fisheries can be found at 25 to 80 mg/l suspended solids, good fisheries were unlikely to be found at 80 to 400 mg/l, while only poor fisheries are typically found at 400 mg/l (Alabaster, 1972).

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 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 target for wet-weather events was chosen for Swift Run Creek as a secondary target.

Overall, the secondary target of 80 mg/l TSS is intended to evaluate solids load affects and assist in orienting and focusing corrective actions for source reductions. Additional TSS targets, based on flow-related considerations, may be developed as additional data on Swift Run Creek become available. At this time, sufficient, site-specific data are unavailable regarding the flow and TSS concentration relationship associated with storm water sources during wet weather runoff periods to establish specific numeric targets. Therefore, to allow for additional data collection, this TMDL is established as a phased TMDL.

SOURCE ASSESSMENT

Stream flow conditions of Swift Run Creek can best be described as unstable and flashy in response to storm events as characterized by the flow extremes recorded during the June, July, and August 2003 surveys conducted by LTI.

From the Huron River confluence upstream, land use in the Swift Run Creek watershed is dominated by residential, commercial, and transportation uses (Table 3). Such development within a watershed alters its hydrologic characteristics because increased areas of impervious surface result in increased runoff and washoff of solids and pollutant loads being discharged to stream reaches within the watershed (Fonger and Fulcher, 2001; and Schueler and Holland, 2000). Substantial reductions in vegetative riparian zones and pervious areas throughout the watershed of Swift Run Creek and the extensive use of structural features, including paved impervious surface areas (e.g., roads and parking lots), curb and gutter, and numerous direct storm sewer discharges, dominate the landscape and contribute to rapid precipitation runoff rates to Swift Run Creek.

There is one NPDES permitted industrial storm water outfall in the Swift Run Creek watershed: Ann Arbor Manufacturing - Permit Number MIS410029 (Table 1, Figure 2). This facility discharges an undetermined volume of storm water to the headwaters of the stream in the vicinity of Ellsworth Road and is subject to the provisions of the general permit No. MIS510000 that requires identifying the level of control necessary to comply with this TMDL. LTI (2003a) identified one Washtenaw County storm water outfall to Swift Run Creek and at least 25 storm water outfalls that are covered under the city of Ann Arbor's Phase 1 Municipal Separate Storm Sewer System (MS4) program (Table 2, Figure 2). The MS4 permitted outfalls require plan development to achieve the TMDL by minimizing pollutant loads to the "maximum extent practicable."

Determination of the annual TSS loads to the Swift Run Creek watershed from the various land use categories involved estimates of the acres of each land use category (LTI, 2003a), a mean annual rainfall of 34 inches, and USEPA's Simple Method model approach (USEPA, 2001). These aspects were used in conjunction with TSS export coefficients derived from the Rouge River Project (Cave et al., 1994). 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 3). The percentage of the total estimated annual TSS load to the Swift Run Creek from NPDES non-storm water point sources (WLA), NPDES storm water sources (WLA), and nonpoint sources (LA) is approximately 552,789 pounds, representing 0%, 93%, and 7% of current contributions, respectively. The use of annual load estimates for TSS is used for comparative purposes to better express the potential magnitude of the TSS loads to Swift Run Creek. Also, this load estimate relates to the 80 mg/l TSS target, a mean annual concentration.

LINKAGE ANALYSIS

A suitable method used to develop a TMDL that addresses the severity of the impacts of sedimentation to a biological community is to measure sediment impacts on stable, colonizable substrates in the stream channel and the associated changes in the biological community.

Increased siltation and embeddedness of colonizable substrates resulting from excessive bank erosion and sedimentation has been demonstrated to impair the biological integrity of rivers (Waters, 1995) by obscuring or reducing the suitability of colonizable or useable substrate by stream biota. With improved habitat through the reduction in sedimentation, both fish and

macroinvertebrate communities respond with an increase in species diversity and an increase in the number of individuals of each species. As a result, the Procedure 51 assessment scores and ratings for quality of the fish and macroinvertebrate communities and habitat are expected to increase as sedimentation rates decline, embeddedness decreases, and habitat diversity increases. These latter characteristics will serve to demonstrate improvement in habitat conditions, WQS attainment, and overall stream quality as expressed through an acceptably rated biological community.

TMDL DEVELOPMENT

The TMDL represents the maximum loading that can be assimilated by a water body while still achieving WQS. The Swift Run Creek biotic community has been impaired by unstable flow conditions, bank erosion, and excessive sedimentation. Therefore, the TMDL is based on reducing sediment loads throughout the watershed to a level that supports a biological community that meets WQS. Using the metrics from Procedure 51, a minimum numeric score of -4 for macroinvertebrate communities and a habitat score of 110 or greater will serve as primary targets for this biota TMDL.

Concurrent with the selection of numeric endpoints, this TMDL also defines the environmental conditions that will be used when defining allowable levels. Some TMDLs are designed around the concept of critical condition. A critical condition is defined as the set of environmental conditions that, if controls are designed to protect, will ensure attainment of objectives for all other important conditions. For example, the critical conditions for the control of point sources in Michigan are provided in Rules 323.1082 and 323.1090 of Michigan's WQS. In general, the lowest monthly 95% exceedance flow for a stream is used to establish effluent limits for point sources. However, the excessive flows to Swift Run Creek are attributable to wet-weather driven discharges. As such, there is no single condition that is protective for all conditions, but efforts are directed towards wet-weather runoff/washoff events.

The secondary target of 80 mg/l TSS is used to develop a TMDL load goal for TSS during wet-weather runoff/washoff events, especially from storm water discharges from the area 1,918 total acres) of urban/industrial/built-up land use category that represents about 66% of the land use area in the Swift Run Creek watershed.

ALLOCATIONS

TMDLs are comprised of the sum of individual WLAs for permitted point sources and LAs for NPS and natural background levels. A margin of safety (MOS), either implicit or explicit, accounts for uncertainty in the relationship between pollutant loads and the quality of the receiving waters. Conceptually, this relationship is defined by the equation:

$$TMDL = \Sigma^{WLAs} + \Sigma^{LAs} + MOS$$

The TMDL represents a maximum load of a pollutant or stressor that can be discharged to a receiving water and still meet WQS. The overall TMDL load capacity is allocated among the three TMDL components: WLA for point sources, LA for NPS and background loads, and the MOS.

WLA

The estimated total annual TSS load from all non-storm water NPDES permitted point sources is zero (Table 1) since there are none in the watershed.

Based on acres of land use categories listed under "Urban/Industrial/Built-Up" of Table 3 and TSS export coefficients derived from the Rouge River Project (Cave et al., 1994), a total annual TSS load estimate of approximately 511,844 pounds is attributable to NPDES industrial and municipal permitted storm water runoff/washoff discharges to the Swift Run Creek watershed (Table 3). All categories are predicted to be meeting the 80 mg/L target secondary target, with the exception of the industrial category, which is predicted to be contributing an average of 149 mg/L TSS to Swift Run Creek (Cave et al., 1994). To achieve the goal of 80 mg/L as an annual average during wet weather events from all point sources, a reduction of only 1% in TSS loads would be necessary from all permitted point sources, resulting in a projected annual WLA of 507,278 pounds of TSS (Table 3).

For individual and general NPDES permitted point source discharges, the receiving stream design flow equals the lowest 95% exceedance flow. However, it is proposed that any TSS limits in NPDES point source permits be established at an effluent limit based on best available treatment (BAT) so as to minimize TSS loads to Swift Run Creek, which then makes it unnecessary to consider mixing zone scenarios. The permitted storm water point source contributions to the WLA are also considered controllable through the existing NPDES permit requirements and storm water through the Phase I and Phase II MS4 programs.

To achieve the primary (biota) and secondary (TSS) TMDL targets, NPDES permitted individual, general, and storm water 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 within the TMDL reach. It will be necessary to employ BAT (applied to individual or general point sources) or "maximum extent practicable" treatment (storm water point sources) that will attenuate the runoff delivery rates and volume inputs to Swift Run Creek in order to reduce flashiness, better stabilize and normalize stream flow conditions, and minimize stream bank erosion, TSS resuspension, and sedimentation impacts.

LA

The LA component of the TMDL defines the load capacity for a pollutant that is nonpoint in origin that includes the following land use categories: agricultural, forested/shrub/open land, and/or water bodies (Table 1). An estimated annual TSS load of 40,945 pounds (LA) is attributed to these categories of NPS in the watershed. All but the agricultural land uses are treated as background load sources because runoff concentrations of TSS are typically less than 80 mg/l. Therefore, the only targeted load reduction source is from agricultural sources, which has a runoff average TSS concentration of 149 mg/l (Cave et al., 1994). A 46% annual reduction (from 23,868 to 13,168 pounds) from agricultural areas in the watershed is recommended resulting in the annual LA, TSS load target of 30,245 pounds, based on achieving a runoff mean annual average concentration of 80 mg/l TSS, the target concentration during wet-weather runoff/washoff events.

In summary, the proposed accumulative annual TSS load estimate to Swift Run Creek (WLA + LA) is 537,523 pounds/year, an overall 3% reduction from existing estimated loads. With the absence of any individual or general NPDES non-storm water permitted point source discharges in the Swift Run Creek watershed, 0% of the annual load is allocated to individual or general NPDES permitted point sources, 94% (507,278 pounds/year) is allocated to the NPDES permitted industrial storm water and the municipal storm water outfalls covered under the Phase I and Phase II MS4 Storm Water Programs, and 6% (30,245 pounds/year) attributed to the LA.

Suspended solids data from the 2003 LTI study indicate that there are sources either unaccounted for, and/or underestimated, in terms of suspended solids contributions to Swift Run Creek. Land use data used to develop the LA and WLA projections for suspended solids do not predict the elevated TSS concentrations observed during the 2003 wet-weather events; e.g., up to 1115 mg/L TSS. Possibilities for the inconsistency between the modeled WLA/LA TSS contributions and the observed TSS concentrations are underestimated contributions from land use practices and/or sources of TSS originating in-stream (e.g. resuspension and/or stream bank erosion during wet-weather events). The latter is likely the most probable cause for the elevated TSS concentrations observed as evidenced by the increases in both TSS concentrations and flow during wet-weather events.

To achieve the primary and secondary TMDL targets, a reduction in the wet-weather runoff/washoff of TSS load through controls in the runoff rates and volume discharges are necessary. It will require employing BMPs that attenuate the runoff delivery rates and volume inputs to Swift Run Creek in order to reduce flashiness, better stabilize and normalize stream flow conditions, and minimize stream bank erosion, TSS resuspension and excessive sedimentation that impacts habitat quality.

MOS

The MOS in a TMDL is used, in part, to account for variability of source inputs to the system and is either implicit or explicit. An MOS is implicit for a biota TMDL because the quality of the biological community, its integrity, and overall composition represent an integration of the effects of the spatial and temporal variability in sediment loads to the aquatic environment.

The habitat score of equal to or greater than 110 will be used to demonstrate acceptable stream quality conditions and represent adequate control of anthropogenic sediment sources to assure improved habitat quality and the biological communities. This targeted score is closely associated with macroinvertebrate community scores of -3 or greater, potentially providing better results than a minimally acceptable value of -4.

For comparison of survey assessment with results from 2003, follow-up biological and habitat quality assessments will be conducted during stable flow conditions during the months of June through September. The results will best reflect an MOS that is implicit and expresses integration of the effects of the variability in sediment loads in the aquatic environment and minimize seasonal variability.

SEASONALITY

Seasonality is addressed in the TMDL in terms of sampling periods for fish and macroinvertebrate communities. To minimize temporal variability in the biological community, sampling will be conducted during June through September of each year during stable, low flow conditions. For assessing TSS loads to Swift Run Creek, seasonal event monitoring will be conducted to define and characterize both hydraulic and TSS loads from the Swift Run Creek watershed that influences the biota TMDL reach.

MONITORING PLAN

Monitoring will be conducted by the MDEQ to assess progress towards meeting the biota and habitat TMDL targets following implementation of applicable BMPs and control measures. Subsequently, annual sampling of the macroinvertebrate community and habitat quality at locations in the vicinity of Hogback Road and Shetland Drive, as a minimum, will be conducted

until assessment results from two consecutive years demonstrate attainment of TMDL targets at these sites. For best comparative purposes, follow-up biological and habitat assessments will be conducted in a June to September time frame, during stable flow conditions. Every effort will be made to sample during similar stream conditions and assess the same sampling locations.

In-stream monitoring of TSS, stream flow, and representative land use runoff/washoff characteristics for a variety of stable flow and wet-weather events will be necessary to refine the TSS loadings estimates for the Swift Run Creek watershed. This information will further define the level of TSS load reduction necessary, seasonally, climatologically, and annually.

Once the BMPs are in place to minimize the effects of runoff and flashy conditions that exist in Swift Run Creek, stream flow and TSS sampling can be implemented so as to measure progress towards the secondary numeric target of 80 mg/l as a mean annual TSS value during wet-weather runoff events. Multiple sampling during critical high flow events, as well as low flow events, needs to be conducted to estimate future TSS loads in Swift Run Creek.

REASONABLE ASSURANCE

The focus of the actions to protect Swift Run Creek is primarily directed towards installing BMPs and other control measures to reduce and minimize solids loads with primary emphasis on reducing runoff peak flows that result in increased flow flashiness in the stream that substantially increases TSS concentrations resulting from resuspension and bank erosion. Control measures potentially include industrial and municipal storm water discharge volume, chemical-specific permit limits, and approved BMPs for areas currently not under any permit.

Rule 323.2161a(8), adopted pursuant to Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), allows that "A permittee shall comply with any more stringent effluent limitations in the national permit, including permit requirements that modify or are in addition to, the minimum measure based on a total maximum daily load (TMDL) or equivalent analysis." In addition, Rule 323.2161a(10) allows that the "department may establish monitoring requirements in accordance with state or watershed specific monitoring plans ar as needed for a permitte to demonstrate the pollution reduction achieved by implementing best management practices." For sites of new construction, the rules specifically require development of a program to evaluate the post-construction storm water runoff from projects, including an ordinance designed to prevent or minimize water quality impacts including extreme flow volumes and conditions.

The regulatory mechanisms are available to reduce the storm water impacts of the urban/industrial/built-up sources on Swift Run Creek. Where the necessary data are available, permit requirements will be established in the NPDES permits. Where necessary, additional data to determine specific loadings and flow volumes associated with these sources will be collected through the NPDES permit requirements.

In addition to establishment of permit requirements, the NPDES storm water permittees in the watershed (industrial, Phase I, or Phase II) are required to collectively develop a watershed management plan that includes the detailing of short- and long-term goals and attainment actions, public education plans, illicit discharge elimination plans, and the development (by each local unit of government within the Swift Run Creek watershed) of their individual storm water prevention plans. The Ann Arbor Township and Pittsfield Township master plans acknowledge that proposed actions for the Swift Run Creek watershed are needed to manage both quality and quantity issues to be consistent with Phase I and II water practices for construction and

postconstruction activities (Ann Arbor Township Planning Commission, 2001 and Pittsfield Township, 2001).

The MDEQ district staff will continue to work with and assist interest groups in the Swift Run Creek watershed to assist in defining and designing approvable actions and programs that assess, develop, plan, and implement BMPs and control measures that best minimize or prevent soil erosion and excessive runoff rates to the Swift Run Creek watershed.

Recommended actions include:

- Through monitoring of point source discharges, identify sources of excessive wet-weather TSS loadings and flow volumes to Swift Run Creek through NPDES permit conditions. Establish permit conditions as necessary.

- Upgrade and maintain the current vegetative riparian zone to reduce soil erosion and loadings to Swift Run Creek from sources within the watershed. BMPs need to be employed within the riparian zone adjacent to the urbanized, residential, industrialized, and commercial areas to minimize the loss through erosion and direct runoff/washoff, thereby minimizing habitat impairment of Swift Run Creek.

- Implementation of BMPs in the storm water permits program that reduces sediment loadings and moderate runoff release rates and excessive runoff/washoff to the Swift Run Creek watershed are expected to improve and protect designated use support throughout the watershed. The goals are for reduced solids loadings and greater flow stability throughout the watershed so that WQS are restored and protected. Available guidance regarding runoff detention and stream protection is provided by Fongers and Fulcher, 2001; and Schueler and Holland, 2000.

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Surface Water Assessment Section
Water Bureau
Michigan Department of Environmental Quality
November 29, 2004

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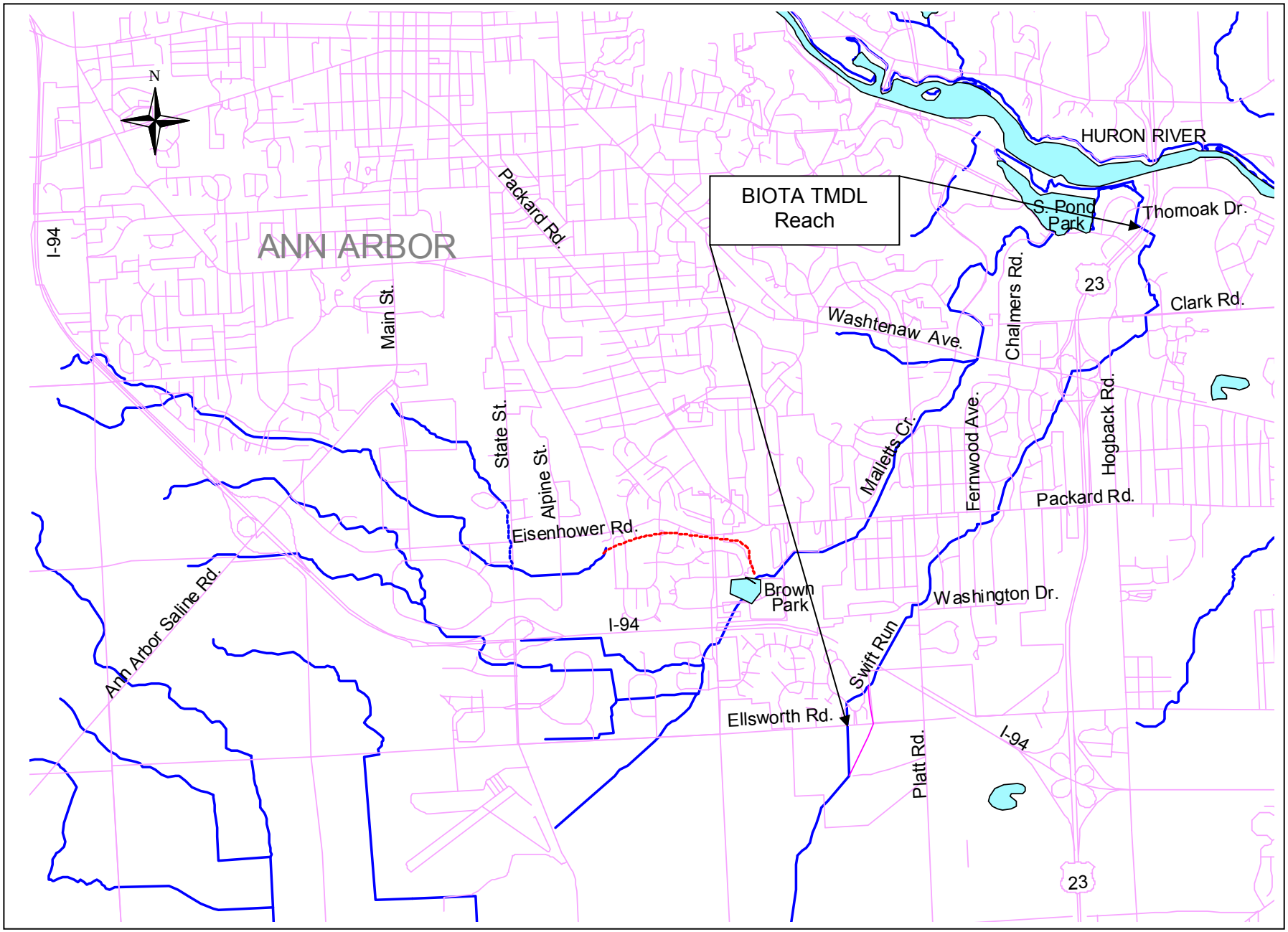

Figure 1. Swift Run Creek Biota TMDL Reach, Washtenaw County, Michigan (MIRIS, 2003).

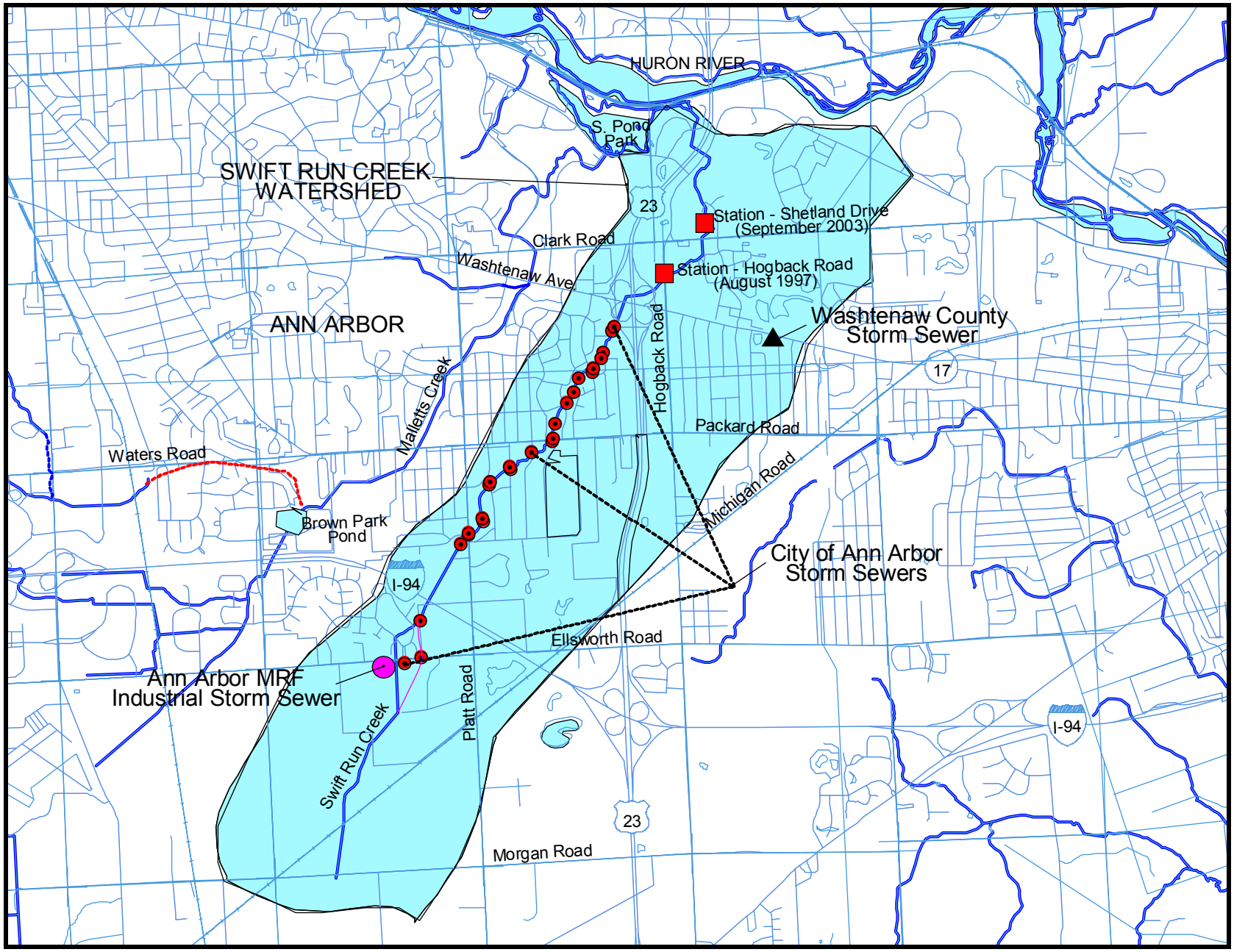

Figure 2. Washtenaw County Phase I storm sewer outfall, city of Ann Arbor managed storm sewers, industrial storm sewer, and biological community assessment sites (August 1997 and September 2003). Source: Scott Wade – (LTI. 2003a).

Table 1. Industrial storm water NPDES permitted outfall tributary to the Swift Run Creek watershed (Source: MDEQ/WB NPDES permit Management System).

FACILITY NAME	PERMIT NUMBER	DESIGN FLOW	LATITUDE (decimal degrees)	LONGITUDE (decimal degrees)
Ann Arbor MRF	MIS410029	unknown	42.2275	-83.7147

Table 2. Washtenaw County Phase I – MS4 Program storm sewer outfalls in the Swift Run Creek watershed managed by the city of Ann Arbor and Washtenaw County (Source: Scott Wade – LTI. 2003a).

Storm Water NPDES Permits (Phase 1 – MS4 Program):

- Washtenaw County **(1 outfall)**
- City of Ann Arbor **(25 outfalls)**

Table 3. Land use categories and TSS loads in the Swift Run Creek watershed, Washtenaw County, Michigan (Source: Scott Wade – LTI [2003a] using 2002 [Ann Arbor] and 1998 [Township] land use coverages).

Source Category	Acres	Estimate Current TSS (pounds/year)*	TMDL TSS Target Load TSS (pounds/year)
WLA Components:			
NPDES Non-Storm Water TSS Load		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/Comm/Util.	600	177,526	177,526
Subtotal:		511,844	507,278 (<1% reduction)
WLA Total:	1,918	511,844	507,278 **(WLA)**
LA Components:			
Agricultural Land			
Cropland	349	23,868	13,168 (45% reduction)
(Background Sources)			
Forested/Shrub/Open Land			
Open Land/Shrub/Range Land	702	16,886	16,886
Water Body			
Lake/Reservoir	9	191	191
LA Subtotal:	1,541	40,945	30,245 **(LA)**
Overall Totals:	2,978	552,789	537,523 (overall 3% reduction)

**TSS load estimates based on PLoad Version 3 model (USEPA, 2001), land use acres derives from 2002 land use database coverage for Ann Arbor, 1998 land use coverage for the townships, and a mean annual rainfall value of 34 inches,*

HURON RIVER 2013 SRF PROJECT PLAN

PREPARED FOR

Huron River Green Infrastructure Drainage District

APPENDIX F
AGENCY CONTACT LETTERS

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January 20, 2013

Bay Mills Indian Community
12214 West Lakeshore Drive
Brimley, MI 49715-9320

Attn: Wanda Perron

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Wanda Perron:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous concrete, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

Washtenaw County has decided to pursue financial assistance for these improvements from the State of Michigan through the State Revolving Fund (SRF). A Project Plan is the required first step in applying for a SRF loan. The SRF Project Plan requirements state that your office is to be notified so that a determination can be made of whether the proposed project could impact religious or culturally significant tribal lands in the vicinity of the project. Maps of the project areas are attached.

Please inform us of your findings at your earliest convenience. Should you have any questions or require additional information regarding this matter, please contact the undersigned.

Very truly yours,
HUBBELL, ROTH & CLARK, INC.
Karyn M. Stickel, P.E.
Staff Engineer
KMS/djr
5 Enclosures
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Michael D. Waring
Keith D. McCormack
Nancy M.D. Faught
Daniel W. Mitchell

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James F. Burton
Jane M. Graham
Donna M. Martin
Charles E. Hart

January 20, 2013

Burt Lake Band of Ottawa and Chippewa
6461 Brutus Road
PO Box 206
Brutus, MI 49716

Attn: Curtis Chambers

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Mr. Chambers:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous concrete, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

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Please inform us of your findings at your earliest convenience. Should you have any questions or require additional information regarding this matter, please contact the undersigned.

