Upper River Rouge Subwatershed In Farmington Hills: Streambank Erosion Inventory Report

Prepared for:

Oakland County Drain Commissioner's Office, and
City of Farmington Hills

May 2006

Limno-Tech, Inc.
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Ann Arbor, MI

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PROJECT SUMMARY

INTRODUCTION

The Rouge River Watershed is under pressure from urbanization, making it vulnerable to heavy loading of non-point source pollutants. One such pollutant is excessive sediment. Although sediment loading is a natural part of a river system, excessive loading can degrade fish and wildlife habitat, destroy wetlands, and reduce the recreational and aesthetic appeal of the river system. In addition, substances such as oils, salts, and nutrients can enter the system attached to sediment particles causing eutrophication and a general decrease in water quality in hydraulically connected lakes and ponds.

The purpose of this project was to:

1. Identify and prioritize stream bank erosion sites in the Upper River Rouge Subwatershed, within the City of Farmington Hills; and,
2. Develop conceptual designs to address streambank erosion at priority sites, in order to demonstrate how erosion problems can be mitigated.

This project was completed under the direction of the Oakland County Drain Commissioner's office and was supported by a USEPA grant under the Rouge River National Wet Weather Demonstration Project and by the City of Farmington Hills.

KEY PROJECT ELEMENTS

Three key elements were performed for this project, each briefly described below and presented in more detail in this report.

- **Stream Bank Erosion Inventory** – Approximately 25.2 miles of stream in the Upper River Rouge subwatershed were inventoried, all within the City of Farmington Hills. The inventory involved deployment of a two-person crew that traversed every mile of inventory streams on foot. Crews recorded streambank conditions on standardized forms, digitally photographed every site where data were entered, and recorded the position of field observations using global positioning system (GPS) technology. A total of 768 stream reaches and individual erosion sites were inventoried. All data was compiled in an electronic database, and a GIS interface was developed to allow the City to search and review the inventory data.
- **Scoring, Ranking, and Prioritization** – Following completion of the inventory, each reach and erosion site characterization was scored using a standardized system, based on the recorded information. Because of the urban nature of the study area, priority was given to sites where erosion posed a threat to public safety or infrastructure. However, because all data were compiled in an electronic database, interested parties may rescore or reprioritize the sites using different criteria in the future.

- **Conceptual Drawings and Cost Estimates for Erosion Mitigation** – After reviewing inventory results, the City of Farmington Hills selected three sites for development of conceptual drawings and cost estimates to mitigate stream bank erosion. The three sites represent a range of erosion problems in the Upper River Rouge subwatershed and should be useful to the City in the future.

PRODUCTS AND DELIVERABLES

This project yielded several deliverables that will be useful in addressing stream bank erosion in the Upper River Rouge subwatershed in Farmington Hills:

- **Electronic Database** – The electronic database compiled from this project contains inventory data and associated digital photographs of the sites. It is expected information will be useful to the City as they continue to manage their portion of the Upper River Rouge subwatershed.
- **Data Viewer** – The electronic data viewer enables interested parties to more easily review the inventory data using GIS technology. With the proper GIS platform, the user is able to view data and digital photography by using a simple "point-and-click" approach.
- **Project Report –** This report documents the inventory and will be a useful reference in the future, as work continues to address stream bank erosion in the Upper River Rouge subwatershed. In addition, it is hoped the approach used here will inform similar inventory studies elsewhere.
- **Conceptual Drawings and Cost Estimates** – Conceptual drawings and cost estimates were developed for three sites. These will not only help the City to understand what can be done to mitigate erosion at those specific sites, but it is hoped that they will also demonstrate various approaches that might be applied elsewhere.

REPORT ORGANIZATION

Following this summary, this report is organized into two major sections:

- Part I provides a detailed description of