Very truly yours,
HUBBELL, ROTH & CLARK, INC.
Karyn M. Stickel, P.E.
Staff Engineer
KMS/djr
5 Enclosures
PDF: HRC; File

555 Hulet Drive, PO Box 824
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Charles E. Hart

January 20, 2013

Grand River Band of Ottawa Indians
1251 Plainfield NE ste B
PO Box 2937
Grand Rapids, MI 49501

Attn: Ron Yob

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Mr. Yob:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous concrete, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

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January 20, 2013

Grand Traverse Band of Ottawa and Chippewa Indians
2605 NW Bayshore Drive
Peshawbetown, MI 49682

Attn: Derek J. Bailey

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Mr. Bailey:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous concrete, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

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January 20, 2013

Hannahville Potawatomi Indian Community
14911 Hannahville B-1 Road
Wildon, MI 49896

Attn: Earl Meshigaud

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Mr. Meshigaud:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous concrete, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

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January 20, 2013

Keweenaw Bay Indian Community
16429 Beartown Road
Baraga, MI 49908

Attn: Summer Sky Cohen

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Summer Sky Cohen:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous concrete, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

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January 20, 2013

Lac Vieux Desert Band of Lake Superior Chippewa Indians
PO Box 249
Watersmeet, MI 49969

Attn: Giiwegiizhigookway Martin

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Giiwegiizhigookway Martin:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous concrete, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

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Karyn M. Stickel, P.E.
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January 20, 2013

Little River Band of Ottawa Indians
375 River Street
Manistee, MI 49660

Attn: Jay Sam

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Jay Sam:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous concrete, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

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HUBBELL, ROTH & CLARK, INC.
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January 20, 2013

Little Traverse Bay Band of Odawa Indians
7500 Odawa Circle
Harbor Springs, MI 49740

Attn: Eric Hemenway and Gijigowi Bipskaabiimii

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Eric Hemenway and Gijigowi Bipskaabiimii:

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January 20, 2013

Match-e-be-nash-shee-wish Band of Potawatomi Indians
PO Box 218
Dorr, MI 49323

Attn: Ed Pigeon

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Mr. Pigeon:

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January 20, 2013

Nottawaseppi Band of Huron Potawatomi
2221 1½ Mile Road
Fulton, MI 49052

Attn: RoAnn Beebe

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear RoAnn Beebe:

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January 20, 2013

Pokagon Band of Potawatomi
PO Box 180
Dowagiac, MI 49047

Attn: Mark Parrish

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Parrish:

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January 20, 2013

Saginaw Chippewa Indian Tribe of Michigan
6650 East Broadway
Mount Pleasant, MI 48858

Attn: William Johnson

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Mr. Johnson:

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James F. Burton
Jane M. Graham
Donna M. Martin
Charles E. Hart

January 20, 2013

Sault Ste. Mariw Tribe of Chippewa Indians
523 Ashmun
Sault Ste. Marie, MI 49783

Attn: Cecil E. Pavlat Sr.

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Mr. Pavlat:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous concrete, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

Washtenaw County has decided to pursue financial assistance for these improvements from the State of Michigan through the State Revolving Fund (SRF). A Project Plan is the required first step in applying for a SRF loan. The SRF Project Plan requirements state that your office is to be notified so that a determination can be made of whether the proposed project could impact religious or culturally significant tribal lands in the vicinity of the project. Maps of the project areas are attached.

Please inform us of your findings at your earliest convenience. Should you have any questions or require additional information regarding this matter, please contact the undersigned.

Very truly yours,
HUBBELL, ROTH & CLARK, INC.
Karyn M. Stickel, P.E.
Staff Engineer
KMS/djr
5 Enclosures
PDF: HRC; File

555 Hulet Drive, PO Box 824
Bloomfield Hills, Michigan 48303-0824
Telephone 248 454 6300 **Fax** 248 454 6312
www.hrc-engr.com

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January 20, 2013

Michigan Department of Environmental Quality
Constitution Hall, 525 West Allegan
Lansing, Michigan 48913
Attn: John Skubinna

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Mr. Skubinna:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous pavement, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

Washtenaw County has decided to pursue financial assistance for these improvements from the State of Michigan through the State Revolving Fund (SRF). A Project Plan is the required first step in applying for a SRF loan. The SRF Project Plan requirements state that your office is to be notified so that a determination can be made of whether the proposed project could impact any Land-Water interfaces. It has been determined that this project will not affect any undeveloped coastal areas along the shores of the Great Lakes. Where work may be within a regulated sensitive habitat, such as a wetland, stream, or floodplain, there will be mitigation as part of the design and permit process per the requirements of Act 452 of 1994, as amended. Your office will be contacted and proper action shall be taken should the work require any new or updated permits.

The project locations can be found at Township 02 S Range: 06 E, Sections 23, 26, 27, 34 and 3; and Township: 03 S Range: 06 E Sections 5, 6, 8 and 9 on the Ann Arbor West, Ann Arbor East, Saline, Ypsilanti West USGS quadrangle maps. Maps of the project areas are attached. Please inform us of your findings at your earliest convenience. Should you have any questions or require additional information regarding this matter, please contact the undersigned at 248-454-6566.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.

Karyn M. Stickel, P.E.
Staff Engineer

KMS/djr
Enclosure
PDF: HRC; File

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January 20, 2013

MDEQ Jackson District Office
301 E. Louis Glick Hwy.
Jackson, MI 49201
Attn: James Sallee

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

Dear Mr. Sallee:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous pavement, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

Washtenaw County has decided to pursue financial assistance for these improvements from the State of Michigan through the State Revolving Fund (SRF). A Project Plan is the required first step in applying for a SRF loan. The SRF Project Plan requirements state that your office is to be notified so that a determination can be made of whether the proposed project could impact any Land-Water interfaces. It has been determined that this project will not affect any undeveloped coastal areas along the shores of the Great Lakes. Where work may be within a regulated sensitive habitat, such as a wetland, stream, or floodplain, there will be mitigation as part of the design and permit process per the requirements of Act 452 of 1994, as amended. Your office will be contacted and proper action shall be taken should the work require any new or updated permits.

The project locations can be found at Township 02 S Range: 06 E, Sections 23, 26, 27, 34 and 3; and Township: 03 S Range: 06 E Sections 5, 6, 8 and 9 on the Ann Arbor West, Ann Arbor East, Saline, Ypsilanti West USGS quadrangle maps. Maps of the project areas are attached. Please inform us of your findings at your earliest convenience. Should you have any questions or require additional information regarding this matter, please contact the undersigned at 248-454-6566.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.

Karyn M. Stickel, P.E.
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KMS/djr
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Memorandum

To: Karol Patton, MDEQ SRF

From: Sally L. Duffy, P.E.

Date: April 23, 2013

Subject: MNFI Rare Species Review – Huron River 2013 SRF Project Plan

HRC Job No. 20120639.02

As of November 1, 2012, the rare species review required as part of the State Revolving Fund (SRF) planning process is completed through the Michigan State University Extension Michigan Natural Features Inventory (MNFI), rather than the Michigan Department of Natural Resources (MDNR). Previously, the MDNR would identify the potentially affected species and provide a letter for use by the SRF staff to assist with their required environmental review. The MNFI process only identifies species that may be impacted, but does not provide a clearance letter. We have therefore prepared this memorandum to summarize the available information related to the rare species.

HRC submitted a request to the MNFI in accordance with SRF guidelines, and received a letter response from Michael Sanders of the MNFI office, dated April 1, 2013. This letter provided a list of all possible species in the vicinity of the project, and included a "comments" section that included only the species that could potentially be impacted by the proposed projects. The information provided by the MNFI is attached for reference.

The species of concern for the projects proposed in the City's Project Plan are as follows:

- State threatened plant mat muhly (*Muhlenbergia richardsonis*)
- State threatened plant white lady-slipper (*Cypripedium candidum*)
- State threatened plant edible valerian (*Valeriana edulis var. ciliata*)
- State threatened plant Leiberg's panic grass (*Dichanthelium leibergii*)
- State threatened plant toadshade (*Trillium sessile*)
- State threatened plant goldenseal (*Hydrastis canadensis*)
- State threatened mussel purple wartyback (*Cyclonaias tuberculata*)
- State threatened butterfly Dukes' skipper (*Euphyes dukesi*)
- State endangered plant purple turtlehead (*Chelone obliqua*)
- State endangered bird Peregrine falcon (*Falco peregrinus*)

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Potential Long-Term Impacts:

Since the primary purpose of these projects is to improve water quality and many projects will include additional native plantings to increase infiltration of stormwater, HRC does not anticipate any long-term negative impacts to any of the listed species. In fact, the projects are designed improve habitat by reducing pollutant and sediment loads to surface waters, and to provide additional habitat opportunities by conversion of impervious surfaces to pervious.

Potential Temporary Short-Term Impacts:

Temporary, short-term impacts due to construction will be mitigated by proper soil erosion and sedimentation control and by applying for any MDEQ permits required for work in surface waters, wetlands and/or floodplains. Regarding the two endangered species listed, the Peregrine falcon and purple turtlehead plant, we do not anticipate that the short-term construction impacts will affect either species. The Peregrine falcon has been known to nest on University of Michigan Bell Tower on campus and no work is proposed in this area. We understand there have only been two known occurrences of the purple turtlehead plant in Michigan, with one being at Argo Park, located at 1437 Longshore Dr. in Ann Arbor. There is no work proposed at this location; the nearest projects in this Section are located across the Huron River in the downtown area along Main Street.

For the threatened species listed, the mat muhly, white lady-slipper and edible valerian have been found in ditches along Huron Parkway, north of the Huron River, and we anticipate no short-term impacts from the Miller Creek bank stabilization project, which is the only one proposed in this vicinity. Leiberg's panic grass and the Duke's skipper butterfly were found in South Pond Nature Area, and there are no projects proposed at this location. Toadshade was found in Eberwhite Woods, and no projects are proposed at this location. Goldenseal was found in Bird Hill Nature Preserve, and there are no projects in this vicinity. The purple wartyback mussel has been known to occur along the entire stretch of the Huron River, and again, no projects are proposed within the Huron River.

HRC therefore does not anticipate that the endangered or threatened species found in this area and/or their respective habitats will be adversely affected by the proposed projects in either the long or short term, and suggest no further actions are required in this matter. We do anticipate, in fact, a positive impact due to reduction of impervious surfaces and improved water quality.

MICHIGAN STATE UNIVERSITY | Extension

Information Agreement

The Michigan Natural Features Inventory (MNFI) is a member of the Natural Heritage Program Network and is part of Michigan State University Extension Service and the Michigan Department of Natural Resources. MNFI is an organization of professionals dedicated to the conservation of Michigan's special natural features. MNFI has the responsibility for inventorying and collecting information about the state's "elements of biological diversity". These data are used to guide conservation and land management activities throughout the state.

The MNFI database is an ongoing and continuously updated information base. The database is the only comprehensive single source of existing information on Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features. This database cannot provide a definitive statement on the presence, absence, or condition of the natural features in any given locality, since most sites have not been specifically or thoroughly surveyed. Furthermore, plant and animal populations and natural communities change with time. Therefore, the information services provided should not be regarded as a complete statement on the occurrence of special natural features of the area in question. In many cases the information may require the interpretation of a trained scientist.

The recipient(s) of the information understand that state endangered and threatened species are protected under state law (Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection). Any questions, observations, new findings, violations or permitting of project activities should be conducted with the Michigan Department of Natural Resources, Wildlife Division. Contact the Endangered Species Coordinator at (517) 373-1263. The recipient(s) of the information understand that federally endangered and threatened species are protected under federal law (Endangered Species Act of 1973). Any questions, observations, new findings, violations or permitting of project activities should be conducted with the U.S. Fish and Wildlife Service in East Lansing. Their phone number is (517) 351-2555. Recipients of the information are responsible for ensuring the protection of protected species before project activities begin.

MNFI is not a for-profit entity and fees for the data are turned back into database maintenance and program support. The costs for information can be obtained on our website MNFI.ANR.MSU.EDU **u**nder the services heading.

By acceptance of the information services made available through MNFI, the recipient understands that access to the information is provided for primary use only. MNFI requests that the user respect the confidential and sensitive nature of the information and restrict access to only those individuals requiring the information for the primary use. There should be no redistribution of the information. Indiscriminate distribution of information regarding locations of many rare species represents a threat to their protection. Additionally, since the information is constantly being updated MNFI requests that any information service provided by MNFI is destroyed upon completion of the primary use. This information should be considered valid for one year only.

The user should identify MNFI as information contributors on any map or publication using MNFI information, as follows: **Michigan Natural Features Inventory. 2013. Biotics 4 - Michigan's Natural Heritage Database. Lansing, Michigan. (Accessed: Month Day, 2013).** Abbreviations are acceptable on maps if referenced in full on accompanying documents.

MSU EXTENSION

Michigan Natural Features Inventory

P.O. Box 13036
Lansing, MI 48901

(517) 373-1552
fax: (517) 373-9566

mnfi.anr.msu.edu

Rare Species Review # 1214 - Installation of stormwater Best Management Practices to reduce non-point

☒ Standard turn around

☐ Rush order

Project or primary use of Information: Spatial data for legally protected species and other rare natural features.

Description of information: T2S, R6E, Several sections

Thomas W. Roberts
Recipient (Please Print)

Thomas W. Roberts
Signature

Hubbell, Roth & Clark, Inc.
Organization/Association

3/20/13
Date

MSU is an affirmative-action, equal-opportunity employer.

MICHIGAN STATE UNIVERSITY | Extension

Thomas W. Roberts
Hubbell, Roth & Clark, Inc.
555 Hulet Drive
P.O. Box 824
Bloomfield Hills, MI 48303-0824

April 1, 2013

Re: Rare Species Review #1214– Stormwater Best Management Practices Project, Washtenaw County, MI T02N R06E several sections and T03S R06E Sections 6, 6, 8 & 9.

Mr. Roberts:

The locations for the proposed projects were checked against known localities for rare species and unique natural features, which are recorded in the Michigan Natural Features Inventory (MNFI) natural heritage database. This continuously updated database is a comprehensive source of existing data on Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features. Records in the database indicate that a qualified observer has documented the presence of special natural features. The absence of records in the database for a particular site may mean that the site has not been surveyed. The only way to obtain a definitive statement on the status of natural features is to have a competent biologist perform a complete field survey.

MSU EXTENSION

Michigan Natural Features Inventory

PO Box 13036
Lansing MI 48901

(517) 373-1552
Fax (517) 373-9566

mnfi.anr.msu.edu

Under Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection, "a person shall not take, possess, transport, …fish, plants, and wildlife indigenous to the state and determined to be endangered or threatened," unless first receiving an Endangered Species Permit from the Michigan Department of Natural Resources (MDNR), Wildlife Division. Responsibility to protect endangered and threatened species is not limited to the lists below. Other species may be present that have not been recorded in the database.

According to the natural heritage database, it is **possible** that listed species will be impacted by this activity. However, MNFI cannot fully assess potential impacts without an on-site survey. Be mindful that MNFI is not a regulatory agency. MDNR Wildlife Division is responsible for issuing permits and enforcement relative to the take of endangered and threatened species. These data can be submitted to the Wildlife Division should it be determined this project requires an endangered species permit. Their contact person is Lori Sargent, MDNR Wildlife Division, P.O. Box 30180, Lansing, MI 48909. Phone: 517.373.1263, email: SargentL@michigan.gov. Should MDNR require more information regarding your project, MNFI offers more detailed reviews including field surveys which I would be happy to discuss with you.

Sincerely,

Michael Sanders
Environmental Review Specialist/Zoologist
Michigan Natural Features Inventory

MSU is an affirmative-action, equal-opportunity employer.

Comments for Rare Species Review #1214

Please refer to Michigan Natural Features Inventory's Rare Species Explorer http://mnfi.anr.msu.edu/explorer/search.cfm for additional species information.

T2S R6E Sections 26 & 27

The state threatened plant **mat muhly** (*Muhlenbergia richardsonis*) has been observed along the S side of Glacier Way just E of Huron Parkway on the E side of a ditched stream. This species is a very slender, wiry, warm season grass that grows in loose to dense tufts or mats that are 2-6 cm tall. In southern Michigan, this species inhabits prairie fens, and in northern Michigan, it is found in alvar communities. Mat muhly flowers from July through September. Fire is an important component of this species' ecology.

The state threatened **white lady-slipper** (*Cypripedium candidum*) has been documented in the same area as mat muhly record above. In Michigan, white lady-slipper occurs primarily in prairie fens and other marly, alkaline sites usually associated with groundwater seepage areas. Prairie fens are herb or herb-shrub wetlands on muck, through which flows groundwater rich in calcium and magnesium carbonates. Sedge meadows, mesic prairie plants, tamarack and dogwood are characteristic plants of fens. Fens are commonly found adjacent to lake and stream systems. White lady-slipper also occurs in wet prairies in southwestern Michigan (also its habitat in the thumb region), which is similar to its typical habitat--tallgrass prairie--outside Michigan. Flowering occurs in late April to May. Prevention of hydrological changes is a necessary prerequisite for maintaining viable fen habitat.

The state threatened **edible valerian** (*Valeriana edulis var. ciliata*) has been known to occur on the S side of Glacier Way, just E of Huron Parkway. This plant inhabits fens, meadows, and wet prairies. Flowering occurs in May and June.

The state threatened mussel **purple wartyback** (*Cyclonaias tuberculata*) has been known to occur along the entire stretch of the Huron River. The purple wartyback mussel inhabits medium to large rivers that have gravel or mixed sand and gravel substrates. Suitable habitat for fish host species must be present for purple wartyback reproduction to be successful. Known hosts for the purple wartyback are the yellow bullhead (*Ameiurus natalis*) and channel catfish (*Ictalurus punctatus*), in addition there may be others. If allowed to, purple wartybacks likely live to over 25 years of age. Freshwater mussels (Unionida) require a fish host to complete their life cycle. Eggs are fertilized and develop into larvae within the gills of the female mussel. These larvae, called glochidia, are released into the water and must attach to a suitable fish host to survive and transform into the adult mussel. The purple wartyback is a summer breeder with fertilized eggs and glochidia released during one summer.

T2S R6E Section 35

The state threatened **Leiberg's panic grass** (*Dichanthelium leibergii*) has been observed in South Pond Park in Ann Arbor. Leiberg's panic-grass inhabits a variety of dry to wet prairie remnants, including railroad right-of-ways. In the main portion of its range this is a characteristic grass of dry prairie and open woodlands. This grass flowers from early to mid-June, and fruits ripen and are shed by mid-September.

The state threatened **Dukes' skipper** (*Euphyes dukesi*) has been observed in South Pond South sedge meadow off Huron River Dr. east from Huron Parkway. Dukes' skipper is found in Michigan in dense stands of the **wide-leaf sedge** (*Carex lacustris*), usually in association with forested swamps and brushy wetlands

with sedges. Adults nectar on buttonbush (*Cephalanthus occidentalis*), swamp milkweed (*Asclepias incarnata*), and joe-pye-weed (*Eupatorium maculatum*). In Michigan, the adult flight period is from late June to early August. The primary threat to this species is the loss of the drainage or destruction of the wetland habitat on which it depends.

T2S R6E Section 28

The state endangered **Peregrine falcon** (*Falco peregrinus*) has been known to nest on University of Michigan Bell Tower on campus. This species prefers open habitats such as grasslands, tundra, and meadows. They nest on cliff faces, crevices or tall manmade structures usually along a major waterway. They have been very successful in urban areas because tall buildings are suitable for nesting in this species, and because of the abundance of pigeons as prey items. The Peregrine falcon is monogamous, and males and females may mate for life. Nest sites may be reused for many years running. Nest height varies from 15 to 60 m. They do not build nests; rather they prefer to lay their eggs on gravelly substrates. Three or four white or pinkish, brown-marked eggs are laid, and are incubated by both sexes, but mostly the female, for about a month. The young fledge in 35 to 42 days, after being fed at the nest. Usually, the male hunts, and the female feeds and broods the chicks.

T2S R6E Section 30

The state threatened **toadshade** (*Trillium sessile*) has been observed in Eberwhite Woods. Toadshade trillium inhabits rich woodlands, particularly favoring limestone and calcareous soils, floodplains and riverbanks. Occasionally it is found on less fertile soils, in rather high, dry limestone woods. This trillium will persist under light pasturing and in fencerows and brushy areas after lumbering. It grows with other local Trillium species such as bleeding heart (*Dicentra sp.),* Hepatica sp., bluebells (*Mertensia virginica*) which is also state threatened, May apple (*Podophyllum peltatum*), wood poppy (*Stylophorum diphyllum*), and violet (*Viola sp*.). Toadshade trillium has a maroon-brown flower which blooms April to mid-May.

T2S R6E Section 20

The state endangered **purple turtlehead** (*Chelone obliqua*) has been observed in Argo Park in Ann Arbor. Throughout its range, purple turtlehead grows in wet, alluvial forests. Purple turtlehead flowers in September. Only two occurrences are known for this species in Michigan.

The state threatened **goldenseal** (*Hydrastis canadensis*) has been known to occur in Bird Hill Park in Ann Arbor. Goldenseal typically inhabits shady, rich, mesic forests, usually under a canopy of beech-sugar maple or oak-sugar maple. It also occurs in moist microhabitats near vernal pools, along streams, or on floodplains, often in moist sandy loam, clay loam, or even organic (muck) soils. This species flowers in early May and produces fruits through September in Michigan. Although H. canadensis populations have been severely diminished through over-harvesting and habitat destruction, it is also a species that can be easily overlooked when obscured by the typical lush vegetation of its forest habitat. Several other state threatened plants often occur in the same habitat as goldenseal.

Codes to accompany Tables 1 and 2:

State Protection Status Code Definitions (SPROT)
E: Endangered
T: Threatened
SC: Special concern
Global Heritage Status Rank Definitions (GRANK)
The priority assigned by NatureServe's national office for data collection and protection based upon the element's status throughout its entire world-wide range. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.
G1 = critically imperiled globally because of extreme rarity (5 or fewer occurrences range-wide or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2 = imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3: Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single western state, a physiographic region in the East) or because of other factor(s) making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
G4: Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
G5: Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
Q: Taxonomy uncertain

State Heritage Status Rank Definitions (SRANK)
The priority assigned by the Michigan Natural Features Inventory for data collection and protection based upon the element's status within the state. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.
S1: Critically imperiled in the state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation in the state.
S2: Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
S3: Rare or uncommon in state (on the order of 21 to 100 occurrences).
S4 = apparently secure in state, with many occurrences.
S5 = demonstrably secure in state and essentially ineradicable under present conditions.
SX = apparently extirpated from state.

Table 1. Legally Protected Species within 1.5 miles of RSR #1214

SNAME	SCOMNAME	FIRSTOBS	LASTOBS	USESA	SPROT	GRANK	SRANK	ELCAT
Populus heterophylla	Swamp or Black cottonwood	1919	1980-05		E	G5	S1	Plant
Acris crepitans blanchardi	Blanchard's cricket frog	1917	1917-11-09		T	G5T5	S2S3	Animal
Eupatorium sessilifolium	Upland boneset	1937	1937-09-17		T	G5	S1	Plant
Muhlenbergia richardsonis	Mat muhly	1979	1981-07-24		T	G5	S2	Plant
Eupatorium sessilifolium	Upland boneset	1997-07-24	2001-10-25		T	G5	S1	Plant
Hydrastis canadensis	Goldenseal	1950-05	1998-05-20		T	G4	S2	Plant
Panax quinquefolius	Ginseng	1938	1980		T	G3G4	S2S3	Plant
Rallus elegans	King rail	1938	1948-05-19		E	G4	S1	Animal
Hydrastis canadensis	Goldenseal	1912	1912-07-19		T	G4	S2	Plant
Poa paludigena	Bog bluegrass	1938	1938-06-05		T	G3	S2	Plant
Hydrastis canadensis	Goldenseal	1937-05-17	1974-05-07		T	G4	S2	Plant
Cypripedium candidum	White lady slipper	1947	1984-06-17		T	G4	S2	Plant
Ranunculus rhomboideus	Prairie buttercup	1924	1924		T	G5	S2	Plant
Hydrastis canadensis	Goldenseal	1863	2000-09-07		T	G4	S2	Plant
Polemonium reptans	Jacob's ladder	1982	1982-05-20		T	G5	S2	Plant
Dichanthelium leibergii	Leiberg's panic grass	1996-06-14	2001-07-16		T	G5	S2	Plant
Zizania aquatica var. aquatica	Wild rice	1909	1918-08-10		T	G5T5	S2S3	Plant
Chelone obliqua	Purple turtlehead	1995-09-30	2001-10-22		E	G4	S1	Plant
Cypripedium candidum	White lady slipper	1971	1981-09-02		T	G4	S2	Plant
Panax quinquefolius	Ginseng	1963	1963		T	G3G4	S2S3	Plant
Valeriana edulis var. ciliata	Edible valerian	1947	1981-07-24		T	G5T3	S2	Plant
Valeriana edulis var. ciliata	Edible valerian	1971	1971-06		T	G5T3	S2	Plant
Asclepias sullivantii	Sullivant's milkweed	2001-07-18	2001-07-18		T	G5	S2	Plant
Morus rubra	Red mulberry	2000-10-27	2000-10-27		T	G5	S2	Plant
Trillium sessile	Toadshade	1999-05	1999-05		T	G4G5	S2S3	Plant
Asclepias purpurascens	Purple milkweed	2001-06-18	2001-06-18		T	G5?	S2	Plant
Spiranthes ovalis	Lesser ladies'-tresses	1997-10-03	1997-10-03		T	G5?	S1	Plant
Clinostomus elongatus	Redside dace		1989-10-10		E	G3G4	S1S2	Animal
Dichanthelium leibergii	Leiberg's panic grass	1996	1996-06-14		T	G5	S2	Plant
Sanguisorba canadensis	Canadian burnet	1981	1991-08-19		E	G5	S1	Plant
Panax quinquefolius	Ginseng	1990	1990		T	G3G4	S2S3	Plant
Clonophis kirtlandii	Kirtland's snake	1997-11-05	1997-11-05		E	G2	S1	Animal
Dichanthelium leibergii	Leiberg's panic grass	1983-09-19	1983-09-19		T	G5	S2	Plant
Hydrastis canadensis	Goldenseal	1994	1994-05-14		T	G4	S2	Plant
Gentiana flavida	White gentian	1918	1981-07-09		E	G4	S1	Plant
Sanguisorba canadensis	Canadian burnet	1924	2001-09-24		E	G5	S1	Plant
Gentiana flavida	White gentian	1924	1924		E	G4	S1	Plant
Gentiana puberulenta	Downy gentian	1861	1867		E	G4G5	S1	Plant
Acris crepitans blanchardi	Blanchard's cricket frog	1950	1950-05-20		T	G5T5	S2S3	Animal
Gentiana flavida	White gentian	1926	1926-09-29		E	G4	S1	Plant
Phoxinus erythrogaster	Southern redbelly dace	1922	1922-05-08		E	G5	S1	Animal
Dichanthelium leibergii	Leiberg's panic grass	1938	1938-06-02		T	G5	S2	Plant
Hydrastis canadensis	Goldenseal	1870	1926-06-04		T	G4	S2	Plant
Cypripedium candidum	White lady slipper	1940	1940-06-09		T	G4	S2	Plant
Cryptotis parva	Least shrew	1902	1944-10-25		T	G5	S1S2	Animal
Linum virginianum	Virginia flax	1862	1862-08-03		T	G4G5	S2	Plant
Aristolochia serpentaria	Virginia snakeroot	1909	1962-06		T	G4	S2	Plant
Valeriana edulis var. ciliata	Edible valerian	1860	1860		T	G5T3	S2	Plant
Carex lupuliformis	False hop sedge	1926	1926-07-21		T	G4	S2	Plant
Hydrastis canadensis	Goldenseal	1935	1935-05-23		T	G4	S2	Plant
Hydrastis canadensis	Goldenseal	1994	1994-04-27		T	G4	S2	Plant
Gentiana flavida	White gentian	1906	1906		E	G4	S1	Plant
Gentianella quinquefolia	Stiff gentian	1860	1924		T	G5	S2	Plant
Acris crepitans blanchardi	Blanchard's cricket frog	1903	1908-05-20		T	G5T5	S2S3	Animal
Euphyes dukesi	Dukes' skipper	2002-07-17	2005-08-02		T	G3	S1	Animal
Euphyes dukesi	Dukes' skipper	2002-07-30	2002-07-30		T	G3	S1	Animal
Euphyes dukesi	Dukes' skipper	1956	1962		T	G3	S1	Animal
Cypripedium candidum	White lady slipper	1960-pre?	1960-pre?		T	G4	S2	Plant
Noturus stigmosus	Northern madtom	1903-10-29	1903-10-29		E	G3	S1	Animal
Phoxinus erythrogaster	Southern redbelly dace	1912-03-31	1922-05-11		E	G5	S1	Animal
Cryptotis parva	Least shrew	1941	1941-10-24		T	G5	S1S2	Animal
Gentianella quinquefolia	Stiff gentian	1997-10-20	1997-10-20		T	G5	S2	Plant
Gentianella quinquefolia	Stiff gentian	1997-09-22	1997-10-22		T	G5	S2	Plant
Dichanthelium leibergii	Leiberg's panic grass	1995-07-24	2001-07-20		T	G5	S2	Plant
Euphyes dukesi	Dukes' skipper	2005-07-12	2005-07-28		T	G3	S1	Animal
Ammodramus henslowii	Henslow's sparrow	2007-06-06	2007-06-29		E	G4	S2S3	Animal
Falco peregrinus	Peregrine falcon	2006	2011		E	G4	S1	Animal
Dichanthelium leibergii	Leiberg's panic grass	1980	2008-06-03		T	G5	S2	Plant
Aristolochia serpentaria	Virginia snakeroot	2008-06-17	2008-06-17		T	G4	S2	Plant
Lampsilis fasciola	Wavyrayed lampmussel	1903			T	G5	S2	Animal
Ligumia recta	Black sandshell	1958-05-17	1958-05-17		E	G5	SNR	Animal
Alasmidonta viridis	Slippershell	1925-07-17	1925-07-17		T	G4G5	S2S3	Animal
Alasmidonta viridis	Slippershell				T	G4G5	S2S3	Animal
Alasmidonta viridis	Slippershell	1928-10-02	1959-10-11		T	G4G5	S2S3	Animal
Epioblasma triquetra	Snuffbox	1958	1958-05-17	E	E	G3	S1	Animal
Silphium laciniatum	Compass plant	1924	1928-06-27		T	G5	S1S2	Plant
Clonophis kirtlandii	Kirtland's snake	1902	1902-07		E	G2	S1	Animal
Galearis spectabilis	Showy orchis	1869	1894-05-23		T	G5	S2	Plant
Morus rubra	Red mulberry	1880	1880-05-18		T	G5	S2	Plant
Cyclonaias tuberculata	Purple wartyback	1903	1997-04		T	G5	S2S3	Animal
Panax quinquefolius	Ginseng	1867	1867		T	G3G4	S2S3	Plant
Myotis sodalis	Indiana bat	1946	1965-05-11	LE	E	G2	S1	Animal
Hydrastis canadensis	Goldenseal	1898	1898-06-08		T	G4	S2	Plant

Table 2: Special concern species and natural communities within 1.5 miles of RSR #1214

SNAME	SCOMNAME	FIRSTOBS	LASTOBS	USESA	SPROT	GRANK	SRANK	ELCAT
Jeffersonia diphylla	Twinleaf	1995	1995-05		SC	G5	S3	Plant
Eragrostis pilosa	Small love grass	1937	1937-09-06		SC	G4	SH	Plant
Euonymus atropurpurea	Wahoo	1992	1992-10-17		SC	G5	S3	Plant
Erynnis baptisiae	Wild indigo duskywing	1995	1997-08-02		SC	G5	S2S3	Animal
Penstemon pallidus	Pale beard tongue	1921	1936-06-07		SC	G5	S3	Plant
Liparis liliifolia	Purple twayblade	2001-06-11	2001-06-11		SC	G5	S3	Plant
Liparis liliifolia	Purple twayblade	1998-10-01	1998-10-01		SC	G5	S3	Plant
Euonymus atropurpurea	Wahoo	1998-07-28	2001-07-11		SC	G5	S3	Plant
Carex squarrosa	Sedge	1998-07-24	1998-07-24		SC	G4G5	S1	Plant
Aster praealtus	Willow aster	2001-09-13	2001-09-13		SC	G5	S3	Plant
Calephelis mutica	Swamp metalmark	1930	1930		SC	G3	S1S2	Animal
Tradescantia virginiana	Virginia spiderwort	1918	1918-05-21		SC	G5	S2	Plant
Angelica venenosa	Hairy angelica		1924-PRE		SC	G5	S3	Plant
Lechea minor	Least pinweed	1924-PRE	1924-PRE		X	G5	SX	Plant
Carex trichocarpa	Hairy-fruited sedge	1996-06-20	1996-06-20		SC	G4	S2	Plant
Microtus pinetorum	Woodland vole	1929	1929-03-21		SC	G5	S3S4	Animal
Liparis liliifolia	Purple twayblade	1994	1994-09-16		SC	G5	S3	Plant
Liparis liliifolia	Purple twayblade	1996	1996-06-25		SC	G5	S3	Plant
Liparis liliifolia	Purple twayblade	1996	1996-06-27		SC	G5	S3	Plant
Carex trichocarpa	Hairy-fruited sedge	1937	1937-07-05		SC	G4	S2	Plant
Liparis liliifolia	Purple twayblade	1996	1996-09-25		SC	G5	S3	Plant
Microtus pinetorum	Woodland vole	1921	1921-07-15		SC	G5	S3S4	Animal
Scirpus clintonii	Clinton's bulrush	1935	1935-05-22		SC	G4	S3	Plant
Strophostyles helvula	Trailing wild Bean	1924	1924		SC	G5	S3	Plant
Lithospermum latifolium	Broad-leaved puccoon	1838	1868-09		SC	G4	S2	Plant
Echinacea purpurea	Purple coneflower	1868	1868-09-01		X	G4	SX	Plant
Geum virginianum	Pale avens	1915	1915-07-14		SC	G5	S1S2	Plant
Hybanthus concolor	Green violet	1984	1984		SC	G5	S3	Plant
Pyrgulopsis letsoni	Gravel pyrg	1945	1946-11		SC	G5	SU	Animal
Jeffersonia diphylla	Twinleaf	1861	1997-06-26		SC	G5	S3	Plant
Scleria triglomerata	Tall nut rush	1838	1838-06-27		SC	G5	S3	Plant
Terrapene carolina carolina	Eastern box turtle	1900	1900		SC	G5T5	S2S3	Animal
Angelica venenosa	Hairy angelica	1995	1995-08-25		SC	G5	S3	Plant
Betula murrayana	Murray birch	1965	1994?		SC	G1Q	S1	Plant
Astragalus neglectus	Cooper's milk vetch	1928	1930-06-24		SC	G4	S3	Plant
Wet Prairie	Wet Prairie, Midwest Type	1968	1981-07-08			G3	S1	Community
Prairie Fen	Alkaline Shrub/herb Fen, Midwest Type	1971	1991-08-19			G3	S2	Community
Dry-mesic Prairie	High Prairie, Midwest Type	1962	1981-09-02			G3	S1	Community
Mesic Sand Prairie	Moist Sand Prairie, Midwest Type	1924	1981-07-09			G2	S1	Community
Erynnis baptisiae	Wild indigo duskywing	2001-07-24	2001-09-16		SC	G5	S2S3	Animal
Erynnis baptisiae	Wild indigo duskywing	2001-09-09	2001-09-09		SC	G5	S2S3	Animal
Erynnis baptisiae	Wild indigo duskywing	2001-08-29	2001-09-18		SC	G5	S2S3	Animal
Erynnis baptisiae	Wild indigo duskywing	2000-07-21	2001-07-14		SC	G5	S2S3	Animal
Aster praealtus	Willow aster	2004-09-29	2004-09-29		SC	G5	S3	Plant
Villosa iris	Rainbow	1903-10-30	1977		SC	G5Q	S2S3	Animal
Noturus miurus	Brindled madtom	1936-09-11	1936-09-11		SC	G5	S2S3	Animal
Noturus miurus	Brindled madtom	1972-10-03	1972-10-03		SC	G5	S2S3	Animal
Etheostoma spectabile	Orangethroat darter	1920-05-01	1920-05-01		SC	G5	S3	Animal
Etheostoma spectabile	Orangethroat darter	1922-05-11	1922-05-11		SC	G5	S3	Animal
Erynnis baptisiae	Wild indigo duskywing	2001-05-09	2001-05-09		SC	G5	S2S3	Animal
Carex trichocarpa	Hairy-fruited sedge	1995-08-05	2004-07-04		SC	G4	S2	Plant
Wet Prairie	Wet Prairie, Midwest Type	1980-09	1985-08-03			G3	S1	Community
Sistrurus catenatus catenatus	Eastern massasauga	1904	2010-08-09	C	SC	G3G4T3T4Q	S3S4	Animal
Sistrurus catenatus catenatus	Eastern massasauga	2003-08-29	2003-08-29	C	SC	G3G4T3T4Q	S3S4	Animal
Wilsonia citrina	Hooded warbler	2005-07-12	2005-07-12		SC	G5	S3	Animal
Ammodramus savannarum	Grasshopper sparrow	2003	2007-06-06		SC	G5	S3S4	Animal
Utterbackia imbecillis	Paper pondshell	1916-10	1916-10		SC	G5	SNR	Animal
Utterbackia imbecillis	Paper pondshell	1917	1945-10-31		SC	G5	SNR	Animal
Utterbackia imbecillis	Paper pondshell	1922-10	1945-09-09		SC	G5	SNR	Animal
Utterbackia imbecillis	Paper pondshell	1946-11	1946-11		SC	G5	SNR	Animal
Paronychia fastigiata	Low-forked chickweed	1909	1909-08-21		X	G5	SX	Plant
Hybanthus concolor	Green violet	1870	1919-06-01		SC	G5	S3	Plant
Hybanthus concolor	Green violet	1919	1919-05-31		SC	G5	S3	Plant
Geum virginianum	Pale avens	1895	1895-08-20		SC	G5	S1S2	Plant
Nicrophorus americanus	American burying beetle		1916-08-07	LE	X	G2G3	SH	Animal
Helianthus hirsutus	Whiskered sunflower	1868	1868-09-16		SC	G5	S3	Plant
Alasmidonta marginata	Elktoe	1924-10-04	1977		SC	G4	S2S3	Animal
Ptychobranchus fasciolaris	Kidney shell	1903	1971-pre		SC	G4G5	SNR	Animal
Ptychobranchus fasciolaris	Kidney shell	1958-05-17	1958-05-17		SC	G4G5	SNR	Animal
Ptychobranchus fasciolaris	Kidney shell	1945-09-09	1945-09-09		SC	G4G5	SNR	Animal
Pleurobema sintoxia	Round pigtoe	1898-08-26	1898-08-26		SC	G4G5	S2S3	Animal
Oxyloma peoriense	Depressed ambersnail				SC	G4G5	SNR	Animal

STATE HISTORIC PRESERVATION OFFICE

Application for Section 106 Review

SHPO Use Only											
☐ IN	Received Date	____	/	____	/	____	Log In Date	____	/	____	/	____
☐ OUT	Response Date	____	/	____	/	____	Log Out Date	____	/	____	/	____
	Sent Date	____	/	____	/	____						

Submit one copy for each project for which review is requested. This application is required. Please type. Applications must be complete for review to begin. Incomplete applications will be sent back to the applicant without comment. Send only the information and attachments requested on this application. Materials submitted for review cannot be returned. Due to limited resources we are unable to accept this application electronically.

I. GENERAL INFORMATION

☒ THIS IS A NEW SUBMITTAL ☐ THIS IS MORE INFORMATION RELATING TO ER#

- ☐ Funding Notice
- ☐ Survey
- ☐ MOA or PA
- ☒ Other: **SRF Project Plan**

a. Project Name: **Huron River 2013 SRF Project Plan**

b. Project Address (if available): **Various Locations throughout the City of Ann Arbor**

c. Municipal Unit: **Washtenaw County Water Resource Commissioner**, County: **Washtenaw**

d. Federal Agency and Contact (*If you do not know the federal agency involved in your project please contact the party requiring you to apply for Section 106 review, not the SHPO, for this information*.): **Mr. Andrew Lausted, US EPA Region 5 77 W. Jackson Blvd. Chicago, IL 60604 312-886-0189**

e. State Agency and Contact (if applicable): **Karol Patton, MDEQ SRF Program, (517) 241-0724**

f. Consultant or Applicant Contact Information (if applicable): **Hubbell, Roth & Clark Atttn: Karyn Stickel 555 Hulet Dr Bloomfield Hills, MI 48303; kstickel@hrc-engr.com**

II. GROUND DISTURBING ACTIVITY (INCLUDING EXCAVATION, GRADING, TREE REMOVALS, UTILITY INSTALLATION, ETC.)

DOES THIS PROJECT INVOLVE GROUND-DISTURBING ACTIVITY? ☒ YES ☐ NO (If no, proceed to section III.)

Exact project location must be submitted on a USGS Quad map (portions, photocopies of portions, and electronic USGS maps are acceptable as long as the location is clearly marked).

a. USGS Quad Map Name: **Ann Arbor West, Ann Arbor East, Saline, Ypsilanti West**

b. Township: **02 S Range: 06 E Section: 23, 26, 27, 34 and 3; and Township: 03 S Range: 06 E and Section 5, 6, 8 and 9**.

c. Description of width, length and depth of proposed ground disturbing activity: **Varies depending on project.**

d. Previous land use and disturbances: **Sites are currently public right-of-ways, parking lots and other previously developed land uses, streams and stormwater controls**.

e. Current land use and conditions: **Storm eastements, public right-of-way, river banks**

f. Does the landowner know of any archaeological resources found on the property? **NO**
Please describe: **n/a**

III. PROJECT WORK DESCRIPTION AND AREA OF POTENTIAL EFFECTS (APE)
Note: Every project has an APE.

a. Provide a detailed written description of the project (plans, specifications, Environmental Impact Statements (EIS), Environmental Assessments (EA), etc. **cannot** be substituted for the written description): ***See attached letter***
b. Provide a localized map indicating the location of the project; road names must be included and legible. ***See Attached Figures***
c. On the above-mentioned map, identify the APE. ***See attached***
d. Provide a written description of the APE (physical, visual, auditory, and sociocultural), the steps taken to identify the APE, and the justification for the boundaries chosen. ***See attached***

IV. IDENTIFICATION OF HISTORIC PROPERTIES

a. List and date **all** properties 50 years of age or older located in the APE. If the property is located within a National Register eligible, listed or local district it is only necessary to identify the district: *None*
b. Describe the steps taken to identify whether or not any **historic** properties exist in the APE and include the level of effort made to carry out such steps: ***The proposed project site locations were cross referenced with documents from the Ann Arbor historic district as well as state and national databases of historic properties and landmarks.***
c. Based on the information contained in "b", please choose one:
☐ Historic Properties Present in the APE
☒ No Historic Properties Present in the APE ***See attached***
d. Describe the condition, previous disturbance to, and history of any historic properties located in the APE: ***None present***

V. PHOTOGRAPHS

Note: All photographs must be keyed to a localized map, and should be included as an attachment to this application.

a. Provide photographs of the site itself. ***See attached***
b. Provide photographs of all properties 50 years of age or older located in the APE (faxed or photocopied photographs are not acceptable). ***n/a***

VI. DETERMINATION OF EFFECT

☒ No historic properties affected based on [36 CFR § 800.4(d)(1)], please provide the basis for this determination.

☐ No Adverse Effect [36 CFR § 800.5(b)] on historic properties, explain why the criteria of adverse effect, 36 CFR Part 800.5(a)(1), were found not applicable.

☐ Adverse Effect [36 CFR § 800.5(d)(2)] on historic properties, explain why the criteria of adverse effect, [36 CFR Part 800.5(a)(1)], were found applicable.

Please print and mail completed form and required information to:

State Historic Preservation Office, Environmental Review Office, Michigan Historical Center, 702 W. Kalamazoo Street, P.O. Box 30740, Lansing, MI 48909-8240

HUBBELL, ROTH & CLARK, INC
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Dennis J. Benoit
James F. Burton
Jane M. Graham
Donna M. Martin
Charles E. Hart

Attachment A

Re: Huron River 2013 SRF Project Plan, Application 106 Review

Ladies and Gentlemen:

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous materials; stream bank stabilization along various creeks; improvements to or construction of wetlands, detention basins, rain gardens and infiltration basins; planting trees or other vegetation; and other stormwater best management practices. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

The proposed projects are intended to improve the integrity of any property's location, design, setting, materials, workmanship, feeling, and association, by improving water quality and utilizing best management practices.

The Project Plan will be submitted to the Michigan Department of Environmental Quality's Environmental Services and Science Division (MDEQ-ESSD) for prioritization of a State Revolving Fund loan. The following additional information is provided as an attachment to the Application for Section 106 Review, in accordance with the National Historic Preservation Act of 1996:

I. GENERAL INFORMATION:

Federal Agency Contact:
Mr. Andrew Lausted, 312-886-0189
US EPA Region 5
77 W. Jackson Blvd.
Chicago, IL 60604

State Agency Contact:
Ms. Karol Patton, (517) 241-0724
MDEQ, Revolving Loan Section
P.O. Box 30457
Lansing, Michigan 48909-7957

This Project Plan is being prepared as part of the State Revolving Fund loan program.

555 Hulet Drive, PO Box 824
Bloomfield Hills, Michigan 48303-0824
Telephone 248 454 6300 **Fax** 248 454 6312
www.hrc-engr.com

II. GROUND DISTURBING ACTIVITY:

Any ground disturbing activities associated with this project will be associated with stormwater improvements. All areas will either be restored to their existing uses or restored from an urban use to a natural feature.

III. PROJECT WORK DESCRIPTION AND AREA OF POTENTIAL EFFECTS (APE)

Project Work Description:

The locations and projects proposed in this Project Plan were each individually evaluated to determine the quantity of first flush stormwater runoff and/or pollutants that could be captured and mitigated. The Best Management Practices (BMPs) were then selected based on watershed storage needs or stream bank protection needs, together with individual site conditions and constraints. The data was then used to design each BMP to maximize the pollutant removal, with emphasis on total suspended solids (TSS), total phosphorous (TP), and *E. coli* removal, as well as onsite infiltration. Projects were selected based on those included in the City's Capital Improvement Plan (CIP). The CIP is developed based on inventory, assessment, and coordinated asset maintenance and improvements. The 17 projects that will be presented in this year's Project Plan are listed herein.

All projects involving road reconstruction will include components in order to treat and detain the first flush and bankfull volumes per City and County standards. Infiltration will be used to the extent necessary based on soil conditions. While some soil conditions are known, additional infiltration may be able to be proposed during design based on more comprehensive soil information. Where infiltration is not used, oversized pipes for extended detention, including sumps for maintenance, or stone reservoirs with underdrains, will be used to promote storm water quality.

1. South Seventh Street (Greenview Drive to Scio Church Road) – Road reconstruction to narrower width incorporating stormwater management.
2. Geddes Avenue (Arlington to Huron Parkway) – Road reconstruction within the existing road footprint and will incorporate stormwater treatment/storage options.
3. 721 North Main Street (former DPW site) – Reduce imperviousness by construction of stormwater wetland and other stormwater quality and flood control improvements.
4. Detroit Street (Catherine to Division) – Replacement of brick pavers with stormwater management incorporated into the design.
5. Farmers Market Parking Lot – Reconstruct and provide storm water management.
6. Briarwood Mall Ponds – Water quality improvements at mall stormwater ponds.
7. Street Tree Planting – Throughout City (locations not shown on map).
8. Malletts Creek – Streambank Stabilization. a) Chalmers to Huron River – Streambank stabilization on the downstream end of the creek. b) Cranbrook Park – Streambank stabilization in creek from Fieldcrest to S. Main. c) Oakbrook to Eisenhower – Streambank stabilization from culverts.

9. Miller Creek (Geddes Road north to University properties) – Streambank Stabilization.
10. Ruthven Park Property – Sediment reduction at the mouth of Miller Creek.
11. State Street (Eisenhower to south of I-94) – Complete reconstruction of road will include stormwater BMPs.
12. Scio Church (Main Street to east of Seventh Street) – Complete reconstruction of road will stormwater BMPs.
13. Stadium (Hutchins to Kipke) – Complete reconstruction of road will include stormwater BMPs.
14. Research Park (Research Park Drive east to railroad) – Construction of a wetland area/detention basin and streambank/culvert improvements.
15. Huron Hills Golf Course – Streambank improvements and construction of a wetland/buffer area.
16. Village Oaks – Improvements to detention and stormwater management to facilitate pollutant removal and improve water quality and reduce volume downstream.
17. Maple Village Shopping Center (Dexter Road at North Maple Road) –Improvements to stormwater management system to reduce runoff and improve infiltration, coordinated with redevelopment of the shopping center.

Description of the APE:

The Area of Potential Effects (APE) is limited to the specific areas identified above, and shown on the attached map. All projects are intended to improve the downstream water quality and to reduce stormwater flows as required. Visually, the projects are within the right-of-way of City roads or are on City property, and properties adjacent to the work areas are typically zoned residential or commercial. Where work will take place near parks or within surface waters, the proposed work will enhance the natural settings. There will be no additional traffic, noise, or other impacts resulting from implementation of the projects, other than short-term, temporary impacts related to the construction work. Proper signage and traffic controls will be installed prior to any work.

IV. IDENTIFICATION OF HISTORIC PROPERTIES:

Research was performed to determine the location of historical features. This included using the State's website to map all State and Federally-registered sites. The Michigan Historic Sites Online website (http://www.mcgi.state.mi.us/hso/findlocation.asp) was verified to determine the absence of historic properties within the Project Area on April 23, 2013.

While there are no historic properties located within the APE, the following are listed sites that are nearby proposed work areas for reference.

Proposed Project Site Nos. 3, 4, and 5 (generally along Main Street in downtown Ann Arbor) involve reconstruction and/or removal of existing paved surfaces and will incorporate additional porous surfaces and other stormwater BMPs to reduce surface runoff and improve stormwater quality. Where brick pavers exist, these will be replaced in kind to maintain a similar appearance. These projects are near the following historic properties:

- Kellogg-Warden House, National and State Register listed, Site ID#P3253
- Michigan Central Railroad Depot, National and State Register listed, Site ID#P3795
- Thomas Earl House, National Register listed, Site ID#P3838
- Main Street Post Office, National Register listed, Site ID#P3836

Proposed Project Site No. 10 (Ruthven Park Property) involves incorporation of stormwater BMPs to reduce sediment at the mouth of Miller Creek. This project is near the following historic property:

- Orrin White House, State and National Register listed, Site ID#P24965

There will be no change to the streetscape view of or from, or any other impacts to any of these nearby historic properties.

V. PHOTOGRAPHS:

See the attached photo sheets.

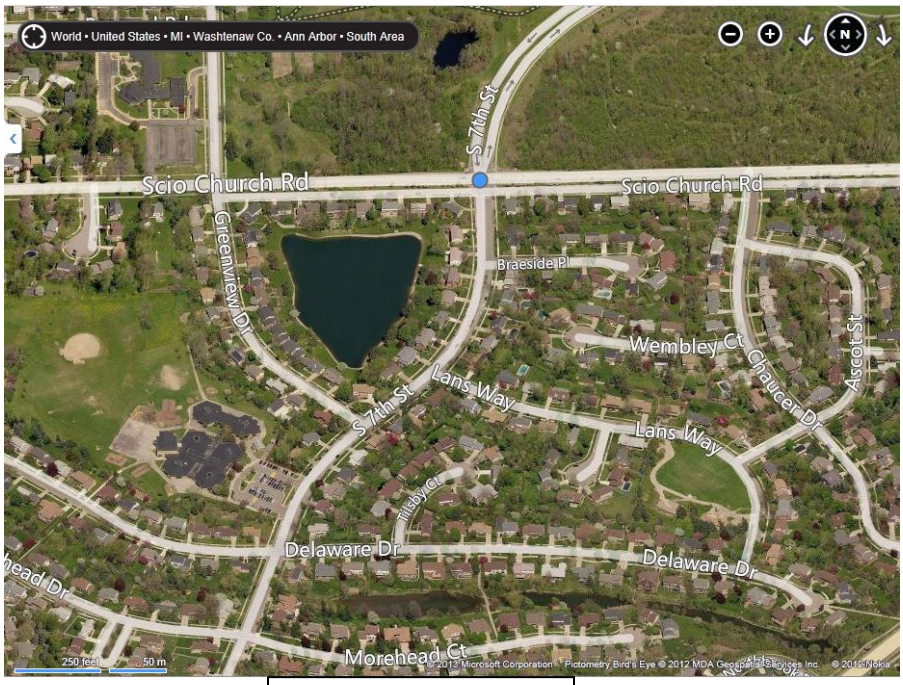
VI. DETERMINATION OF EFFECT:

This project will not have any adverse effect on the nearby historic properties.

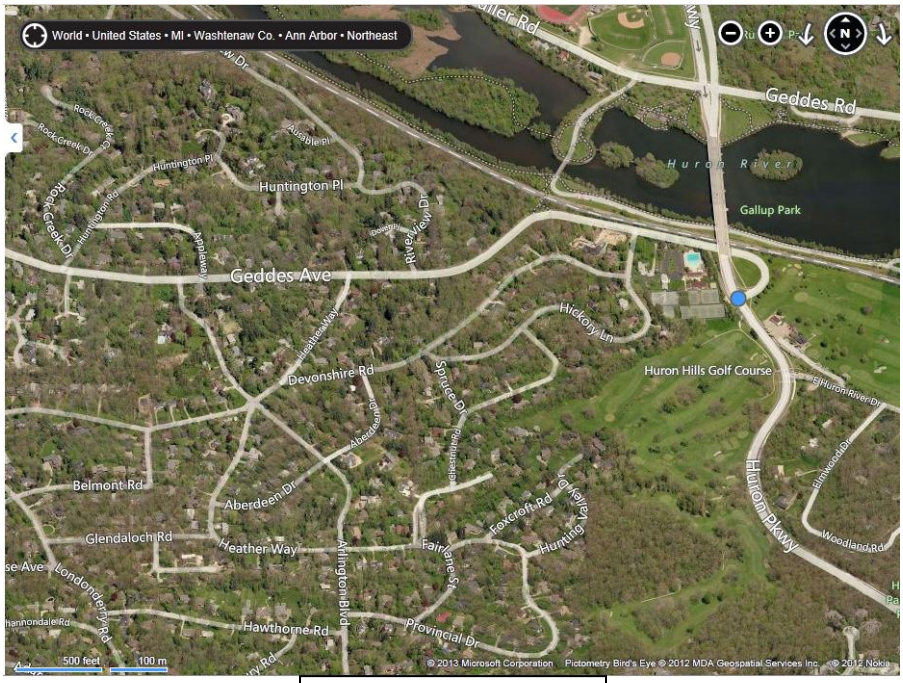
The project **will not** diminish the integrity of any property's location, design, setting, materials, workmanship, feeling, or association. There are **no** foreseeable effects caused by the undertaking that may occur later in time. The proposed project is in keeping with all of the sites' existing uses and context. All sites will be restored to their existing uses and there will be no discernable change to the physical, visual, auditory, and sociocultural climates of the project sites.

There will be minimal ground disturbance and the streetscape view of the site will be improved by the additional natural features and improved stormwater quality. All areas will either be restored to their existing conditions, or include additional natural features. The pre and post-construction climate of the APE therefore will not be negatively impacted.

A temporary impact to the area will be experienced due to the increased noise, traffic, and work activity associated with construction. However, this will be mitigated by limiting construction activity on nights and weekends, requiring periodic cleaning and maintenance of the sites to protect the public and prevent excessive dust or debris, and having all activity comply within the City Codes.



Site #1, South 7th Street



Site #2, Geddes Avenue

Site #3, Former DPW

Site #4, Detroit & Catherine

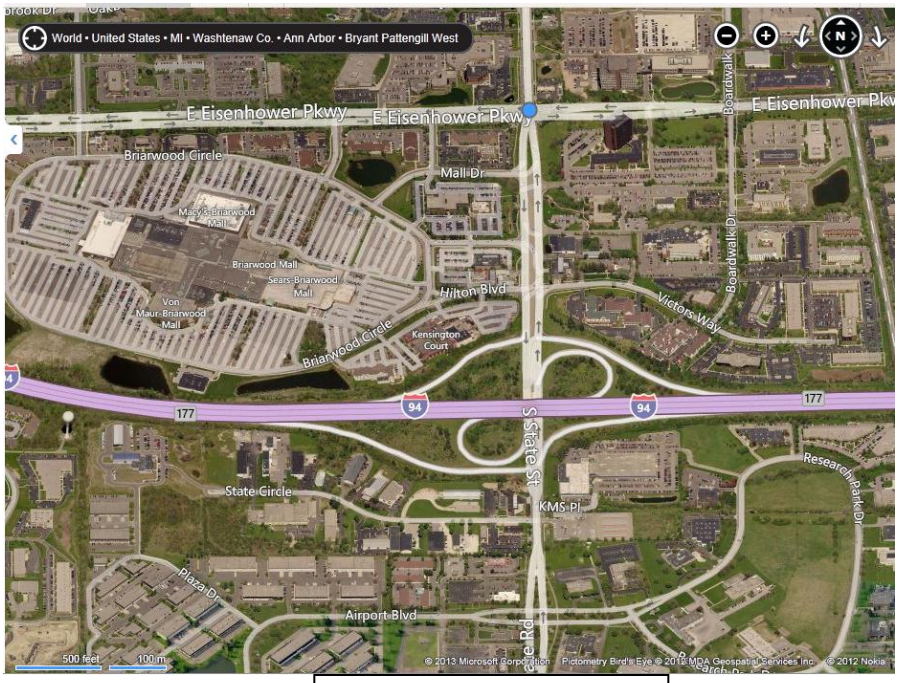
Site #5, Farmer's Market Parking Lot

Site #6, Briarwood Mall Pond

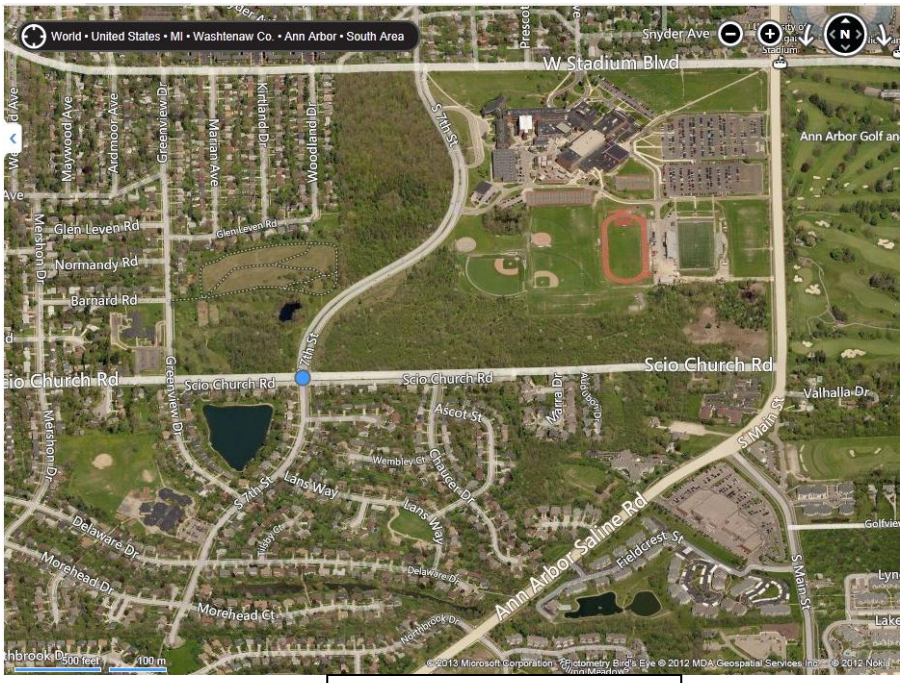
Site #8, Mallets Creek

Site #9, Miller Creek

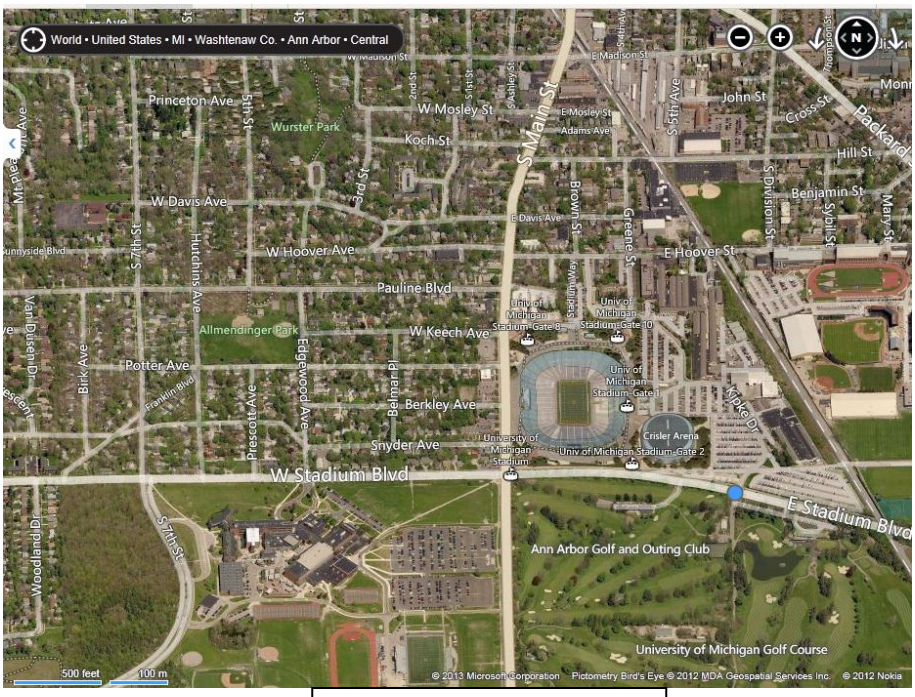
Site #10, Ruthven Park, Miller Creek Sediment



Site #11, State Street



Site #12, Scio Church Road



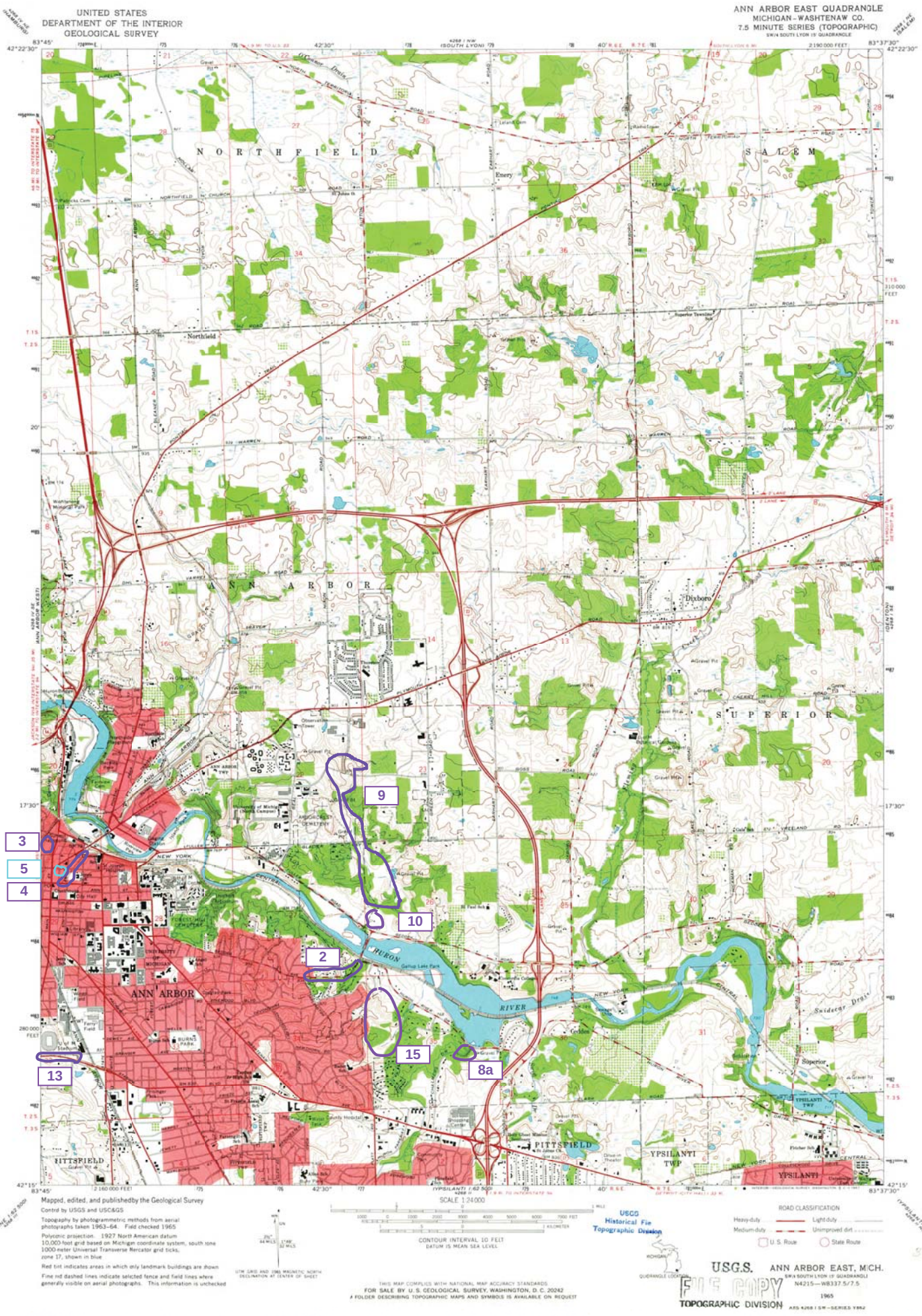
Site #13, Stadium Blvd.

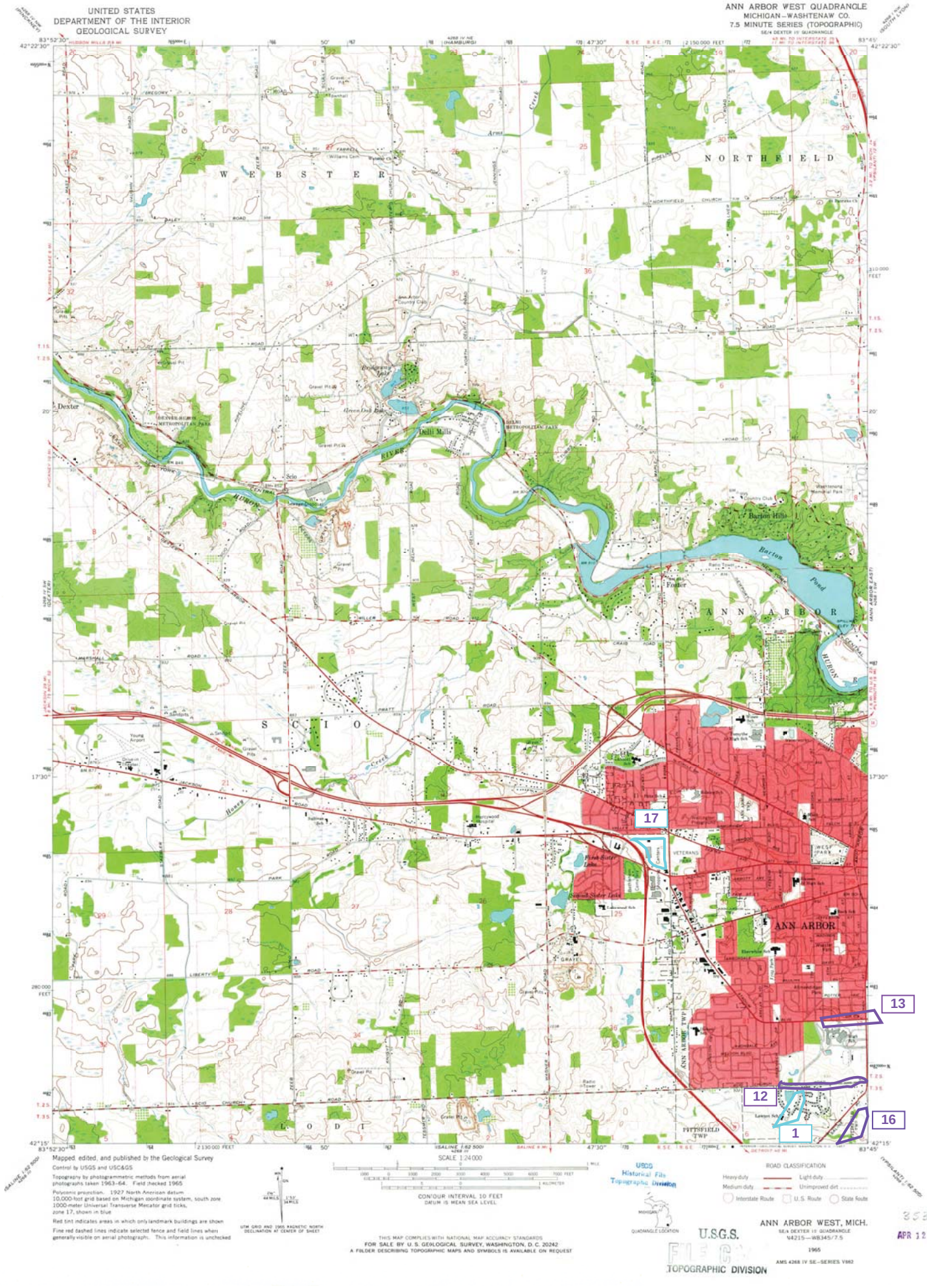
Site #14, Research Park

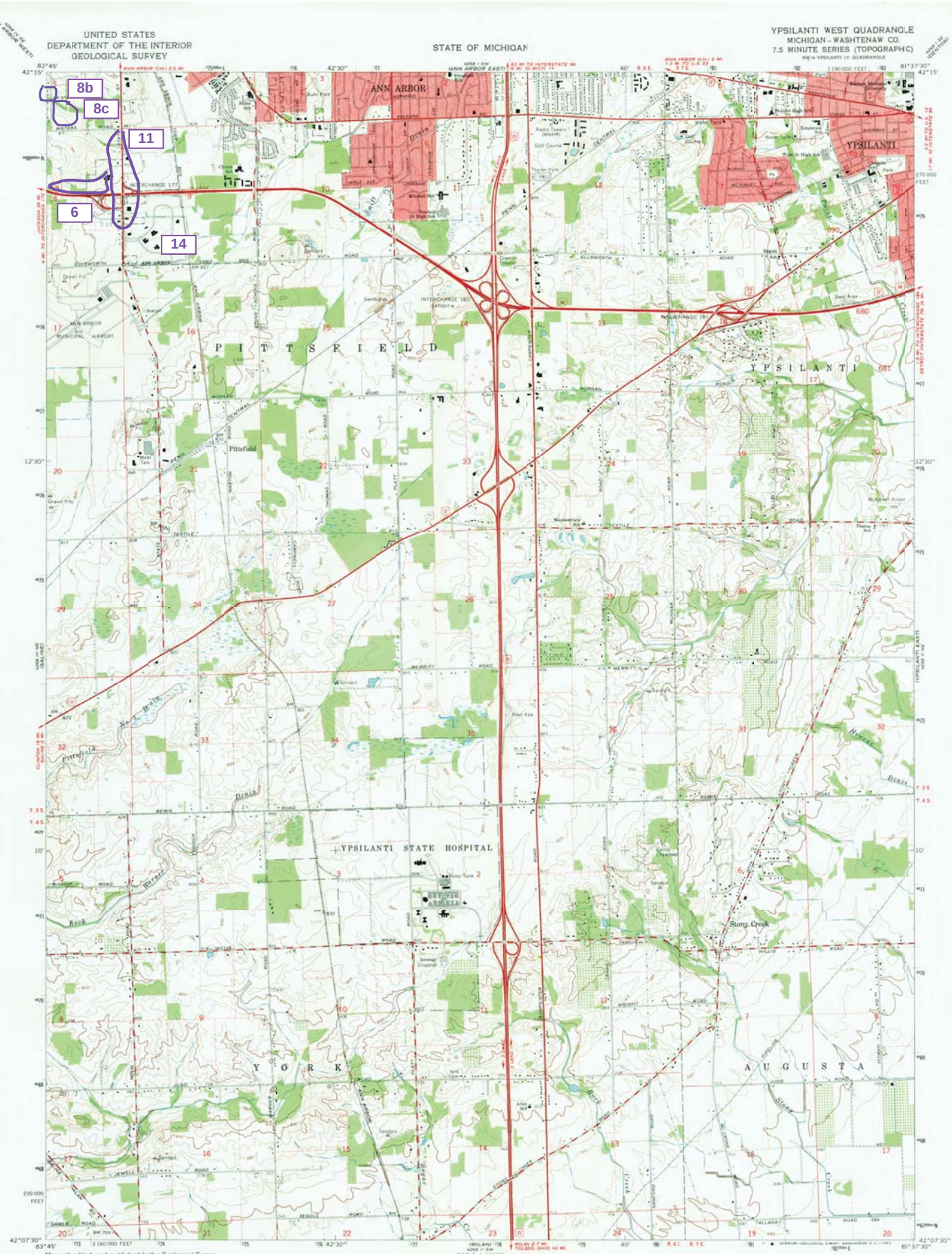
Site #15, Huron Hills Golf Course

Site #16, Village Oaks Shopping

Site #17, Maple Village Shopping


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
ANN ARBOR EAST QUADRANGLE
MICHIGAN-WASHTENAW CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NORTHFIELD
SALEM
ANN ARBOR
SUPERIOR
YPSILANTI TWP
PITTSFIELD
Northfield
Dixboro
Emery
Gallup Lake Park
HURON
RIVER
Saidecar Drain
NEW YORK CENTRAL
3
5
4
9
10
2
13
15
8a
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
ROAD CLASSIFICATION
USGS
Historical File
Topographic Division
USGS. ANN ARBOR EAST, MICH.
N4215—W8337.5/7.5
1965
FILE COPY
TOPOGRAPHIC DIVISION
MAY 17 1967


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
ANN ARBOR WEST QUADRANGLE
MICHIGAN—WASHTENAW CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
WEBSTER
NORTHFIELD
SCIO
ANN ARBOR
LODI
PITTSFIELD TWP
ANN ARBOR TWP
Dexter
Delhi Mills
Scio
Barton Hills
Barton Pond
Huron River
Green Oak Ber.
Bridgewater Lake
Fresh Water Lake
Salt Water Lake
Mallets Creek
Honey Creek
Gravel Pits
Country Club
Radio Tower
17
13
12
16
1
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography by photogrammetric methods from aerial photographs taken 1963–64. Field checked 1965
Polyconic projection. 1927 North American datum
10,000-foot grid based on Michigan coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue
Red tint indicates areas in which only landmark buildings are shown
Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photograph. This information is unchecked
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
ROAD CLASSIFICATION
Heavy duty
Medium duty
Light duty
Unimproved dirt
Interstate Route
U.S. Route
State Route
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
USGS Historical Files Topographic Division
QUADRANGLE LOCATION
U.S.G.S.
TOPOGRAPHIC DIVISION
ANN ARBOR WEST, MICH.
SE/4 DEXTER 15' QUADRANGLE
N4215—W8345/7.5
1965
AMS 4268 IV SE.—SERIES V882
APR 12 1967



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF MICHIGAN

YPSILANTI WEST QUADRANGLE
MICHIGAN—WASHTENAW CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey in cooperation with State of Michigan agencies

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1965. Field checked 1967

Polyconic projection. 1927 North American datum
10,000-foot grid based on Michigan coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks,
zone 17, shown in blue

Red tint indicates areas in which only landmark buildings are shown

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked.

SCALE 1:24000

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U.S. Route — State Route

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

USGS Historical File Topographic Division

YPSILANTI WEST, MICH.
N4207.5—W8337.5/7.5
1967
AMS 4268 II NW—SERIES V862

DEC 11 1969

HUBBELL, ROTH & CLARK, INC
Consulting Engineers

Principals
George E. Hubbell
Thomas E. Biehl
Walter H. Alix
Peter T. Roth
Michael D. Waring
Keith D. McCormack
Nancy M.D. Faught
Daniel W. Mitchell

Senior Associates
Gary J. Tressel
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Randal L. Ford
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Timothy H. Sullivan

Associates
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Marvin A. Olane
William R. Davis
Jesse B. VanDeCreek
Robert F. DeFrain
Marshall J. Grazioli
Thomas D. LaCross
Dennis J. Benoit
James F. Burton
Jane M. Graham
Donna M. Martin
Charles E. Hart

April 24, 2013

Southeast Michigan Council of Governments (SEMCOG)
535 Griswold Street
Suite 300
Detroit, MI 48226-3602

Re: Huron River 2013 SRF Project Plan HRC Job No. 20120639

To Whom It May Concern

Hubbell, Roth & Clark Inc. (HRC) is presently working with the Washtenaw County Water Resource Commissioner to develop a Project Plan for improvements in mitigating non-point source pollution. This will include several projects at various locations throughout the City of Ann Arbor. These projects may include the replacement of existing pavement with porous concrete, stream bank stabilization along various creeks, construction of rain gardens and/or planting trees or other vegetation. These projects are being undertaken as part of the City's and the County's ongoing mission to improving surface water quality in the area. Appropriate permitting measures will be taken for all work included in this project.

Washtenaw County has decided to pursue financial assistance for these improvements from the State of Michigan through the State Revolving Fund (SRF). A Project Plan is the required first step in applying for a SRF loan. The SRF Project Plan requirements state that your office is to be solicited for input regarding the impacts of the proposed project upon local development plans, area wide waste treatment management plans and/or regional water quality management plans. We also request confirmation that the population figures and projections shown in the Project Plan are acceptable. A copy of the project plan is attached.

Please inform us of your findings at your earliest convenience. Should you have any questions or require additional information regarding this matter, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.

Karyn M. Stickel, P.E.
Staff Engineer

KMS/djr
Enclosure
PDF: HRC; File

Y:\201206\20120639\06_Corrs\Project Plan Letters\SEMCOG.docx

555 Hulet Drive, PO Box 824
Bloomfield Hills, Michigan 48303-0824
Telephone 248 454 6300 **Fax** 248 454 6312
www.hrc-engr.com

STATE OF MICHIGAN
RICK SNYDER
GOVERNOR
MICHIGAN STATE HOUSING DEVELOPMENT AUTHORITY
STATE HISTORIC PRESERVATION OFFICE
SCOTT WOOSLEY
EXECUTIVE DIRECTOR

June 4, 2013

KARYN STICKEL
HUBBELL ROTH & CLARK
555 HULET DRIVE
BLOOMFIELD HILLS MI 48303

RE: ER09-479 Ann Arbor/Huron River 2013 SRF Project Plan, T2S, R6E, T3S, R6E, Ann Arbor, Washtenaw County (EPA)

Dear Ms. Stickel:

We have received your request for review of the above-cited undertaking at the location noted above. The information that you have sent has prompted us to ask for additional details. Please submit more detailed information on the proposed tree planting and brick paver replacement, including specific locations for these activities plotted on a map/maps. If available, please include any plans and specifications that might provide useful for our understanding of the scope of work for this project.

Additionally, the State Archaeological Site Files show numerous verified prehistoric and historic archaeological sites within and adjacent to this project, including a prehistoric Native American cemetery that was investigated by the University of Michigan in the 1930s. There appear to be 17 project locations; many of these may be previously heavily disturbed, leaving no original ground surfaces or buried soils intact. However, it is unclear whether proposed work may impact previously undisturbed areas, or areas not previously disturbed to the depths of proposed work, that may contain archaeological materials.

So that we may assess potential impacts to archaeological sites, please provide the following additional information:

1. Details of the extent of proposed ground disturbance (width, length, depth) for each project area;
2. Assessments of previous ground disturbance for each area, and whether proposed work may disturb any potentially intact soils;
3. Include maps illustrating project details for each area; if possible, showing scaled plans on aerials would be particularly helpful.

Contact archaeologist Stacy Tchorzynski tchorzynskis@michigan.gov (517) 373-6358 with any questions you may have.

Please note that the Section 106 review process cannot proceed until we are able to consider the information requested above. This letter does not clear the project. If you have any questions, please contact Brian Grennell Cultural Resource Management Specialist, at (517) 335-2721 or by email at grennellb@michigan.gov. **Please reference our project number in all communication with this office regarding this undertaking.** Thank you for your cooperation.

Sincerely,

Brian G. Grennell
Cultural Resource Management Specialist

for Brian D. Conway
State Historic Preservation Officer

SAT:BGG

From: Stickel Karyn
To: "Tchorzynski, Stacy (MSHDA)"
Subject: RE: ER09-479 - Washtenaw County 2013 Project Plan
Date: Wednesday, June 26, 2013 10:41:44 AM
Attachments: Figure 20_reduced.pdf
Figure 21_reduced.pdf
Figure 22_Reduced.pdf

Stacy –

The streambank stabilization will be done using hand equipment and some heavy equipment based on access. Riprap may be utilized to a small degree, but the intention is to use natural vegetation. The banks will be reshaped and planted for restoration. We anticipate access from main roads, but that has not been finalized yet. There is not likely to be much ground disturbance associated with the access and all will be restored.

The three additional projects are as follows, with exhibits attached:

1. Lawton Park Underground Storage Basin (Figure 20) – An 825,000 CF underground storage basin will be construction at Lawton Park. The is an existing park with soccer fields, baseball and other park equipment. The area of disruption will be approximately 4.5-5 acres, and the ground disturbance will be 10-15' deep.
2. Churchill Downs Park (Figure 21) – A 625,000 CF above ground storage basin will be construction at Churchill Downs Park. This will take place in an existing wooded area along I-94 and Scio Church Road. The project will consist primarily of a low flow channel that is approximately 2300' long and the ability to store large rain events above that. The area of disturbance is approximately 8 acres and the maximum excavation will be less than 5'.
3. Lans Basin (Figure 22) – The project will consist of the retrofit of an EXISTING chain of detention basins to restore storage capacity. These basins are located in rear yards. The project will consist of the reconstruction of several existing dams, and dredging of the ponds. The total area of disturbance is approximately 6-6.5 acres. The maximum depth to be dredged is 8', but that will consist of sediment which has been deposited in order to restore the ponds to their original capacity.

Please let me know if you have any additional questions, or require additional information.

Thanks,
Karyn

From: Tchorzynski, Stacy (MSHDA) [mailto:TchorzynskiS@michigan.gov]
Sent: Monday, June 24, 2013 11:22 AM
To: Stickel Karyn
Cc: Grennell, Brian (MSHDA)
Subject: RE: ER09-479 - Washtenaw County 2013 Project Plan

Karyn,

Thank you again for the additional information. We do, however, have a few more questions.

Regarding the **stream bank stabilization** portions of the project, can you tell us what methods will be used? Will riprap be employed? Will the banks be reshaped? What is the nature of associated revegetation efforts? Also, please explain whether additional workspaces or access will be needed for this work, and whether heavy machinery will be used, and any possible ground disturbance associated with it.

In your previous email, you mentioned that three additional sites will be added to the project. We look forward to receiving that information.

Thank you,
Stacy

Stacy Tchorzynski
Archaeologist
State Historic Preservation Office & Department of Natural Resources
Michigan Library and Historical Center
702 W. Kalamazoo, P.O. Box 30740
Lansing, MI 48909-8240
Phone: (517) 373-6358
tchorzynskis@michigan.gov www.michigan.gov/shpo

From: Stickel Karyn [mailto:KStickel@hrc-engr.com]
Sent: Monday, June 17, 2013 4:01 PM
To: Tchorzynski, Stacy (MSHDA)
Cc: Grennell, Brian (MSHDA)
Subject: ER09-479 - Washtenaw County 2013 Project Plan

Stacy –

We received a letter from Brian Grennell in response to the above referenced request, requesting additional information. Specifically, the letter asked for additional detail regarding the proposed ground disturbance as well as project maps. I have attached that information for the sites available. We are still working on three additional sites, and that information will be forwarded along when available. One of the specific questions was the location of the tree plantings. These are unknown at this time. Trees will be planted as part of the City's forestry program. These trees are generally planted as part of road projects, along the edges of roads, in the City owned rights-of-way. These areas are generally previously disturbed for the installation of roads, sidewalks, utilities, etc. All other projects are described and shown on the attached documents. Please let me know if you have any questions regarding this information.

Thanks,
Karyn

Karyn M. Stickel, P.E.
Senior Project Engineer
Hubbell, Roth & Clark, Inc.
555 Hulet Drive
P.O. Box 824
Bloomfield Hills, MI 48303-0824

HRC
HUBBELL, ROTH & CLARK, INC
Consulting Engineers

Roads			
Figure #	**Name of Site**	**Area of Disturbance**	**Disturbance Previously of Intact Soils***
11	Geddes Avenue	L = 1125' W= 45' D= 5'	No
12	Detroit Street	L = 863' W= 45' D= 5'	No
13	Farmers Market Parking Lot	L = 420' W= 38' D= 5'	No
14	South State Street	L = 2100' W= 60' D= 5'	No
15	Scio Church Road	L = 1800' W= 45' D=	No
16	Stadium Blvd. (Hutchins to Kipke)	L = 1780' W= 45' D= 5'	No
17	721 North Main Street	Acres = 3 acres D = 5'	No
18	South Seventh Street	L = 900' W= 30' D= 5'	No

Streams			
Figure #	**Name of Site**	**Area of Disturbance**	**Disturbance Previously Intact Soils**
NA	Street Tree Planting	TBD	No - All trees will be planted in the ROW along areas where roads and other utilities have been installed
24	Malletts Creek - Research Park	L = 700' W= 20'	Yes - Along existing stream to provide stabilization
25	Briarwood Mall Ponds	Acres = ?	No - Previously disturbed for construction of ponds
26	Mallets Creek Mouth	L = 864' W= 20'	Yes - Along existing stream to provide stabilization
27	Malletts Creek - Oakbrook to Eisenhower	L = 2300' W= 20'	Yes - Along existing stream to provide stabilization
28	Malletts Creek - Cranbrook Park	L = 1500' W= 20'	Yes - Along existing stream to provide stabilization
29	Miller's Creek	L = 990' W= 20'	Yes - Along existing stream to provide stabilization
30	Huron High School Baffle Box	L = 120' W= 20'	Yes - Along existing stream to provide stabilization
31	Huron Hills Golf Course	L = 1250' W= 20'	No - Along previously developed golf course
NA	Village Oaks	Acres = ?	No - Optimization of existing detention basin
NA	Maple Village	Acres = 30	No - Redevelopment of Existing Shopping Center

*The first category of projects will not be disturbing any undisturbed areas as they are generally road projects, or redevelopment of existing properties in order to provide better storm water management. The second phase of projects take place along existing water courses in order to provide stabilization, or involves retrofits to existing ponds or basins in order to provide better storm water quality treatment.

HURON RIVER 2013 SRF PROJECT PLAN

PREPARED FOR

Huron River Green Infrastructure Drainage District

APPENDIX G
SITE PHOTOS

Photo 1 – 721 N. Main Street

Photo 2 – Briarwood Mall Ponds

Photo 3 – Detroit Street

Photo 4 – Farmers Market

Photo 5 – Malletts Creek – Oakbrook to Eisenhower

Photo 6 – Malletts Creek – Research Park to RR Tracks

Photo 7 – Millers Creek

Photo 8 – Research Park Wetlands

Photo 9 – Huron Hills Golf Course

Photo 10 – Malletts Creek – Chalmers to Huron River

Photo 11 – Malletts Creek – Cranbrook Park

Photo 12 – Stadium Boulevard

Photo 13 – Scio Church Road

Photo 14 – Seventh Street

Photo 15 – Geddes Road

HURON RIVER 2013 SRF PROJECT PLAN

PREPARED FOR

Huron River Green Infrastructure Drainage District

APPENDIX H
WATERSHED MANAGEMENT PLANS – EXECUTIVE SUMMARIES

A partnership between The Washtenaw County Drain Commissioner, The City of Ann Arbor, and Pittsfield Township.

EXECUTIVE SUMMARY

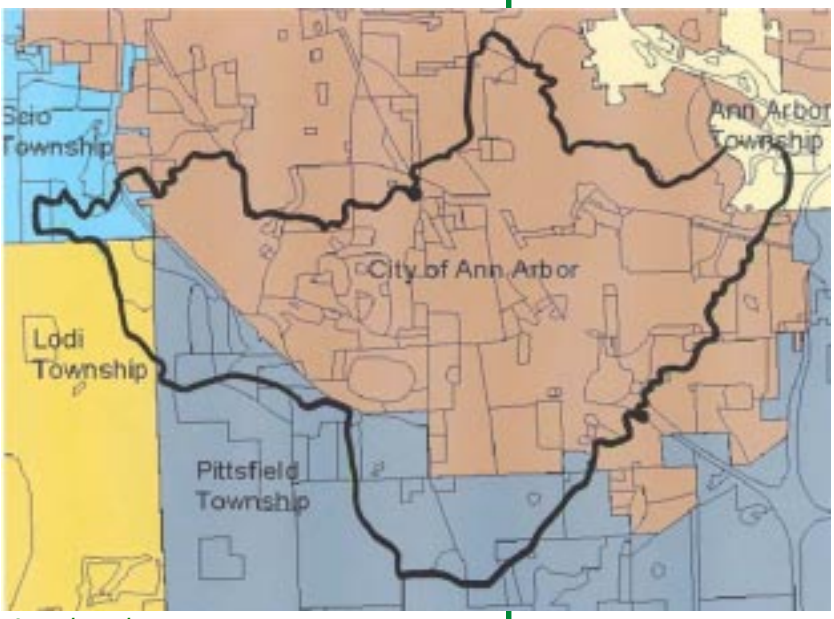
Introduction to Malletts Creek

Malletts Creek is located in eastern Washtenaw County, primarily in the City of Ann Arbor and Pittsfield Township. The Malletts Creek watershed is 11-square miles in area and flows into the Huron River. Most of the creek is a Washtenaw County drain, which means the Drain Commissioner is responsible for maintaining these portions of the drainage course. In the last 40 years, the watershed has seen extensive development, including shopping malls, new subdivisions, apartment complexes, homes, parking lots, businesses, stores, churches, and industrial buildings.

Because much of the land is heavily developed (37% of the land is covered with impervious surfaces), Malletts Creek is considered an urban watershed.

Background of Malletts Creek Restoration Project

Malletts Creek is a Chapter 20 County Drain and natural stream that is in need of maintenance and improvement. The Washtenaw County Drain Commissioner, City of Ann Arbor, and Pittsfield Township, have recognized structural, water quality and flow capacity problems, and wish to restore Malletts Creek. In addition, the Michigan Department of Environmental Quality (MDEQ) has mandated a 50% phosphorus reduction to protect the Huron River and downstream impoundments and has specified the need to improve the creek's habitat (fisheries) value.



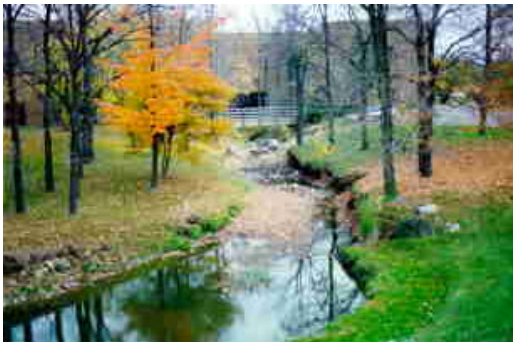
Area location

In order to begin the process of restoration and repair of Malletts Creek, the project sponsors contracted with a consultant team to undertake a comprehensive assessment of the Creek and to develop an overall plan to guide the restoration work.

The consultant team worked closely with staff from the office of the Washtenaw County Drain Commissioner, the City of Ann Arbor and Pittsfield Township, to study Malletts Creek, identify the underlying problems and provide an innovative, long-range, staged, practical, cost-effective approach to solving these problems. The final plan was required to reflect community input, have significant public support, and the approval of the City of Ann Arbor and Pittsfield Township.

Restoration Team

In January of 1999, the consultant team of Environmental Consulting & Technology, Inc. (ECT), Applied Science, Inc. (ASI) and Tilton & Associates, Inc. (TAI) was chosen to study the problems in Malletts Creek and prepare a restoration plan.



Research Park

Severe bank erosion at Chalmers Road

Key Problems

Several key problems were identified in previous work performed by the Office of the Drain Commissioner, the City of Ann Arbor, Pittsfield Township, the Michigan Department of Environmental Quality, the Huron River Watershed Council and the Malletts Creek Association. These included:

Water quantity problems:

- Increased peak quantity and peak velocity in the creek
- Channel and bank erosion resulting from high velocities
- Isolated flooding associated with increased flow and culvert restrictions

Major water quality problems:

- High phosphorus
- Erosion and sedimentation
- Increased water temperature

Structural Problems

- Repairs to headwalls/endwalls
- Repairs to bridge abutments

Diminished habitat:

- Lack of bank vegetation
- Degraded stream beds
- Frequent and severe peak flows

Consequences of the Problems

As a consequence of the urbanization and the resulting flashy flow characteristic of the creek, the view of the creek as a community amenity was diminished. The resulting sediment and associated phosphorus loads from Malletts Creek degrading the downstream impoundments, leading the Michigan Department of Environmental Quality (MDEQ) to require a 50% reduction in the phosphorus loading. In addition, the MDEQ recognized that the Malletts Creek fish and wildlife habitat had been severely impacted. This, coupled with isolated flooding issues, caused the local units of government to initiate this comprehensive restoration project.

Goals of the Restoration Project

The project team analyzed the creek and its watershed, with the goal of developing plans and implementation activities to achieve the following:

- Address structural repairs as needed
- Reduce phosphorus pollution by 50%
- Increase habitat for fish and wildlife
- Control stream velocities and flow rates
- Establish an educated and involved public

Throughout the project, the team aggressively sought and obtained input, advice and preferences of the public, to learn about its perception of problems and acceptable strategies for restoration.

Use a safe lawn fertilizer

Detention Pond by I-94

Data Collection Activities

The team began to study the watershed by collecting existing data on water quality, quantity, and benthic populations. To supplement the existing data, new water quality testing, and a benthic study were conducted. The team performed a limited detention pond inventory, surveyed cross sections, and performed a physical survey by walking the stream and reporting on the vegetation and habitat as well as needed structural repairs.

Best Management Practices (BMPs)

Previous studies of the watershed indicated that sources of its problems are largely "non-point" sources of pollution. Best Management Practices (BMPs) are methods to prevent or mitigate such pollution. Categories of BMPs that were reviewed included management methods, treatment methods, and source controls. BMPs were evaluated by the project team and at public meetings.

Three categories of BMP's were identified and evaluated:

Source controls, such as changing lawn fertilization and landscape practices, are proactive, keeping water runoff clean and using it as a resource. These measures can save money and are particularly useful in residential areas but they need to happen throughout the watershed and require public education and buy-in by the public.

Treatment methods, such as detention ponds, are reactive, cleaning up and slowing down polluted storm water runoff from developed lands. Since they require initial capital investment and long term maintenance, treatment methods can be implemented by government alone, or in partnership with private land owners. Existing ponds can be retrofitted to improve quantity and quality performance

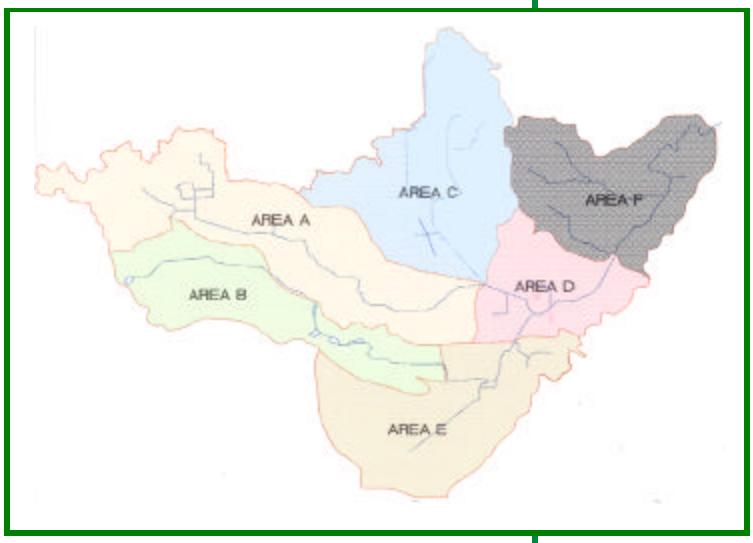
Management methods include revising local ordinances to reduce runoff and improve storm water management and protecting key flood-prone land.

Modeling Study

A detailed computer modeling study was performed. This study enabled the team to predict flow rates and flood elevations as well as phosphorus levels in the creek. Simulation of future land use assumed full development of the watershed. Because future development projects will be required to adhere to modern ordinances, the differences are minimal between the existing conditions and the model predictions for future land use. The modeling study components are described below:

Hydraulic Study

- Installed and collected data from a USGS flow gage at Chalmers Road and a rain gage at the U.S. Army Reserve Base on Industrial Highway
- Input data into the EPA Storm Water Management (SWMM) model
- Identified areas of potential flooding and suggested solutions



Malletts Creek Subwatersheds

Phosphorus Study

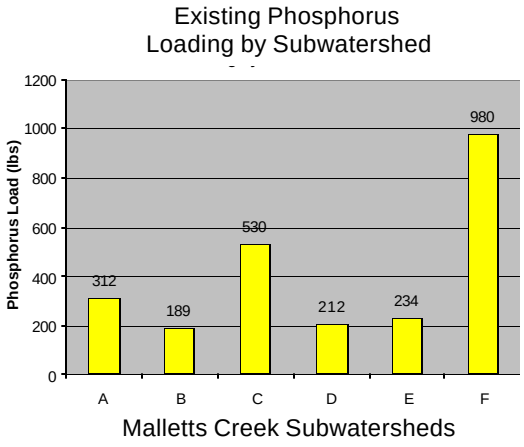
- Reviewed existing water quality data
- Collected water samples at six locations across the watershed during the year
  - Input this data into a phosphorus loading model
  - Predicted likely sources of high phosphorus loading by subwatershed, and identified anomalies suggesting unknown sources of phosphorus, such as illicit discharges

Hydraulic and Hydrologic Analysis Results

This portion of the modeling study showed that Malletts Creek is experiencing extreme peak flows, most likely attributable to the fact that 22% of the land area in the watershed is impervious surface directly connected to the storm water system and creek. Half of the flow of Malletts Creek is from the Burns Park residential neighborhood (shown as area "C" on the map displayed to the left), which represents 20% of the watershed.

Analysis of the 10-year storm and the 100-year storm showed 5 specific points of concern along Malletts Creek resulting from changes in hydrology, or improperly sited, designed or constructed buildings or private storm water management facilities:

- Eisenhower Office Park (100-year storm)
- Eisenhower Parkway west of State St. (100-year storm)
- Oakbrook Drive east of Main St. (10-year storm)
- Lansdowne residential area (10-year storm)
- Cranbrook Tower area upstream of Briarwood ponds (100-year storm)



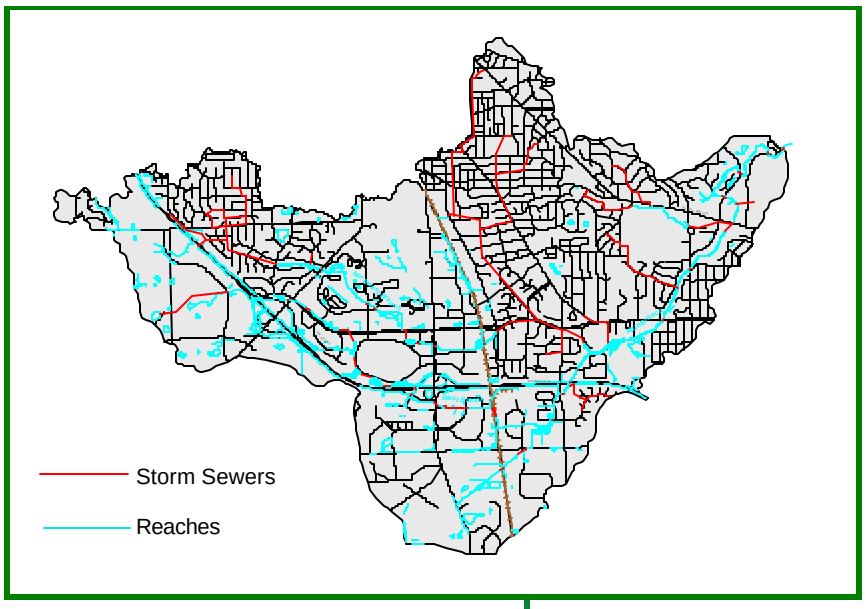
Phosphorus Analysis Results

From the water quality data, it was determined that the majority of the phosphorus pollution washes off of the land, entering the Creek in rainstorms.

The team divided the watershed into 6 subwatersheds for a detailed analysis, and the phosphorus model enabled the team to distribute the contribution of phosphorus among the 6 different subwatersheds.

The phosphorus contribution varied between the subwatersheds which is a significant finding and means that different management activities are appropriate in the subwatersheds. Creative source controls need to be implemented, and treatment methods or detention areas need to be constructed where possible.

To reduce the total phosphorus in the creek by 50% the following activities are recommended:



Malletts Creek hydrology

- Modify existing detention basins to detain and treat smaller storms
- Add 5 in-system storage structures to 3 storm drains (County Farm, Lansdowne and Burns Park areas)
- Promote landowner participation in creek-safe lawn maintenance (target 25% participation)
- Increase street sweeping in residential and commercial areas
- Renovate Brown Park pond, which is owned by the Malletts Creek Drainage District
- Create a new wetland pond at County Farm Park

If these recommendations are implemented, the MDEQ requirements will be fulfilled for the Malletts Creek Watershed.

Habitat Analysis Results

Malletts Creek is under an MDEQ mandate to improve habitat quality. Excessive water velocities are undermining fisheries and species habitat. The following are recommendations from the habitat analysis.

- Increase detention in the watershed to reduce peak velocities
- Remove logjams and sediment islands
- Create meandering low flow channels between pools
- Stabilize stream bank with plantings to provide food and cover for wildlife
- Protect and create riparian wetland areas

Malletts Creek at Highland Drive

The team completed a thorough reconnaissance of Malletts Creek and identified locations where structures and streambanks were in need of repair. Structures such as culverts and headwalls were in some cases found to be deteriorated and will need to be repaired or replaced. Structural streambank stabilization approaches such as rip rap may be needed where vegetative methods are not feasible.

Public Involvement

To be effective, the restoration planning and implementation process must continue to include all the groups that live and work in the watershed. One of the project goals was to establish an educated and involved public. To accomplish this, the team identified a list of stakeholder groups, including elected and appointed officials, environmental groups, public and private schools, business associations, homeowners associations, commercial, residential and riparian landowners and lawn care companies.

Several mechanisms were used to reach and involve these stakeholders. These included a web page, four community-wide meetings, interacting with the Malletts Creek Association (a citizen based creek protection group), conducting focus groups and telephone surveys.

The restoration activities included in this report come from the community as well as the staff of the Washtenaw County Drain Commissioner's Office, City

of Ann Arbor, Pittsfield Township, and the consultant team. The full range of problems in Malletts Creek can only be addressed by including actions that involve the people who live, work and visit the watershed; government alone cannot achieve full success.

Key Findings that Direct Restoration Activities

The study's findings, consisting of direct observation, sampling and analysis, modeling and community involvement, have directed the team to recommend a restoration strategy. The key findings are as follows:

- Peak discharge and velocity exceed acceptable levels
- 97% of the phosphorus pollution occurs from storm water runoff, not dry weather flow
- The urbanized areas, such as most of subwatersheds C and F that are built without detention ponds, contribute more to the Creek's high peak flows velocity and phosphorus problems than others
- With control of discharge and velocity, habitat can be improved

Recommended Restoration Activities

Based on the key findings, the team and stakeholders formulated activities and strategies to accomplish the reduction in peak flows and velocities, reduction in phosphorus concentration and improvement in fish and wildlife habitat.

Treatment Controls

- Institute both public and private solutions for flood concerns
- Retrofit detention basins
- Add in-system storage structures on large storm drains
- Renovate Brown Park pond
- Create wetland pond at County Farm Park
- Create new wetland ponds and extended detention basins
- Install catch basin restrictors

Structural Repairs

- Repair failed endwalls and outlet structures
- Repair broken culverts
- Repair cracked headwalls
- Remove large sediment islands
- Stabilize sections of the streambank

Source Control Activities

- Reduce lawn fertilizer use, increase native landscaping
- Implement related public education and technical assistance program
- Conduct illicit discharge elimination program
- Provide extra resources to strengthen soil erosion and sedimentation control enforcement
- Increase street sweeping
- Revise local government ordinances to reduce runoff and improve storm water management
- Modify residents yard waste and leaf handling practices

Habitat Restoration

- Remove logjams
- Remove sediment islands
- Restore streambank corridor and stabilize erosion
- Make in-stream improvements, the addition of low flow channels, ponds and riffle pools.

The Malletts Creek Restoration Plan also recommends ongoing periodic monitoring to measure program success.

Restoration Plan Activities and Costs

The recommended restoration activities are presented on Table 1. The activities are described and have been given project numbers for tracking of costs and scheduling during a restoration plan period of 6 years. It is further recommended that some activities continue to occur after the 6 year restoration period. These activities are given on Table 2 as on-going activities. The estimated cost of the on-going activities also is given on Table 2.

On Table 3, the costs of the restoration are summarized by year, for the 6 year restoration plan is about $19 million, with about $11.5 million in capital costs for: the construction of a new wetland pond in County Farm Park; improvements of the wetland in Brown Park; streambank stabilization; structural repairs to headwalls, endwalls, bridge abutments, detention pond modifications and construction of in-system storage structures in large storm drains. The remainder of the costs are for finance costs, operation and maintenance (O&M) costs, and public involvement programs.

The current apportionment for drain improvement projects requested by petition to the Drain Commissioner is given on Table 4.

Beneficial Impacts of Restoration Activities

The recommendations of this restoration plan will:

- Reduce peak discharge
- Reduce flow velocity
- Reduce total phosphorus to the Huron River by 50%
- Provide habitat improvement along 7 miles of the Creek
- Increase aesthetic enjoyment of the Creek
- Control flooding for the ten-year storm along the main channel.

Table 1: Restoration Activity Schedule and Estimated Costs

Project #	Restoration Activities	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total Estimated Costs
		SCHEDULE						
1	Illicit Discharge Elimination Program							$212,700
2	Sampling for Bacteria & Phosphorus							$27,720
2a	Sampling for Benthics							$9,900
3	USGS Stream Gage - Continue Operation							$54,000
4	Enforce Existing Ordinances							$450,000
5	Ordinance & Code Revisions for Stormwater Quality & Management							$360,000
6	Stream Maintenance (routine)							$195,000
7	Public Education Program							$720,000
8	Design In-System Storage Structures for Large Storm Drain Outlets							$75,000
9	Remedy 10-yr. Storm Flooding Problem - Design Solution for Oakbrook Drive Crossing							$10,000
10	Investigate 100-yr. Storm Flooding Problems - Determine Responsibilities							$20,000
8a	Construction of In-System Storage Structures							$1,198,214
9a	Remedy 10-yr. Storm Flooding Problems - Start Construction							$42,600
11	Start Detention Pond Study Throughout The Watershed (Survey & Design 40 ponds/year)							$696,360
12	Design Structural Repairs to Stream -To be done by petition.							$150,000
11a	Start Detention Ponds Retrofit - Outlet Structures, Wetlands and Sediment Forebay							$2,218,250
12a	Structural Repairs to Stream -Start Construction							$4,837,815
13	Residential Street Sweeping - Phase 1 - Area F							$10,100
14	Brown Park Pond Improvements - Design							$250,000
15	County Farm Park Wetlands - Design							$50,000
13a	Residential Street Sweeping - Phase 2 - Area F & C							$27,000
14a	Brown Park Pond Improvements - Start Construction							$2,244,163
15a	County Farm Park - Start Construction							$263,600
13b	Residential Street Sweeping - Phase 3 - All Areas							$134,800
14b	Brown Park Pond - Monitoring							$35,000
15b	County Farm Park Wetland Pond - Monitoring							$35,000
16	Sweep Commercial Streets on a Monthly Basis							$68,800
17	Stream Bank Stabilization - Design							$208,000
18	Habitat Improvements - Design							$22,000
19	Pilot Project - Catch Basin Restriction							$1,169,329
20	Catch Basin Cleaning - Clean 2x/year							$944,300
17a	Stream Bank Stabilization - Implement							$2,211,311
18a	Habitat Improvements - Implement							$174,000
								$19,124,962

Table 2: On-going Restoration Activities and Estimated Costs

Project #	Restoration Activities	Estimated Costs/Year
2	Sampling for Bacteria & Phosphorus	$9,360
2a	Sampling for Benthics	$3,300
3	USGS Stream Gage - Continue Operation	$9,000
4	Enforce Existing Ordinances	$75,000
5	Ordinance & Code Revisions for Stormwater Quality & Management	$60,000
6	Stream Maintenance (routine)	$32,500
7	Public Education Program	$120,000
13b	Residential Street Sweeping - Phase 3 - All Area	$67,400
14b	Brown Park Pond - Monitoring	$17,500
15b	County Farm Park Wetland Pond - Monitoring	$17,500
16	Sweep Commercial Streets on a Monthly Basis	$34,400
20	Catch Basin Cleaning - Clean 2x/year	$472,150
	TOTAL	$918,110

Table 3: Malletts Creek Restoration Plan
Estimated Costs Summary

	Capital Costs	Finance Costs	O&M Costs	Public Involvement Costs	Total Estimated Costs
Year 1	$ 105,000	$0	$ 323,760	$ 53,000	$ 481,760
Year 2	$ 1,117,600	$294,814	$ 324,900	$ 66,000	$ 1,803,314
Year 3	$ 2,206,500	$698,522	$ 337,060	$ 103,000	$ 3,345,082
Year 4	$ 3,597,500	$1,315,285	$ 269,800	$ 178,000	$ 5,360,585
Year 5	$ 2,729,580	$963,651	$ 965,930	$ 181,000	$ 4,840,161
Year 6	$ 1,807,160	$613,151	$ 758,750	$ 115,000	$ 3,294,061
Totals	$ 11,563,340	$3,885,422	$ 2,980,200	$ 696,000	**$ 19,124,962**

Note: Finance costs are assumed to be 6.5% over 10 years
Finance costs were calculated on capital projects over $500,000

Table 4: Malletts Creek Drainage District
Apportionment %

Ann Arbor City	**74.54**
Pittsfield Twp.	**18.85**
State	**5.62**
Washtenaw County	**0.99**

WATERSHED MANAGEMENT PLAN FOR THE HURON RIVER IN THE ANN ARBOR – YPSILANTI METROPOLITAN AREA

Prepared on behalf of and with funding support from

Janis A. Bobrin
Washtenaw County Drain Commissioner

Technical assistance from
the Huron River Watershed Council

Huron River Watershed Council

Protecting the river since 1965

Revised October 2011

CHAPTER 1: INTRODUCTION

1.1 THE MIDDLE HURON WATERSHED

For the purposes of this plan, the watershed within the Ann Arbor-Ypsilanti Metropolitan Area (see Figure 1.1) will be referred to as the Middle Huron Watershed. The Middle Huron Watershed is part of the Huron River Watershed (see Figure 1.1), one of Michigan's natural treasures. The Huron River supplies drinking water to approximately 150,000 people, supports one of Michigan's finest smallmouth bass fisheries, and is the State's only designated Scenic River in southeast Michigan. The Huron River Watershed is a unique and valuable resource in southeast Michigan that contains ten Metroparks, two-thirds of all southeast Michigan's public recreational lands, and abundant county and city parks. In recognition of its value, the State Department of Natural Resources has officially designated 27 miles of the Huron River and three of its tributaries as "Country-Scenic" River under the State's Natural Rivers Act (Act 231, PA 1970). The Huron is home to one-half million people, numerous threatened and endangered species and habitats, abundant bogs, wet meadows, and remnant prairies of statewide significance.

The Huron River basin encompasses approximately 900 square miles (576,000 acres) of Ingham, Jackson, Livingston, Monroe, Oakland, Washtenaw, and Wayne counties (Figure 1.1). The main stem of the Huron River is approximately 136 miles long, originating at Big Lake and the Huron Swamp in Springfield Township, Oakland County. The main stem of the river meanders from the headwaters through a complex series of wetlands and lakes in a southwesterly direction to the area of Portage Lake. Here, the river begins to flow south until reaching the Village of Dexter in Washtenaw County, where it turns southeasterly and flows to its final destination of Lake Erie. The Huron is not a free-flowing river. At least 98 dams segment the river system, of which 17 are located on the main stem.

The immediate drainage area to the Middle Huron Watershed is 217 square miles (138,593 acres), representing approximately 24% of the Huron River Watershed. The Middle Huron Watershed is defined as the land area that drains to the Huron River downstream of the confluence with Mill Creek and through Ford and Belleville Lakes. All or portions of 13 local communities are situated in the Middle Huron Watershed, of which the largest portions are within the Cities of Ann Arbor and Ypsilanti, and the townships of Scio, Ann Arbor, Superior, Pittsfield, Ypsilanti and Van Buren. Other communities with smaller areas in the watershed include the townships of Webster, Northfield, Salem, Lodi, as well as the Village of Dexter and the City of Belleville. The entire watershed lies in Washtenaw County, with the exception of the majority of the drainage to Belleville Lake, which is in Van Buren Township and the City of Belleville in Wayne County.

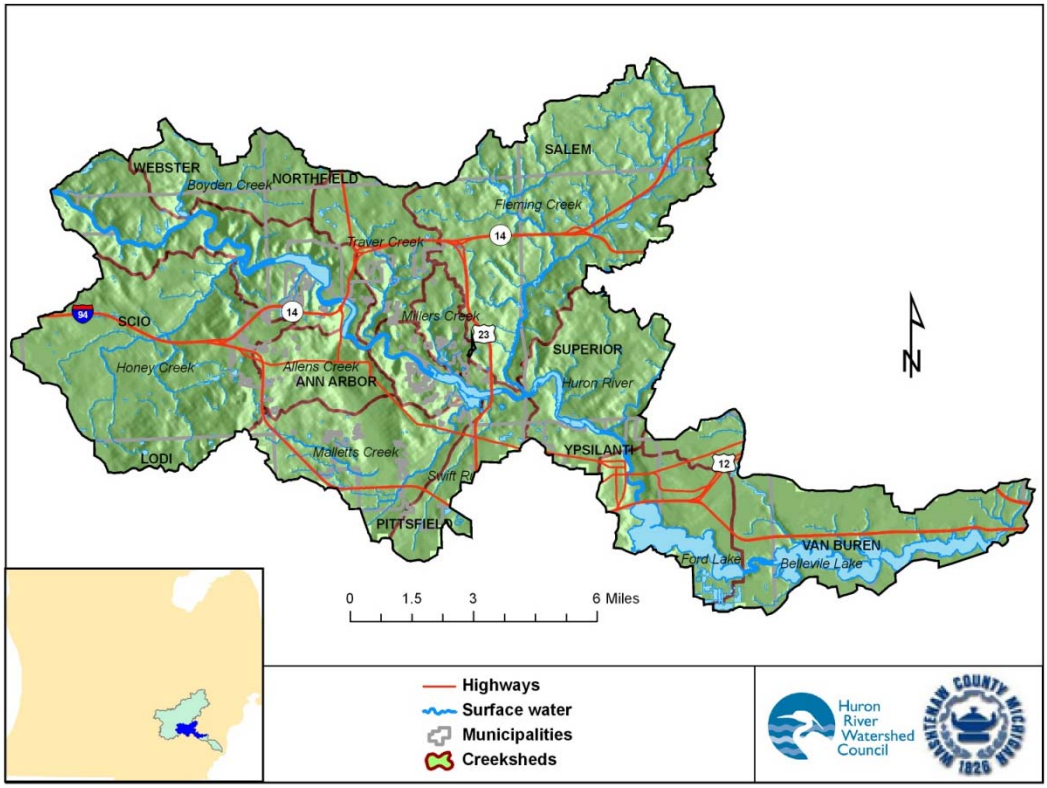


Figure 1.1 The Middle Huron Watershed boundary within the Ann Arbor-Ypsilanti Metropolitan Area, showing municipal and creekshed boundaries.

The segment of the Huron River in the Middle Huron Watershed begins at the outfall of Mill Creek in Dexter and ends at the French Landing Dam, which creates the Belleville Lake impoundment. From the Mill Creek outlet, the river flows unrestricted toward the southeast until it reaches a series of impoundments beginning with Barton Pond and ending in Belleville Lake. Nine major tributaries and the two lake drainages run directly into the Huron River system. These eleven distinct sub-basins are also known as "creeksheds." The mainstem of the Huron River in the Middle Huron Watershed is approximately 40 miles long with additional 593 miles of contributing streams. A relatively significant elevation drop from watershed inlet to outlet coupled with intensive urban development means that fewer lakes and wetlands remain in the Middle Huron than in the Upper Huron watersheds or other watersheds in Michigan. The elevation drops 199.5 feet over 40 river miles for an average gradient of 5.0 ft/mi. This gradient compares to an average of 3.3 ft/mi for the entire Huron River. Approximately 5,393 acres (8.4 sq. miles) of wetlands remain in the Watershed as of 2000, comprising about 6% of the total watershed area. The Middle Huron area contains 378 lakes and impoundments, of which 43 are greater than 5 acres and 10 of which are greater than 20 acres. All the waters greater than 20 acres in size are impoundments.

The watershed contains a few small protected natural areas including Dexter-Huron Metropark, Delhi Metropark, Barton Park, Bird Hills Park, Nichols Arboretum, Matthaei Botanical Gardens, and Belleville Park, as well as numerous other public and private local parks. The watershed's land cover is dominated by urban and sub-urban residential, commercial and industrial uses, with low-density residential areas,

grasslands/old agricultural fields, forested lands, and wetlands scattered primarily in the northern and western fringes of the watershed.

In recent decades, the Huron River Watershed has experienced amplified development pressures from a growing economy and urban sprawl. According to the U.S. Census data and the Southeast Michigan Council of Governments (SEMCOG)[1], the total population of the seven communities* that comprise over 90% of the Middle Huron Watershed's population increased 5.5% from 1990 to 2007. The forecast to 2030 shows a 13.5% increase in population from 2007 levels. This growth rate falls in between that of other subwatersheds of the Huron River: Wayne and Oakland Counties' populations are hovering at a constant rate or declining, while rapid growth is occurring in Livingston County.

Washtenaw County continues to be one of the fastest growing counties in the state, reflecting a trend in growth out from Detroit to the more outlying areas spurred by highway improvements, the establishment of infrastructure, and a desire for open space, among other factors. According to SEMCOG, Washtenaw County's population increased by almost 9% from 2000 to August 2007, compared with 2.2% in Oakland County, -0.9% in Wayne County (excluding Detroit) and 23% in Livingston County. SEMCOG predicts that most of Washtenaw County's growth in the next 23 years will take place in Scio, Superior and Ypsilanti Townships, with projected growth rates all over 30%. The more developed municipalities are projected to experience more modest growth below 10%.

If current development practices are employed to accommodate the projected increase in population and associated infrastructure, then SEMCOG estimates 40% of the remaining open spaces will be developed within the Huron River Watershed by 2020. Much of this projected conversion of undeveloped land will occur in the Middle Huron area where it will hasten degradation of the hydrology and water quality of surface waters. Common practices that impact hydrology and water quality include draining wetlands, straightening and dredging streams ("drains"), removing riparian vegetation, installing impervious surfaces and storm sewers, inadequately controlling soil erosion, and poorly designing stream crossings. Such practices result in altered hydrology ("flashy" flows and flooding), soil erosion and sedimentation, elevated nutrients, nuisance algal blooms, dangerous levels of pathogens, and degraded fisheries.

1.2 Purpose of the Watershed Management Plan

The Watershed Management Plan (WMP) for the Huron River in the Ann Arbor-Ypsilanti Metropolitan Area is part of an effort led by communities in the Middle Huron Watershed seeking to plan activities to address water quality issues highlighted in the State of Michigan's Clean Water Act §303(d) report on impaired waters. The original WMP was completed in 1994 and then updated in 2000. This version is the second update of the WMP, and was carried out as a major redraft. Much data and other information on the Middle Huron has been compiled over this time, and the authors have sought to include as much as possible. This version was also reformatted to be consistent with the structure and content of other WMPs in the Huron River Watershed.

* Includes Scio Township, City of Ann Arbor, Ann Arbor Township, Superior Township, City of Ypsilanti, Ypsilanti Township, and Van Buren Township.

Portions of the Middle Huron Watershed fail to meet minimum water quality standards or provide designated uses protected under Michigan law. In 1996, based on water quality monitoring studies, the Michigan Department of Environmental Quality (MDEQ) listed the Middle Huron River Watershed as significantly contributing phosphorus to the impaired waterbodies of Ford and Belleville lakes. The MDEQ placed the lakes on the State's 303(d) list of impaired waters, which means that their quality is poor enough to require the establishment of a Total Maximum Daily Load (TMDL). A TMDL is the maximum amount of a particular pollutant a waterbody can assimilate without violating numerical and/or narrative water quality standards. The reason for the impaired status was cited as excess phosphorus loading from point and nonpoint sources in the Middle Huron River Watershed.

Both point and nonpoint source contributions need to be reduced if the goal is to be met. The communities of the Middle Huron are under mandate from the State of Michigan to reduce phosphorus loading to the river by 50% in order to meet the TMDL. As a result of field studies, MDEQ established a TMDL target concentration of 50 micrograms per liter (µg/L) of phosphorus for Ford Lake, and 30 micrograms per liter (µg/L) of phosphorus for Belleville Lake to significantly reduce or eliminate the presence of nuisance algal blooms (Kosek, 1996). Scientists estimate that the areas covered under this WMP contribute about 75% of total phosphorus to the Middle Huron, with Mill Creek contributing the remainder.

The primary purpose of this plan is to address this impairment as well as others listed for the Middle Huron Watershed (see section 1.2.1). The Ann Arbor-Ypsilanti Watershed Management Plan represents a broad effort to restore and protect the integrity of water quality and quantity of the Middle Huron system. This plan presents a state-approved methodology to diminish the adverse effects of nonpoint source pollution to meet the established TMDLs and proactively address others that will be developed within the watershed. This plan outlines both quantitative and qualitative steps considered necessary to meet water quality goals for the Middle Huron River and its Watershed.

In order for the State of Michigan to approve a watershed plan, the plan must meet the following criteria as established in State Rule 324.8810:

> *A watershed management plan submitted to the MDEQ for approval under this section shall contain current information, be detailed, and identify all of the following:*
>
> *(a) The geographic scope of the watershed.*
>
> *(b) The designated uses and desired uses of the watershed.*
>
> *(c) The water quality threats or impairments in the watershed.*
>
> *(d) The causes of the impairments or threats, including pollutants.*
>
> *(e) A clear statement of the water quality improvement or protection goals of the watershed management plan.*
>
> *(f) The sources of the pollutants causing the impairments or threats and the sources that are critical to control in order to meet water quality standards or other water quality goals.*
>
> *(g) The tasks that need to be completed to prevent or control the critical sources of pollution or address causes of impairment, including, as appropriate, all of the following:*
>
> *(i) The best management practices needed.*

(ii) Revisions needed or proposed to local zoning ordinances and other land use management tools.
(iii) Informational and educational activities.
(iv) Activities needed to institutionalize watershed protection.

(h) The estimated cost of implementing the best management practices needed.

(i) A summary of the public participation process, including the opportunity for public comment, during watershed management plan development and the partners that were involved in the development of the watershed management plan.

(j) The estimated periods of time needed to complete each task and the proposed sequence of task completion.

The above criteria are necessary for approval under the Clean Michigan Initiative guidelines. To be approved for funding under federal Clean Water Act section 319, a plan must meet the "9 Minimum Elements:"

a. *An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in this watershed-based plan (and to achieve any other watershed goals identified in the watershed-based plan). Sources that need to be controlled should be identified at the significant subcategory level with estimates of the extent to which they are present in the watershed.*
b. *An estimate of the load reductions expected for the management measures described under paragraph (c) below. Estimates should be provided at the same level as in item (a) above.*
c. *A description of the NPS management measures that will need to be implemented to achieve the load reductions estimated under paragraph (b) above (as well as to achieve other watershed goals identified in this watershed-based plan), and an identification (using a map or a description) of the critical areas in which those measures will be needed to implement this plan.*
d. *An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan.*
e. *An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented.*
f. *A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious.*
g. *A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.*
h. *A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether this watershed-based plan needs to be revised or, if a NPS TMDL has been established, whether the NPS TMDL needs to be revised.*
i. *A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) immediately above.*

The communities involved in the development of this plan are committed to protecting the sensitive natural areas of the Middle Huron Watershed, mitigating impacts of existing point and nonpoint source pollution, and restoring degraded areas.

1.2.1 Total Maximum Daily Load Program

A Total Maximum Daily Load (TMDL) is the maximum amount of a particular pollutant a waterbody can assimilate without violating state water quality standards. Water quality standards identify the applicable "designated uses" for each waterbody, such as swimming, agricultural or industrial use, public drinking water, fishing, and aquatic life. MDEQ establishes scientific criteria for protecting these uses in the form of a number or a description of conditions necessary to ensure that a waterbody is safe for all of its applicable designated uses.

The state also monitors water quality to determine the adequacy of pollution controls from point source discharges. If a waterbody cannot meet the state's water quality criteria with point-source controls alone, the Clean Water Act requires that a TMDL must be established. TMDLs provide a basis for determining the pollutant reductions necessary from both point *and nonpoint* sources to restore and maintain the water quality standards. Point sources is the term used to describe direct discharges to a waterway, such as industrial facilities or waste water treatment plants. Nonpoint sources are those that enter the waterways in a variety of semi- or non-traceable ways such as stormwater runoff.

In Michigan, the responsibility to establish TMDLs rests with the MDEQ. Once a TMDL has been established by the MDEQ, affected stakeholders must develop and implement a plan to meet the TMDL, which will bring the waterbody into compliance with state water quality standards

As of the 2006 303(d) List of Nonattaining Waterbodies from the DEQ, ten waterbodies in the Middle Huron are listed for water quality problems. To date, four TMDLs have been established for Ford and Belleville Lakes (phosphorus), Geddes Pond (pathogens), Malletts Creek (poor fish and macroinvertebrates), and Swift Run (poor macroinvertebrates). Six TMDLs for other pollutants are scheduled for future establishment in the watershed, as described in Table 1.1.

Table 1.1: Waterbodies requiring TMDLs in the Middle Huron Watershed
(Source: MDEQ 2006 303(d) list of nonattaining waterbodies)

Waterbody	Pollutant or Problem	TMDL Status	Location/Area
Ford Lake/ Belleville Lake	Nutrient enrichment (phosphorus)	Approved in 2000	Impoundments of the Huron River located between the cities of Ypsilanti and Romulus.
Huron River (Geddes Pond and Allen Creek)	Pathogens (rule 100)	Approved in 2001	Geddes Pond Dam upstream to Argo Dam, Ann Arbor

Waterbody	Pollutant or Problem	TMDL Status	Location/Area
Malletts Creek	Poor fish and macroinvertebrate communities	Approved in 2004	Huron River confluence u/s to Packard Rd.
Swift Run	Poor macroinvertebrate community	Approved in 2004	SE Ann Arbor: Huron River confluence upstream to Ellsworth Rd
Honey Creek	Pathogens (rule 100)	Approved in 2009	Confluence of Huron River upstream to Wagner Rd..
Barton Pond	Fish Consumption Advisory for Polychlorinated Biphenyls (PCBs)	Scheduled for 2010	Impoundment of Huron River in vicinity of Barton Hills (suburb of Ann Arbor). From dam u/s to Conrail RR bridge crossing.
Ford Lake/ Belleville Lake	Fish Consumption Advisory for Polychlorinated Biphenyls (PCBs)	Scheduled for 2010	Impoundments of the Huron River located between the cities of Ypsilanti and Romulus.
Huron River	Water Quality Standard Exceedance for Polychlorinated Biphenyls (PCBs)	Scheduled for 2010	Lake Erie confluence upstream to include all tributaries.
Second Sister Lake	Fish Tissue-Mercury	Scheduled for 2011	W of Ann Arbor.
Unnamed Lake	Fish Consumption Advisory for PCBs, and Fish Tissue-Mercury	Scheduled for 2010 (PCBs) and 2011 (Mercury)	S. of Ford Lake in the NE corner of Sec. 26, T3S, R7E (Textile Road and Burton Road).

These individual TMDLs are discussed in greater detail in Chapter 2. Concerns related to established TMDLs in the watershed, and primarily nonpoint source-related actions to address those TMDLs, are included in this plan. However, because the problems associated with Mercury and PCB TMDLs are likely to be linked to broadly diffuse air-deposition or specific point sources yet to be defined, actions designed to address such TMDLs are not emphasized in this plan. The TMDLs to be developed for those waterbodies will identify source reductions to be implemented. This plan should be updated following development of those TMDLs, if necessary, to incorporate implementation activities.

1.2.2 Other Subwatershed Management Plans

This Plan was developed with the intention of fulfilling the watershed management planning criteria for the U.S. EPA's Clean Water Act §319 Program and MDEQ's Clean Michigan Initiative Program. In addition, many of the communities have developed plans to comply with the NPDES Phase II Stormwater Program, and these plans are referenced within. It should also be noted that several other "subwatershed" plans have been developed previously through a combination of community, public and private collaborative efforts. These include the Millers Creek Plan (see Appendix E), the

Malletts Creek Plans (Appendices F and X), the Fleming Creek Plan (Appendix G), the Ford Lake Plan (Appendix H), Allens Creek Plan (Appendix I), and the Swift Run Plan (Appendix Y). These plans and efforts are described in further detail in other chapters of the plan.

It is intended that this WMP will serve as an "umbrella" plan to incorporate and reference those other plans and consolidate their recommendations. Due to the broader scope of this plan, the evaluation, analysis and recommended actions will also be broader and less specific than those in subwatershed plans. For example, this plan recommends implementation of a number of individual best management practices (BMPs) in targeted areas. The subwatershed plans will often recommend specific locations for implementation of these BMPs. In many sections of this plan, references are made to elements within subwatershed plans. Users are encouraged to refer to those plans for more specific analysis and recommendations.

1.3 The Watershed Management Plan Community Input

The first task involved in developing the original 1994 Watershed Management Plan was the formation of a Policy Advisory Committee, with members representing each of the communities in the project area. In January 1993, an initial meeting of this group was convened to discuss issues related to nonpoint source pollution in the planning area and individual community concerns. Following this introductory meeting, goals and objectives for controlling water quality were developed and submitted to committee members for review and approval. Since that time the Committee has continued to meet on a regular basis to assist in watershed planning activities throughout the Middle Huron basin. Currently, the Middle Huron Partnership Initiative coordinates the meeting of these communities with the expressed intent to plan and implement activities to address the Ford and Belleville Lakes TMDL for phosphorus.

Efforts to update the Ann Arbor-Ypsilanti WMP are being coordinated under the leadership of the Washtenaw County Drain Commissioner (WCDC) in conjunction with the Huron River Watershed Council. For this 2007 update, an Advisory Committee was established, with representation from each of the communities in the Middle Huron Watershed, with the exception of Van Buren Township and the City of Belleville, as Belleville Lake was added to the geographic scope late in the update process. Project staff held bi-monthly meetings with the Advisory Committee to get feedback on different sections of the WMP. Materials were also distributed to Committee members and other interested parties for review, comment and input. All communities were given draft copies of the WMP for review prior to finalizing. The recommendations contained in this Watershed Plan update were the result of formal and informal meetings with community officials and staff since adoption of the initial plan in 1994 and its 2000 update. This update will again be presented to these communities to integrate with their commitments under other plans.

1.3.1. Technical Advisory Committees

Several Technical Advisory Committees were established to provide input to individual components of this plan. A Committee was established to assist in revising the Drain Commissioner's standards governing the design of stormwater management systems in new developments. Members included staff from local planning, engineering, building

inspection and utilities departments. Private engineering and planning consultants were also represented, as well as the Huron River Watershed Council, the County Soil Conservation District and the MDNR. Committee members were provided with working drafts of the Drain Commissioner's standards (including explanations about how revisions work to improve water quality and quantity control) and asked to provide feedback on their practicality for implementation within Washtenaw County. Revised standards were adopted in 1994. Public involvement and review also guided the 2000 update and this 2007 update. That group was developed specifically to recommend stormwater permit standards. Those standards are not scheduled for revision prior to adoption of the WMP.

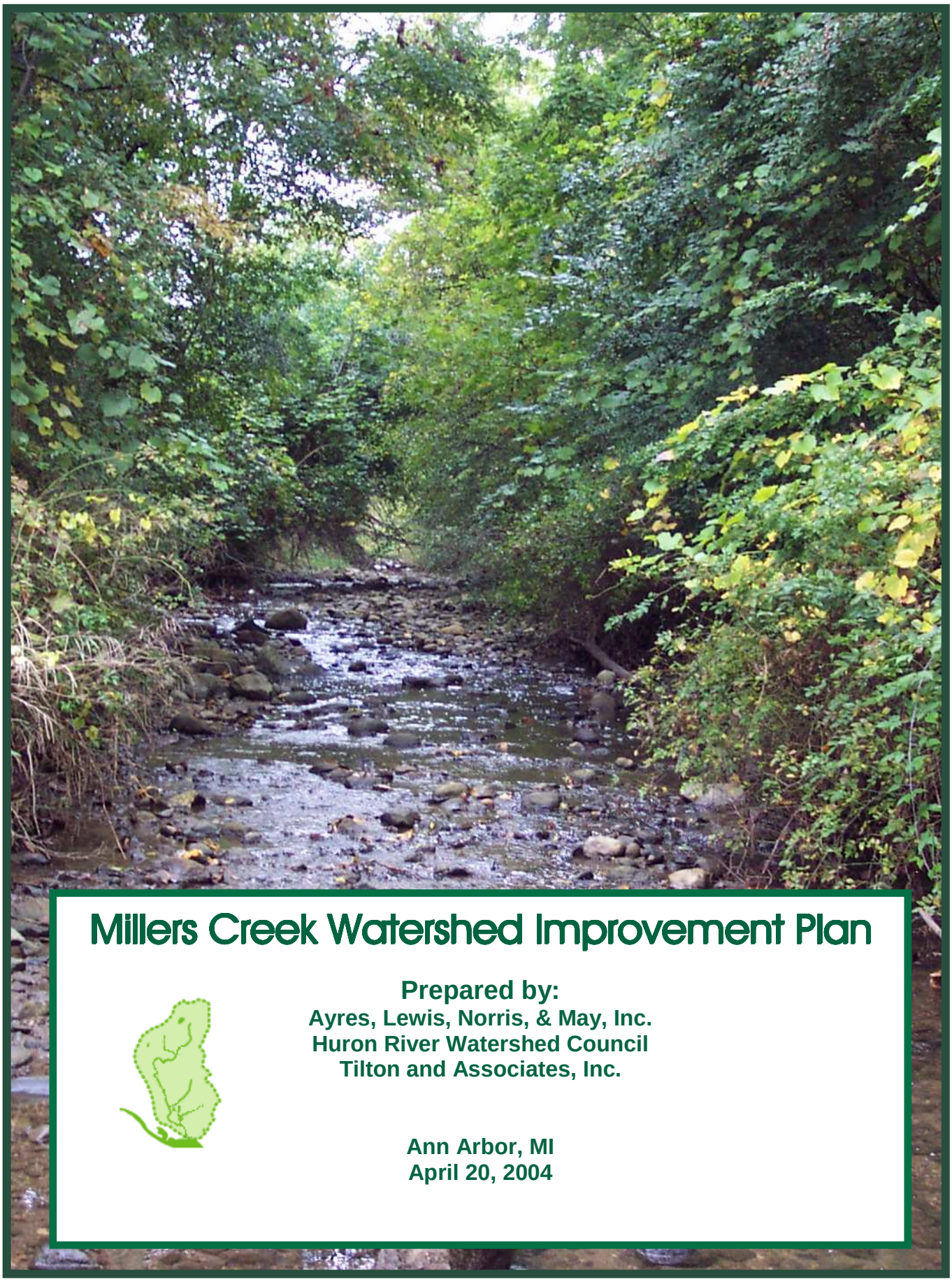
Additionally, the Middle Huron Partnership Initiative was formed to address the Ford and Belleville Lakes TMDL. The Partnership originally formed in 1999 following development of the TMDL, and an updated Cooperative Agreement was signed in 2005 (see Appendix B). This voluntary agreement commits the DEQ and community partners to specific steps to address the phosphorus reduction targets described in the TMDL. The Partnership meets twice a year to report on progress and also serves as a de facto advisory body for this WMP.

1.3.2 Input from Local Subwatershed and Creek Groups

Creek groups have contributed a unique community involvement component to the development of the original WMP and updates. Several creek groups have formed since the development of the original WMP, and several of these have developed subwatershed plans or other sets of recommendations. These include plans for Allens, Millers, Malletts, and Fleming Creeks, and Ford Lake. This plan incorporates these components not simply as feedback for the update, but as a basic framework for updating the plan. Recommendations made in this document represent a collaborative effort between the Huron River Watershed Council, the Office of the Washtenaw County Drain Commissioner, the individual creek groups and the greater creekshed communities.

Staff from the Huron River Watershed Council and the Washtenaw County Drain Office have met, and will continue to meet with creek groups, throughout the process of developing and implementing watershed plans. Involving these groups will continue to foster community support for WMP implementation and creek restoration activities. Representatives of the Huron River Watershed Council and the Drain Office will remain involved in these groups to assist in their development, management planning, grant proposals, policy and technical assistance, and special event coordination. In addition, creek group representatives will continue to advise the Drain Office and the Huron River Watershed Council in program development as they have for current and past restoration projects, the Huron River Watershed Council's Adopt-A-Stream program and others.

[1] Southeaset Michigan Council of Governments. Community Profiles. http://www.semcog.org/data/communityprofiles. Accessed August 2007.



Millers Creek Watershed Improvement Plan

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City of Ann Arbor (AAB) Building Department
City of Ann Arbor (AAU) Utilities Department (now Systems Planning, Public Services)
Huron River Watershed Council (HRWC)
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1. EXECUTIVE SUMMARY

1.1 Project Background

This document is a comprehensive watershed improvement plan for Millers Creek, an urban tributary of the Huron River located on the northeast side of the City of Ann Arbor in Washtenaw County, Michigan. This project originated as a unique public and private sector partnership funded by Pfizer Global Research and Development, Inc. (Pfizer), the second largest landowner in the watershed. Plan development oversight was provided by the Millers Creek Action Team (MCAT), a voluntary group of watershed stakeholders including businesses, community representatives, and local and state entities.

This project was prompted by flooding and bank erosion on Pfizer's Ann Arbor campus (See **Figure 1.1**). Pfizer decided to investigate the problems and develop a solution by looking at their campus in the context of the entire Miller Creek watershed. With assistance from the Washtenaw County Drain Commissioner (WCDC) and the Huron River Watershed Council (HRWC), Pfizer initiated MCAT and this project. Concern for the creek coalesced in the middle to early 1990s when an earlier version of MCAT, led by the Environmental Research Institute of Michigan (ERIM), the HRWC and the WCDC began investigating possible watershed-wide improvements.

Figure 1.1 Damage on Pfizer Campus Along Millers Creek

The creek has little to no existing institutional support. It is not a county drain and is considered a receiving water for the City of Ann Arbor and the University of Michigan North Campus storm water drainage. The creek is also identified as a contributing source in the Ford and Belleville Lakes Total Maximum Daily Load (TMDL) for phosphorus and the Geddes Pond TMDL for *E. coli*.

On-going planning efforts consulted for this project include the Northeast Area Plan (NAP), the Ann Arbor Parks and Recreation Department Open Space Plan 2000-2005 (PROS Plan), and the *E. coli* implementation plan (2003). The NAP and PROS plans provided recommendations of forecasted land use for a fully built-out Millers Creek watershed.

1.2 MCAT Mission and Project Goals

The mission of MCAT is to establish and implement socially, environmentally, and economically sustainable watershed management standards and practices that will improve the quality of the Millers Creek watershed. The goals of this plan are to develop a set of recommendations that will improve stream habitat and watershed hydrology, improve recreational opportunities in and around the creek and help local stakeholders achieve the objectives of the Ford and Belleville Lakes total phosphorus TMDL and the Gallup (Geddes) Pond *E. coli* TMDL. Implementation of these recommendations will also help foster activities that perpetuate urban watershed and stream stewardship, and create a healthier balance between the local community and its ecosystems.

1.3 Project Overview

This project began in the spring of 2002. MCAT developed a work scope, selected a consultant team to prepare the Watershed Improvement Plan, and regularly advised and collaborated with the consultant team to create the plan. The consultant team compiled existing source data and undertook a detailed investigation of field conditions including watershed and subwatershed delineations, flow, velocity and, water quality measurements, in-stream and corridor habitat, macroinvertebrate diversity, stream bed and bank stability, and infrastructure conditions. Runoff, flow, velocity, and water quality models were developed and calibrated to field-collected data sets.

MCAT developed a vision statement for the watershed, including goals and objectives to measure progress. Watershed residents and other volunteers helped with stream monitoring and developing management recommendations. Feasibility and performance of each recommended improvement were assessed using qualitative and quantitative measures. This report was compiled to summarize and communicate project results. It includes a prioritized implementation plan, estimated costs and a monitoring plan.

1.4 Existing Conditions

Millers Creek is the steepest tributary to the Huron River. Over the mainstem of the creek, the average gradient (change in elevation over creek length) is 52 ft/mi. By comparison, the average gradient of the Huron River is 2.95 ft/mi. Approximately 36% of the 2.4 square mile (1,531 acres) Millers Creek watershed is covered in impervious surfaces – roads, roofs, driveways, and parking lots. Most of the storm sewer was designed to be self-cleaning and does not have catch basin sumps. Many built-out areas in the watershed have little or inadequate storm water detention storage, and watershed soils are predominantly poorly draining clay loams. This combination results in high peak flows arriving at the stream minutes after the onset of rainfall. The steepness and flashiness of the stream wreak havoc on the aquatic community by periodically wiping away the streambed and severely eroding the stream banks. In some locations near Huron Parkway, creek incision and meandering are threatening the bike path. All macroinvertebrate sampling, with the exception of the site near Narrow Gauge Way, has found an impoverished benthic community. This is probably due to frequent episodes of mobilized streambed. High concentrations of *E. coli* (up to 18,000 counts/100 ml), indicative of water contaminated with warm-blooded animal waste, have been found in several locations along the creek. High total suspended solids and high total phosphorus loads are most likely a result of runoff loads and stream bank and bed erosion. Flow and geomorphology data suggest the erosion loads are primarily originating in the middle reaches of the creek. These loads are then deposited in the creek delta that extends from Huron High School to the Huron River or are carried into the Huron River.

1.5 Improvement Plan and Analysis

An extensive list of possible improvements was compiled based on field and Geographical Information Systems (GIS) analyses. Improvement feasibility was ranked qualitatively based on technological challenges, engineering design requirements (e.g., level of complexity), property ownership, public acceptance, and potential site constraints. A total of 112 separate improvements were considered. Five alternative scenarios were created to capture key improvement recommendations and to quantify the degree of hydrologic and water quality goal attainment. The alternatives analysis was structured as a series of incremental improvements: from the least costly and most highly feasible projects to the most costly and least feasible. It was assumed that there was no practical limit on the number of improvements that could be implemented to try and reach some predevelopment standard. Research has shown that

streams with a high percentage of impervious surface area (>15%) are not likely to ever be completely restored to predevelopment condition (Booth, et al. 2002). This does not invalidate the need to conserve and enhance the resource, but rather imposes realistic limits for restoration success.

1.6 Quantitative Assessment and Results

Recommended improvement performance was tested using the calibrated suite of models and literature estimates of source control effectiveness. The calibrated models were adjusted to assumed build–out conditions based on the NAP and PROS plans. The build-out scenario included 30.5 acres of new residential development, 18 acres of new commercial land with an additional 80.5 acres set aside for floodplain, recreational area or conservation easements. Since the watershed is almost completely built out, and most soils are poorly drained, hydrologic control relies almost entirely on new and retrofitted best management practices (BMPs). Results also demonstrate that even with a built-out watershed, source control is still more efficient and cost-effective for protecting water quality than end of the pipe BMPs.

1.7 Implementation, Projected Costs and Funding

Implementing the Millers Watershed Improvement Plan will require the concerted efforts of the City of Ann Arbor, Washtenaw County, Ann Arbor Township, and the University of Michigan, all of which are regulated storm water communities under Phase I and II National Pollutant Discharge Elimination System (NPDES) storm water permits. These communities are responsible for ensuring water quality and addressing water use impairments. However, a committed public-private partnership, much like the one that initiated this project, will ultimately be the key to success. All individual landowners, institutions, industries, business owners, and local units of governments have a stake in the Millers Creek improvement process and can contribute to the successful implementation of the plan.

The recommended improvements include structural and non-structural BMPs. The structural BMPs include proprietary BMPs (underground storage/treatment units), detention pond retrofits, roof drain disconnects, sediment traps, detention ponds and regional off-line peak flow reduction facilities. Some of the recommended non-structural BMPs include a phosphorus-free fertilizer ordinance, street sweeping, conservation easements, public education plans and long-term performance monitoring. Except for the purchase of (some) conservation easements, these non-structural BMPs are the most cost-effective solutions for hydrologic and water quality control. Structural BMP priorities include detention pond retrofits, roof drain disconnects, sediment traps, detention facilities and two priority streambank stabilization sites. The next priority is for regional off-line peak flow reduction facilities. Recommended streambed stabilization, daylighting and some bank stabilization measures are assigned the lowest priority.

The next major step for this plan is to obtain City of Ann Arbor, the University of Michigan and the Michigan Department of Environmental Quality (MDEQ) acceptance and endorsement. MDEQ acceptance will make the watershed eligible for Clean Michigan Initiative (CMI) and Clean Water Act-Section 319 funding, two of the most significant sources of outside support. This plan also recommends that watershed stakeholders petition for creation of a Millers Creek Drainage District to provide a long-term framework for financing improvements and maintenance activities. MCAT intends to lead implementation of this plan and offer technical and administrative assistance to watershed stakeholders.

HURON RIVER 2013 SRF PROJECT PLAN

PREPARED FOR

Huron River Green Infrastructure Drainage District

APPENDIX I
VILLAGE OAKS-CHAUCER COURT DRAINAGE PLAN – EXECUTIVE SUMMARY

City of Ann Arbor
Village Oaks-Chaucer Court Drainage Area Study Final Report

Prepared For: Mr. Troy Baughman, PE, Project Manager
City of Ann Arbor

Prepared By: Eric M. Harris, PE
Wade Trim

Date: July 9, 2012

1. Executive Summary

As vacant property is developed, the associated changes to natural storm drainage patterns can result in unintended impacts to adjoining properties. These negative impacts can occur despite the best efforts of the local community and property developers to provide adequate drainage. Typically, the storm water issues result from the compounded effect of runoff from multiple individual sites, none of which may be a problem on their own, but collectively impact the evolving drainage system and its outlet. Since the timing of individual property development can vary within a watershed and may occur over decades rather than years, it is not always practical to plan and implement construction of an ultimate master drainage system adequate to serve all properties until sufficient land development occurs, and the new runoff characteristics and specific drainage needs of the watershed are defined.

Historically during heavy rain events, backyard (and basement) flooding has occurred between the west edge of the Village Oaks Subdivision and the east edge of the Lansdowne Subdivision near Chaucer Court. The residents of the area reported that even during more frequent, less intense rain events there is still substantive overland flow in this same area. More specifically, flooding occurred during the June 5-6, 2010 storm event which led to backyard flooding in this area, as well as basement flooding. Known contributing sources of increased storm water include, but may not be limited to, the additive effects of nearby property development upstream of and at higher elevations from the affected area.

Site developments and storm improvements within the areas tributary to the point of flooding within the Village Oaks–Chaucer Court area were designed and constructed independently. In 1991, a new storm sewer was constructed by the City of Ann Arbor to address flooding issues on Chaucer Court, improving the outlet to Malletts Creek. However, drainage issues are present in the area today. Prior to the study conducted in conjunction with this report, there had not been a comprehensive

assessment of how runoff from the overall drainage system performs holistically which this study looked to achieve.

Working collaboratively with residents impacted by the flooding, the City of Ann Arbor solicited proposals for consulting services to evaluate the watershed and develop a recommended solution to this flooding problem. The drainage study was to define the tributary area, assess existing conditions, develop and evaluate alternatives and make recommendations for improvements. A key component of the work plan was the public engagement process that maintained active participation of local residents in the evaluation. During wet weather, excessive storm water causes extensive and frequent backyard flooding in the Village Oaks–Chaucer Court neighborhood, which has led to basement flooding.

The area impacted by flooding is the backyard area between Village Oaks and Chaucer Court that was designed to be a storm water detention basin. Although this basin currently receives flow from the upstream tributary area, it appears that it was only intended to receive flow from the Village Oaks.

Backyard flooding has been documented at least twice in 2010 during moderate rain events indicating that the existing drainage system is unable to handle a one-year frequency storm. In 2011, Ann Arbor experienced record breaking rainfall as local rain gages recorded the wettest year in recorded history which resulted in increased backyard flooding.

The problems associated with the chronic flooding of the storage area between Chaucer and Village Oaks Courts were identified from a number of contributing factors. Generally speaking, the Village Oaks (VO) storage is impacted by the storm water runoff from the upstream and downstream areas, including backwater conditions from the storm outlet to Malletts Creek. Specific factors identified in the drainage study, include:

- from larger storm events; tributary flows from Ann Arbor-Saline Road drainage, Lambeth Drive, and Chaucer Drive north of Ascot Road

- backwater conditions due to restricted flow where the 36-inch Chaucer Court sewer discharges to the 24-inch outlet sewer to Malletts Creek across Ann Arbor-Saline Road

- VO detention basin filling prematurely and to higher levels due to the configuration of the Chaucer Court Storm Sewer, and its inlets, that do not hydraulically separate all of the upstream flow from the VO detention basin and downstream tributary areas

- excess flows due to the existing conditions of the individual site detention basins and their outlets
- Lack of an emergency overflow from the VO detention

To determine the extent and nature of the upstream drainage area and contributing flows, a detailed analysis of the existing site conditions was performed. The existing site conditions information came from several sources including local residents, City staff, field investigations and topographic survey, record drawings, Geographic Information Systems (GIS) data, existing computer models, and Flood Insurance Studies (FIS). The information gathered from this analysis was used as inputs to develop the drainage system computer model.

Once the existing conditions model was developed and calibrated, the model was used to simulate various design rainfall conditions and to test various alternatives. The rainfall events simulated included the 100% annual occurrence (1-year), 20% annual occurrence (5-year), 10% annual occurrence (10-year), a storm equal to the June 2010 event and the August 1998 event.

Modeled alternatives were developed based on several Technical Advisory Committee (TAC) meetings. The TAC included City of Ann Arbor Staff, staff from the Washtenaw County Water Resources Commission (WCWRC), Wade Trim, and three residents from the VO neighborhood. A total of eight alternatives were developed, modeled and the results evaluated by the TAC.

The alternatives studied were wide-reaching, ranging from a complete capture and bypass of all upstream storm water flows directly to Malletts Creek, to a complete capture and detention of all upstream flows in a regional detention basin. Alternatives included a look at underground storage to replace above-grade detention requirements for VO; however, this proved to be cost prohibitive. Also, compliance with the WCWRC standard rules and regulations requires that there be no increased impact (i.e., flow rate or water quality) to Malletts Creek. Another important consideration is the impacts to natural features for proposed recommendations (including corrections to existing detention basins) that will need to be looked at during the final design phase. Examples of these potential impacts can be seen in the slides as shown in Appendix No. 11. Consequently, the TAC member's affiliated with the City selected alternative No. 5 as the leading option, based upon the City's interpretation of applicable requirements. This option includes restoration of basins at VO and the upstream developments, install restrictors where missing, and construction of a regional basin. Planning level estimates place the cost for this alternative in the range of $858,000 - $1,248,000. Cost range is due to potential land costs (associated with the area for the constructed regional basin) that range from an estimated $6/sf to $10/sf. However, due to VO and Chaucer property owner concerns regarding the adverse impacts of increased on-site detention at VO

(detailed below), No. 7, which involves approximately 7,000 cu. ft. for VO being stored off-site in the regional detention, would represent a more desirable outcome

2. Introduction

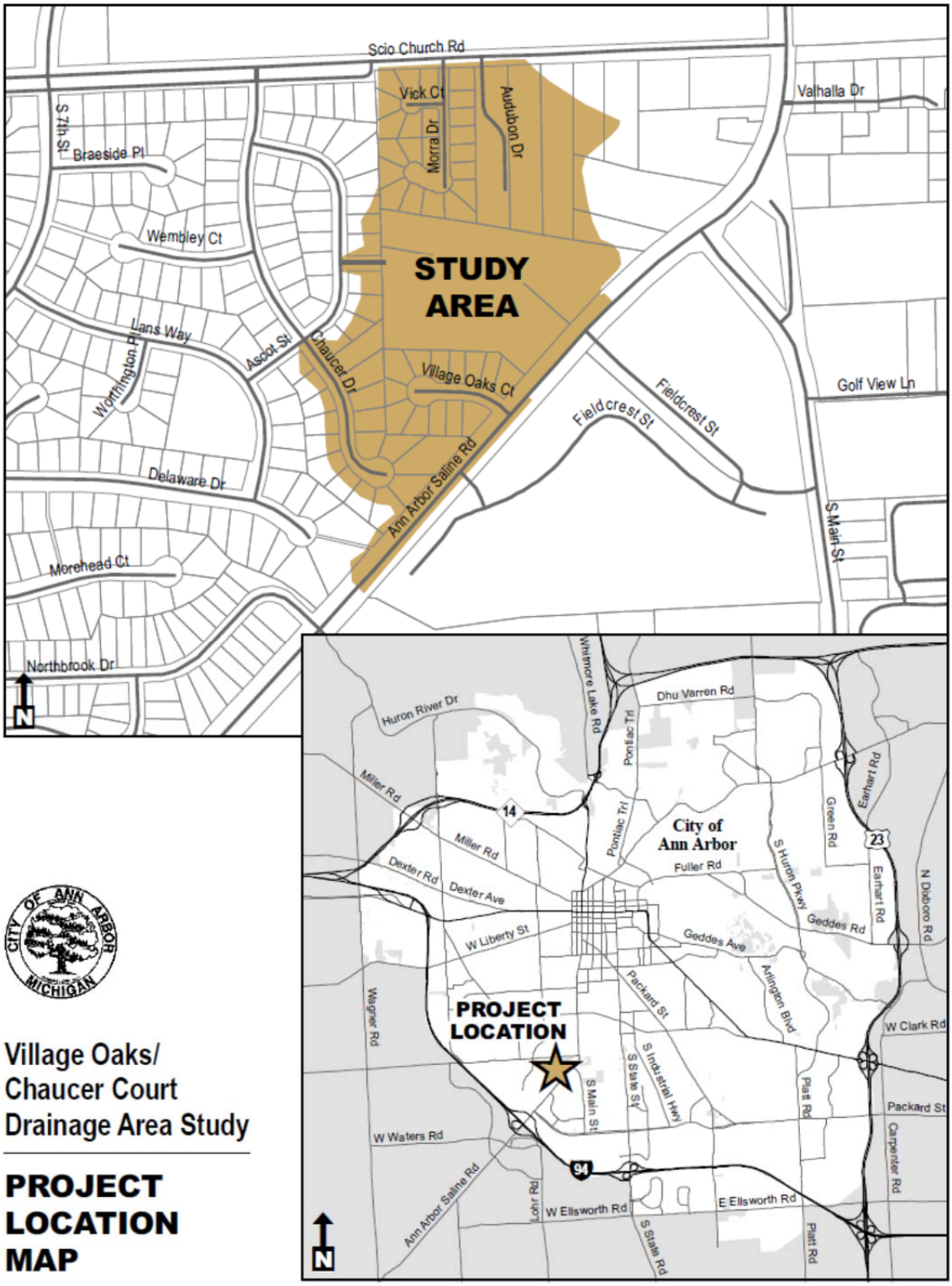
General – The Village Oaks–Chaucer Court study area is located near the southwest corner of the City of Ann Arbor. The study area is shown in Figure 1. The drainage area is comprised (in whole or in part) of eight entities including:

1. Lansdowne Subdivision (i.e. Chaucer Court & Lambeth)
2. The Meadows
3. Country Place
4. Karrington (a.k.a. Sunrise)
5. Village Oaks
6. Entire vacant parcel north of VO
7. Southern portion of vacant parcels east of Country place
8. City of Ann Arbor (Ann Arbor/Saline Rd)

Prior to the late 1970's, the only developed land in this area included the Lansdowne Subdivision. During the 1980's and 1990's the other sites were developed while the vacant parcels remain undeveloped.

Each of these developments was implemented under different land development rules and regulations that have changed through the years. For example, Meadows and Country Place were developed as site condominium projects (containing individually owned condominium units with general commonly owned elements), whereas Village Oaks and the Landsdowne Subdivision were developed as platted subdivisions. The land development review process varied based on the type of development. In addition, the storm water detention regulations changed through the years. City rules did not explicitly require emergency overflow structures or freeboard to be constructed as part of the storm water detention systems until June, 2000.

Figure 1 – Study Area



Purpose – The purpose of the project is to perform a drainage area study and recommend storm water improvements to the Village Oaks–Chaucer Court drainage area to mitigate flooding. Specific components necessary to the study include: public outreach and engagement; delineating the drainage area; developing an existing conditions model; characterizing previous storm events that have led to flooding in the Village Oaks–Chaucer Court area; reviewing historical requirements and identifying deficiencies within the watershed; developing and modeling improvement alternatives; and presenting a final recommendation.

Scope – The scope of the study is summarized as follows:

1. Existing conditions

   To determine the extent and nature of the upstream drainage area and contributing flows, a detailed analysis of the site conditions was performed. The information gathered during this analysis was used as inputs to the computer model.

   The existing site conditions information were developed from several sources including local residents, City staff, field investigations, record drawings, Geographic Information Systems (GIS) data, existing computer models, and Flood Insurance Studies (FIS).

2. Existing Storm Water Management System

   The flooding problem within the Village Oaks–Chaucer Court area has a complex tributary system that includes multiple sequential detention basins, restricted conveyance, and downstream backwater conditions. This type of system required the use of a dynamic computer model that accounts for these complexities and has the flexibility to verify the effectiveness of alternatives to correct the flooding. The City's previously developed model of the Ann Arbor storm water system was developed using the InfoSWMM framework. The portion of the InfoSWMM model related to this drainage area project was extracted and used as a starting point for the additional model development performed for this project.

   All modeling work was performed using the standard version of the U.S. EPA SWMM Version 5. Model development included both the hydrology and hydraulics to simulate the entire system.

3. Public Engagement

   Public involvement was an important component of the study project to reach out and engage neighbors as part of the information gathering, information sharing,

analysis, and development of recommendations. A Technical Advisory Committee (TAC) was formed that included residents from VO as well as City and County staff and public meetings were held for residents within the study area. Meeting minutes were kept and all engagement activities were documented in an outreach and engagement activities log. The outreach and activities log is included in Appendix No.1.

4. Recommendations

   Improvement alternatives for the existing drainage system were developed collaboratively with the TAC and evaluated with the calibrated SWMM model. The alternatives developed included re-establishing storage, increasing conveyance capacity, intercepting and bypassing upstream flows, regional detention, and emergency overflows.

   At the completion of the project, this final report was developed to include planning level cost estimates for the improvements studied, a description how the current system functions, the development of the hydrologic and hydraulic model, model calibration, findings, alternative screening and evaluations, and final recommendations.

Background – Historically during heavy rain events, backyard (and basement) flooding has occurred between the west edge of the Village Oaks Subdivision and the east edge of the Lansdowne Subdivision near Chaucer Court. The residents of the area reported that even during more frequent, less intense rain events there is still substantive overland flow in this same area.

In 1989, a drainage study (Chaucer Court Storm Sewer Study, Dated 12/1989) was performed in response to reported basement flooding which had occurred in the spring of that year on Chaucer Court, in Lansdowne Subdivision No. 3. That investigation led to the construction of a relief storm sewer (City file no. 89067) which was completed in 1991. A copy of the Chaucer Court Storm Sewer Study, Dated 12/1989 is included in the Appendix No.2.

The additional flooding that occurred in this area during the June 5-6, 2010 storm event led to backyard flooding as well as basement flooding. City staff met with residents of the Village Oaks–Chaucer Court area regarding recent and past excessive overland flow. Known contributing sources of increased storm water included the additive effects of nearby property development upstream of, and at higher elevations than, the affected area.

3. Technical Work

A. Existing conditions

1) Field work

i) survey

Detailed topographic surveys were performed at each of the existing detention basins for VO, Karrington, Country Place and the Meadows. These surveys were then compared to previously approved site plans for each development to determine the difference between approved detention basin volume capacities and the capacities as they exist today. With exception of Karrington, it was determined that all existing basins were currently under capacity. See Figure 2. Note: The 15,000 ft3 required volume for VO as shown in Figure 2 was later refined to be 14,061 ft3.

Figure 2 – Existing Storage Summary Table

Existing Storage - Review

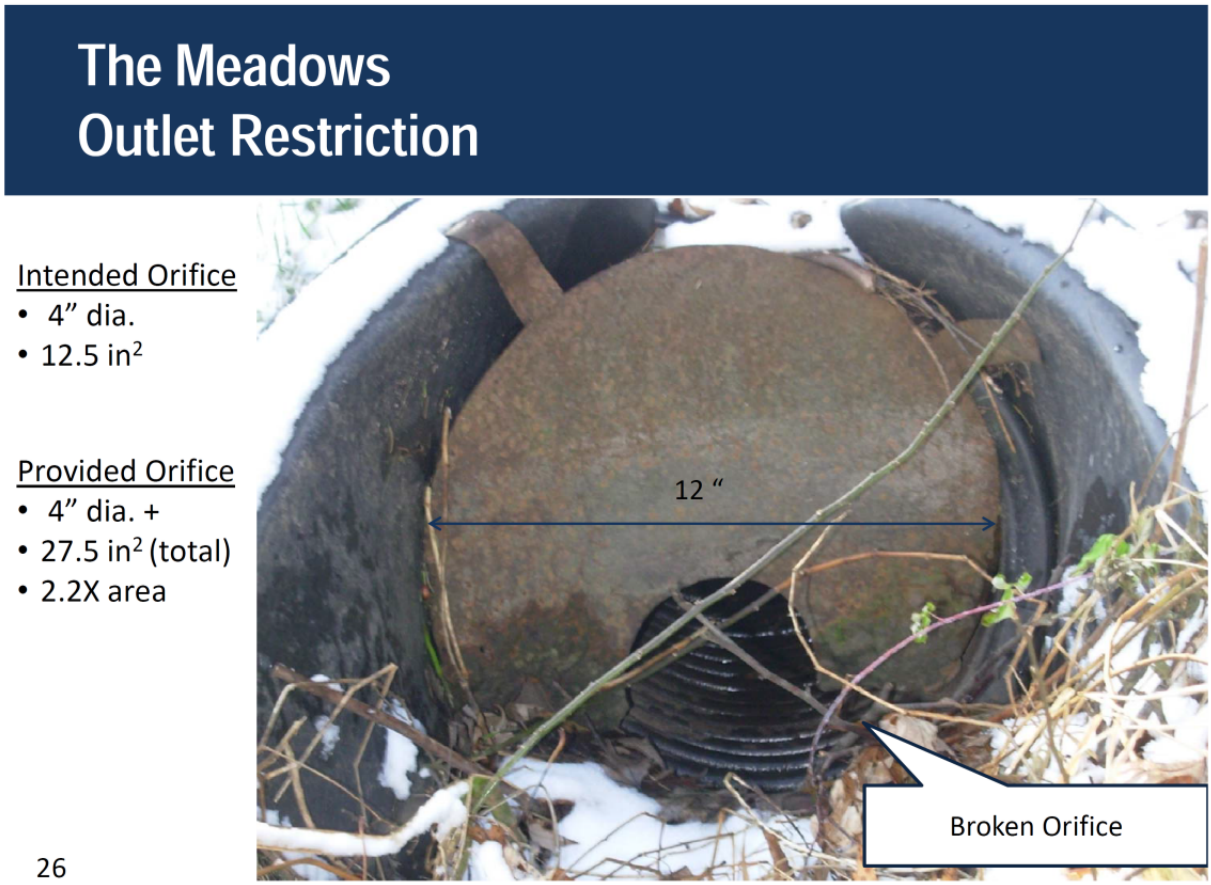
Storage Location	Required Volume (ft^3)	Actual Volume (ft^3)	Intended Restricted Flow (cfs)	Actual Outlet Flow (cfs)	Comment
The Meadows	27,832	8,900	1.0	1.0/14$_{bypass}$	Undersized Storage
Country Place	10,379	4,900	0.4	7.0	No Orifice Plate
Karrington	19,130	19,400	0.8	9.7	No Orifice Plate
Village Oaks	15,000*	11,500	0.75	7.3	No Orifice Plate

*Based on design drawing contours

Field work also included a visual review of the existing outlet control structures to verify that storm water flow restrictors were installed in accordance with the approved site plans. Restrictors were missing from all the developments outlet control structures except for The Meadows.

Although the Meadows restrictor orifice plate was installed, a closer look revealed the restrictor has a larger opening (i.e. increased flow rate capacity) than was permitted in the approved plans. See Figure 3. The larger opening can be attributed to a poorly installed restrictor plate that allows a portion of the storm water flows to pass around the restrictor plate. The lower 25 percent of the restrictor plate is missing due to deterioration further reducing the effectiveness of the restrictor plate. Not including the storm water that flows around the plate, it was estimated the current restrictor is allowing for more than twice the allowable outflow rate.

Figure 3 – Meadows Place Existing Outlet Restrictor



ii) infiltration tests

Using the Natural Resources Conservation Service (NRCS) soils map for Washtenaw County, it was determined that there are four soils types within

the drainage area. Tests were conducted at three locations representing each of the three soil types to determine the difference between the dry and saturated soil infiltration rates. Both the dry and saturated soil infiltration rates were used as inputs in the hydrologic model. See Appendix No. 3 for testing locations, soil types and testing results.

2) GIS data
The City of Ann Arbor GIS database was used extensively throughout the study. Data used included:

- Storm sewer system
- soil surveys
- wetlands
- woodlands
- LiDAR based 2-foot contour
- impervious and pervious surfaces
- parcels
- aerial imagery

This information was used in conjunction with other data to prepare maps, determine drainage areas, and perform flow calculations.

3) Record drawings

Approved site plan drawings and storm water calculations were reviewed and compared to existing conditions as determined from the field work and from the City's GIS.

Originally approved storm water calculations for VO were unavailable for review. Calculations were performed, based on the criteria as required at the time VO was being approved, and it was determined that 22,000 ft3 of storage was required for the storm water detention basin. Absent the originally approved calculations, the contours, as depicted on the approved site plans, were used as the basis for the required storm water detention basin volume which was determined to be 14,061 ft3. A review of the design calculations and drawings for Meadows Place were compared to recalculations and anomalies were identified. These discrepancies along with concerns expressed by VO TAC members are further described in Appendix No. 4.

4) Existing computer models

The City of Ann Arbor had developed an InfoSWMM model of the storm water collection system that was used as a starting point for the development of the more detailed SWMM5 model representing the additional hydraulic complexities of the system from Malletts Creek to the head waters of the system.

5) City staff and resident input

Actual storm flow measurements were unavailable for this study; therefore, the drainage area study had limited data for use in calibrating the computer model. As a result, the historic information provided by the local residents describing how the watershed responds to rainfall events was a key source of information. The information included high level water marks the residents documented during the 2010 flooding events that played an integral role in understanding the impacts to the system during those events. See Figures 4 & 5. Residents that attended the public meetings were able to provide specific accounts of observed flows that helped to verify if the delineated drainage area was accurate and in some areas, the drainage area was modified.

Figure 4 – High Water Mark

Figure 5 – Flow Path

July 2010 – Staking

City of Ann Arbor staff regularly reviewed documents providing valuable feedback and were a constant source for overall historical perspective of how the various components of the system evolved over time. Staff provided rainfall data for specific storm events and land valuation figures that were used in the cost estimates.

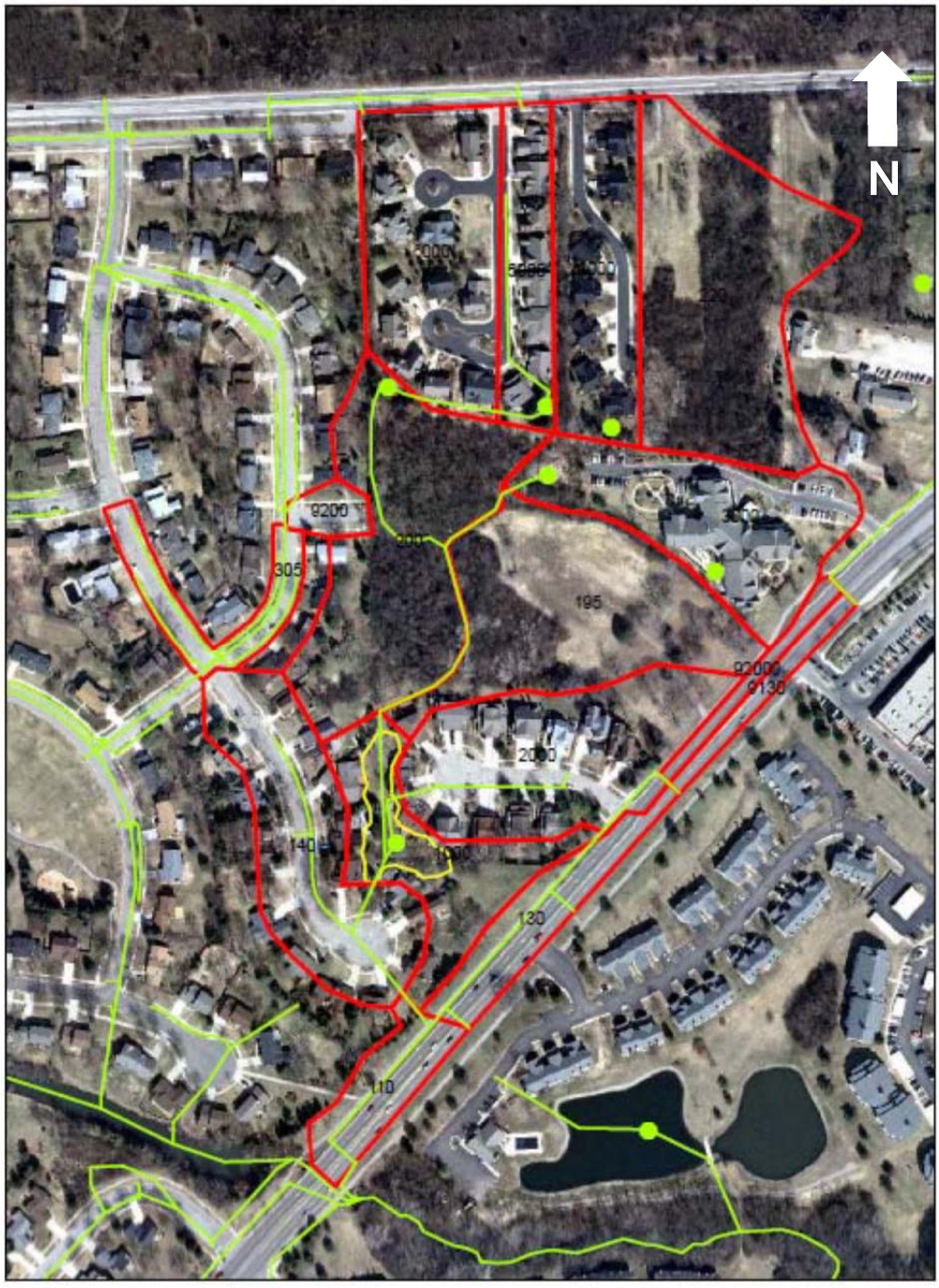
B. Computer modeling

1) Hydrologic

i) LiDAR

The initial step in developing the hydrologic model involved a comprehensive delineation of the watershed and the individual subareas within the watershed. See Figure 6. The initial delineation was performed using the available 2-foot contour data in the City's GIS, developed from Light Detection and Ranging (LIDAR) data. The initial delineation was mapped in GIS and field investigations were performed to verify that the delineation was accurate and to identify any additional areas that have inflow to the system that was not consistent with the GIS and record drawings.

Figure 6 – Watershed Subareas



ii) Field survey data

Detailed topographic surveys were performed at each of the existing detention basins for VO, Karrington, Country Place and the Meadows. Storm sewer pipes and control structures were observed to confirm the

storm water flow paths and to identify new flow paths that do not show up in the record drawings or the City's GIS. One example of a new flow path was discovered where storm water discharge from the Country Place basin was routed directly into the Karrington basin through a storm water collection pipe.

iii) Measurements from residents

Measurements, as shown in Figures 4 & 5 were used to help quantify the storm water volume and water depth that was later used to calibrate the computer model.

iv) Rain gauge data

Rain gauge data used to drive the model was based on over a month of continuous radar rainfall data that was provided by the City. The radar rainfall data had a start date several weeks before the June event making it possible to perform a continuous model simulation during the calibration process and to account for antecedent soil moisture conditions leading up to the June 2010 event.

C. Hydraulic

1) Collection and conveyance systems

i) The hydraulic model included multiple branches that extend upstream to the points of inflow from individual subareas. These branches included both open channel and piped systems. The closed conduits were modeled based on available record drawings and supplemental field survey data. The open channels in the model were largely based on cross-sections cut using the 2-foot contour data provided in the City's GIS.

In some instances it was necessary to model the drainage route using both parallel closed conduit and open channel elements such as the drainage between the Village Oaks and Chaucer Court Subdivisions. Under these instances, the closed conduit represented the intended flow path below grade, and the open channel represented a higher level overland flow relief.

2) Detention

i) At the point of inflow from a subarea containing a detention basin, a storage node was added to the model simulating the stage/storage relationship as shown on the record drawings supplemented with field information. Each storage node had an associated stage/discharge relationship that simulated the rate of discharge from each basin.

In the area of flooding between Chaucer and Village Oaks Court, a storage element was added to the model representing the same stage/storage characteristic for this area. The stage/storage relationship, as well as the stage/discharge characteristics, at this location was based on the available 2-foot contour data, supplemented with field survey data with special attention given to the high level overflow points from this storage area.

3) Downstream boundary conditions

   i) Downstream boundary conditions were established at Malletts Creek as a simple, fixed 10-year flood elevation based on the Federal Emergency Management Agency (FEMA) FIS backwater profiles. The Malletts Creek 10-year flood elevation did not have an appreciable backwater impact on the collection system.

4) Calibration

   i) The initial development of the hydrologic and hydraulic models was based on the best available information to represent the physical properties associated with rainfall, runoff, flow routing, and backwater conditions. After the initial model was developed, historic model simulations were performed and the results compared to measured data from the field and observations from the local residents. Based on a comparison of the model and measured results, specific parameters were adjusted to improve the correlation of the model results to measured data.

      The model was calibrated to the June 2010 event to match the extent of the flooding reported by the residents. The model was further calibrated to observed rear yard storm water flow width from the July 21, 2010 and July 23, 2010 events including recorded high water marks observed by the local residents during the events. The rainfall data used to drive the model was based on over a month of continuous radar rainfall data that was provided by the City.

      The continuous rainfall record for the period made it possible to perform a continuous model simulation during the calibration process to account for antecedent moisture conditions in the soil column leading up to the June event. Antecedent conditions account for the buildup of moisture that fills the available surface depression storage and saturate the soil column. This moisture buildup reduces the capacity of soil to adsorb additional moisture thereby increasing the percent of storm water runoff during subsequent events.

5) Simulations/determination of existing level of service

i) The hydrologic/hydraulic model, using design storm inputs based the Soil Conservation Service (SCS) Type II rainfall distribution, was used to simulate various design rainfall conditions and to test various alternatives. The model was run for several design storm rainfall events to identify the level of service provided by the existing system without the risk of flooding to the adjacent homes. The design events used in the modeling included the 100% annual occurrence (1-year), 20% annual occurrence (5-year), 10% annual occurrence (10-year), a storm equal to the June 2010 event, and the August 1998 event. The model results indicate that the watershed in the model is relatively small and very sensitive to peak rainfall intensity. Based on the simulation results, the June 2010 storm event was categorized as a 3-year storm based on peak flow and 7-year storm based on runoff volume.

4. Alternatives Development

Improvement alternatives for the existing drainage system were developed collaboratively with the TAC and evaluated with the calibrated SWMM model. The alternatives included improvements to storage, increased conveyance capacity, flow interception and bypass, regional detention, and emergency overflows. Alternatives were to incorporate the use of storm water best management practices (BMPs) to improve water quality and area aesthetics, including opportunities for Low Impact Development (LID) principles. However, such principles would likely be difficult to incorporate without the needed magnitude of storm water reduction to resolve the flooding issues and therefore were not incorporated in the study. Best management practice principles should be incorporated during the design phase.

The development of alternatives begins by understanding the components that make up the drainage area and how they contribute to the flooding issues experienced by the residents. The drainage area is comprised (in whole or in part) of eight entities including:

1. Lansdowne Subdivision (i.e. Chaucer Court & Lambeth)
2. The Meadows
3. Country Place
4. Karrington (a.k.a. Sunrise)
5. Village Oaks
6. Entire vacant parcel north of VO
7. Southern portion of vacant parcels east of Country place
8. City of Ann Arbor (Ann Arbor/Saline Rd)

The overall drainage area can be broken down into subareas as shown in Figure 7. Each subarea has its own contributing flow, both intended and unintended. These areas include:

- Approximately 475 feet of roadway drainage from Chaucer Drive is intended to be intercepted by two catch basins at Ascot Road. Due to the size of the drainage area and the slope of Chaucer Drive, a portion of the flow from Chaucer Drive overruns the catch basins during large storm events and becomes tributary to Chaucer Court.

- Similarly, approximately 450 feet of the north side of Ann Arbor-Saline Road is served by a single catch basin just north/east of Village Oaks Court. Due to the size of the area tributary to this catch basin and the extreme slope of the roadway, a portion of Ann Arbor/Saline Road drainage, during large storm events, overruns this catch basin and discharges to the Village Oaks Court. Although some of the flow overrunning the catch basin was observed to flow past Village Oaks Court; the flow diverted into the Village Oaks Court is further contributing to the downstream effects due to backwater conditions.

- Each of the existing developments (with exception to Karrington) has detention basins not meeting the required storage volume capacity requirements as shown on their original construction documents. Furthermore, each development is missing the required restrictor (or has a partial restrictor) that is allowing a significant amount of flow to essentially pass directly through their respective storm systems leading to the VO detention area.

- Due to the existing soil types and their infiltration rates and clearing and compaction of soils in the vacant parcels; overland flow from these parcels is typically exceeding the traditionally assumed (agricultural) flow rate of 0.20 cfs/ac.

Figure 7 – Drainage Subareas

Collectively, these factors have resulted in significantly high flow rates to the Village Oaks – Chaucer Court area that cannot be served by the existing downstream conveyance system.

A total of eight alternatives were developed by the TAC and modeled. Alternatives 1 through 8 are summarily described below:

1. Collect all upstream (US) flows and VO flows into single large pipe connected directly to Malletts Creek

2. Restore all US basins and collect and bypass flows, construct 14,000 ft3 below grade detention for VO (box culvert)

3. Restore all US basins, construct US regional basin, connect outlet from US regional basin to existing bypass, construct 14,000 ft3 below grade detention for VO (box culvert)

4. Restore all US basins and collect and bypass flows, construct 14,000 ft3 above grade detention for VO (excavated basin), replace 24” pipe under Ann Arbor/Saline Road with 36” pipe

5. Restore all US basins, construct US regional basin, connect outlet from US regional basin to existing bypass, construct 14,000 ft3 above grade detention for VO (excavated basin & retaining wall)

6. Restore all US basins and collect and bypass US flows, construct 6,500 ft3 above grade detention for VO (excavated basin), replace 24” pipe under Ann Arbor/Saline Road with 36” pipe

7. Restore all US basins, construct US regional basin, connect outlet from US regional basin to existing bypass. Pursue alternatives to store Village Oaks detention exceeding 6,500 ft3 in regional basin; the Meadows and/or Country Place might also participate in regional detention.

8. Restore all US basins, construct US regional basin, connect outlet from US regional basin to existing bypass, extend and upsize VO current outlet, no storage for VO

Underground storage to replace above grade detention requirements for VO were looked at in alternatives 2 and 3 but proved to be cost prohibitive. Other alternatives were also ruled out based on other factors including; WCWRC standard rules and regulations that require there be no increased impact (i.e., flow rate or water quality) to Malletts Creek; all developments are required to provide their own on-site storm water detention; and VO requirement to provide 14,061 ft3 of storage. These factors

led to the TAC to select alternative No. 5, based on the City's interpretation of the requirements, or alternative No. 7, also acceptable to the City and the County, and preferable to the property owners. Both include installation of upstream restrictors where missing and broken, and construction of a regional basin; the two alternatives differ in whether all US and VO detention is on-site, or if a portion is stored in the regional detention. Other, specific improvements may be necessary (i.e. increasing the size of the 24-inch pipe under Ann Arbor/Saline Road) depending on the final design and the level of service proposed. Planning level estimates place the cost for this alternative in the range of $858,000 - $1,248,000 noting that other specific requirements not yet identified may increase the estimated costs. See Appendix No. 5 for detailed descriptions of each alternative and cost estimates. Cost range is due to potential land purchase costs (associated with the area for the constructed regional basin) that range from an estimated $6/sf to $10/sf.

5. Public Meetings

1) Meeting #1 – Open Sharing

The first public meeting was held on January 19, 2011 at Lawton Elementary School. Approximately 20 residents, City staff and Wade Trim were in attendance. See Appendix No. 6 for meeting notice.

The goals of the meeting were to inform the residents of the reason for the study, the project goals, background, and the study process. The meeting was also intended to solicit additional input from the residents to gain a historical perspective and better understand the flooding issues they have directly observed. Wade Trim presented for approximately 30 minutes before opening the floor to a question and answer session that lasted for approximately 50 minutes. After the Q & A session; the group was divided into 3 sub-groups with one Wade Trim and one City representative at each table reviewing an aerial view drawing of the study area to allow for the residents to ask any questions they wanted and to share their history of the area. Wade Trim and City staff pointed out areas of initial concern prompting input from residents of their observations to help confirm issues and to refine the existing conditions that would be later used in the development of the existing conditions model. See Appendix No. 7 for the PowerPoint presentation that was given to the residents.

2) Meeting #2 - Alternatives

The second public meeting was held on March 2, 2011 at Lawton Elementary School. Approximately 20 residents, City staff, City Council and Wade Trim were in attendance. See Appendix No. 8 for meeting notice.

The goals of this meeting were to present the model results of the existing conditions, present the four initial alternatives (Alternatives 1, 2, 3 & 4) developed and looked at by the TAC at that time, and obtain additional input from residents. The TAC felt presenting the development and results of the existing conditions

model was important but did not want to spend much time on this subject to allow for a maximum amount of time collaborating with the residents over the 4 studied alternatives. The presentation included pictures taken during the June 2010 event to help remind folks of the extent of the flooding problems and why the study was being conducted. There was also a slide added to help the audience understand some of the frequently used terms so they can better understand the material being presented. The meeting was held for approximately 2 hours that included a 30 minute presentation by Wade Trim and then a collaborative session with the residents as each alternative was discussed. The pros and cons of each alternative were discussed and noted on a large easel for all to see. See Appendix No. 9 for the PowerPoint presentation that was given to the residents.

3) Meeting #3

   The City will be meeting with each of the neighborhoods to present the final recommendations and discuss future action plans.

4) An “Outreach and Activities” log was kept for the project that documented dates and individuals involved for each of the TAC meetings, public meetings, meetings with residents and home owners associations, phone calls and other specific items. See Appendix No. 1.

6. TAC Meetings/Review

A Technical Advisory Committee (TAC) was assembled at the beginning of the study that was comprised of a small group of representative stakeholders including; City Staff, residents, and the WCWRC. See Appendix No. 10 for TAC role description.

The main function of the TAC was to provide input on the existing conditions and to offer stakeholder guidance for determining the most efficient, cost effective, practical, and implementable solution to mitigate future flooding in the Village Oaks-Chaucer Court drainage area.

The TAC met a total of eight times between January of 2011 and January of 2012. See Appendix No. 11 for each of the PowerPoint presentations and respective meeting minutes for each TAC meeting.

Note: The first two TAC meetings were based on the PowerPoint presentation given at the first two public meetings to the residents and therefore the final version of the PowerPoint presentations became the meeting minutes of the first two TAC meetings. The Final TAC meeting focused on a summary review of the alternatives amd a final alternative selection. Npo official presentation was prepared or meeting minutes kept. A copy of the agenda has been included in Appendix No. 11.

7. Conclusions/Recommendations

The Village Oaks – Chaucer Court drainage area as we see it today has evolved over the past 40 years. This evolution has resulted, due to the compounding effects of combined surface storm water runoff, in unintended impacts to residents. This is largely due to the span of time over which these developments have occurred. As a result, each development was implemented under differing rules and regulations that have changed through the years; making it impractical to plan and implement a master drainage system that will adequately serve all properties until such time that a sufficient amount of development has occurred that more clearly defines the needed components of a master drainage system.

The Village Oaks – Chaucer Court area is comprised of a complex tributary system that includes multiple sequential detention basins, restricted conveyance, and downstream backwater conditions. Each tributary identified has been ostensibly operating, independently with no negative impacts, when reality reveals the collective negative effects of this “system” as seen downstream and adjacent to the Village Oaks – Chaucer Court area.

This study reveals that a number of smaller mitigation steps can be taken to alleviate the flooding issues including: adding additional catch basins along Ann Arbor/Saline Road, Chaucer and Ascot Drives; restoring detention basin volume capacities and installing and fixing restrictors; and, installing emergency overflow measures to increase levels of service. A larger and more comprehensive step involves construction of a regional basin to collect, detain, and slowly release storm water flow from US developments. This step can be a win-win situation for not only the existing developments; but for future development as well.

Although a number of alternatives were studied, and certainly more could be developed; the standards and regulations that exist today limit the approaches one can look at to resolve the flooding problems. Construction costs also play a significant role in limiting options, particularly when considering the impact to individual property owners to contribute to the cost.

It’s these limiting factors that have led to the selection of alternative No. 5 by the TAC that includes VO and the upstream developments to restore their basins, installation of restrictors where missing and broken, and construction of a regional basin. As previously stated; other, more specific improvements may be necessary (i.e. increasing the size of the 24-inch pipe under Ann Arbor/Saline Road) depending on the final design and the level of service proposed. The location of the regional basin is best served in the wooded area located on the vacant parcel immediately north of the VO subdivision. This area currently serves as storm water collection point for all areas US, and contributing flows directly to the Village Oaks – Chaucer Court area. The process of establishing a regional basin would include the city

petitioning the Washtenaw County Water Resource Commissioner (WCWRC) to undertake the basin project. This process requires the application of the WCWRC rules and regulations as they pertain to storm water storage and water quality. This point of clarification seeks to help the reader differentiate the many cost estimates in the Appendix items that are based on differing criteria that were used in the calculation of estimated construction quantities and subsequent cost estimates.

Final planning level estimates, based on the WCWRC rules and regulations, place the cost for alternative No. 5 in the range of $858,000 - $1,248,000 noting that other specific requirements not yet identified may increase the estimated costs. See final cost estimate, Appendix No. 5. Cost range is due to potential land purchase costs (associated with the area for the constructed regional basin) that range from an estimated $6/sf to $10/sf.

8. Action Items

During the course of this study, the city has moved forward with working with the upstream developments (Meadows, Country Place and Karrington) on the re-installation of the missing restrictors. However, the detention volume deficiency identified during the field investigation phase remains to be addressed for the detention systems located at Village Oaks, Country Place and Meadows.

One of the items identified with the Village Oaks detention system is the lack of an emergency overflow structure which was not required by city code at the time of the development. As a result, the city has acknowledged the installation of an emergency overflow structure would be performed at city cost as part of the anticipated regional basin project.

The city plans to meet with the existing developments to share the findings and recommendations from the study as well as begin discussion on alternatives for correcting the volume deficiencies. The regional basin may provide an option for the existing developments to utilize it for providing their missing volume. A planning level cost estimate and allocation for this option has been developed by the city and is included in Appendix No. 5. The alternatives and steps for correcting the volume deficiencies are outlined below.

If Village Oaks, Country Place, and/or the Meadows choose to correct and maintain the detention volume on-site, there are several options:

1. Restore the required storm water detention volume in the location shown on the approved site plan.

- The only permit necessary to do this is a Grading/Soil Erosion and Sedimentation Control Permit which can be obtained from the City Planning and Development Services Unit.

2. Restore the required storm water detention volume with no more than 50% of the volume being relocated elsewhere on-site.

    - Chapter 57, Section 5:122 (5)(k) - An administrative amendment to site plan is required. Note – Village Oaks was a platted subdivision, therefore this step is not applicable for the Village Oaks site.

    - Provided there is not a net increase in impervious area to the site, this process does not require the existing storm water management system to be brought into compliance with current Chapter 63 storm water management requirements.

    - Implementation of this option will require a Grading/Soil Erosion and Sedimentation Control Permit which can be obtained from the City Planning and Development Services Unit.

    - Applicable condominium master deed document(s) will need to be reviewed for any necessary amendments.

3. Restore the required storm water detention volume with more than 50% of the volume being relocated elsewhere on-site.

    - Chapter 57, Section 4:122 (4) - A site plan for Planning Commission approval is required. Note – Village Oaks was a platted subdivision, therefore this step is not applicable for the Village Oaks site.

    - Existing storm water management system will need to be brought into compliance with current Chapter 63 requirements.

    - Implementation of this option will require a Grading/Soil Erosion and Sedimentation Control Permit which can be obtained from the City Planning and Development Services Unit.

    - Applicable condominium master deed document(s) will need to be reviewed for any necessary amendments.

Below are the necessary potential options identified by the City to date through which the existing developments request might participate in the anticipated regional basin project (i.e., off-site detention) as opposed to correcting and maintaining the full detention volume on their own sites.

Village Oaks

1. Establishment of a homeowners association (necessary for Zoning Board of Appeals petition)

2. In accordance with Chapter 63, Section 5:668 obtain a request for a variance from the Zoning Board of Appeals for shifting required detention volume upstream to the regional basin (since rate of runoff from VO will exceed Chapter 63 requirements).

3. In accordance with Chapter 57, Section 5:133, propose an amendment to the Site Development Agreement for City Council approval (necessary for documenting the required volume amount stored on-site and off-site).

Country Place/Meadows

1. Restore the required storm water detention volume with no more than 50% of the volume being relocated off-site.

    - Chapter 57, Section 5:122 (5)(k) - An administrative amendment to site plan is required.

    - Provided there is not a net increase in impervious area to the site, this process does not require the existing storm water management system to be brought into compliance with current Chapter 63 storm water management requirements.

    - If grading activities are proposed on-site, a Grading/Soil Erosion and Sedimentation Control Permit will need to be obtained from the City Planning and Development Services Unit.

    - Applicable condominium master deed document(s) will need to be reviewed for any necessary amendments.

2. Restore the required storm water detention volume with more than 50% of the volume being relocated off-site.

    - Chapter 57, Section 4:122 (4) - A site plan for Planning Commission approval is required.

    - Existing storm water management system will need to be brought into compliance with current Chapter 63 requirements.

- Implementation of this option will require a Grading/Soil Erosion and Sedimentation Control Permit which can be obtained from the City Planning and Development Services Unit.

3. Applicable condominium master deed document(s) will need to be reviewed for any necessary amendments.

4. In accordance with Chapter 57, Section 5:133, propose an amendment to the Site Development Agreement for City Council approval (necessary for documenting amount off volume to be stored off-site).

Note: The Site Plan amendment process opens the site to a comprehensive review by all city departments which may result in other compliance issues being identified.

Appendix:

1. Outreach and engagement activities log
2. 12/1989 Chaucer Ct Storm Sewer Study
3. Infiltration Tests
4. VO Record Drawings and calculation discrepancies
5. Cost estimates
6. Public Meeting No. 1 Notice
7. Public Meeting No. 1 Notice Presentation and sign in sheet
8. Public Meeting No. 2 Notice
9. Public Meeting No. 2 Notice Presentation and sign in sheet
10. TAC Role Description
11. TAC Meeting Minutes and PowerPoint agendas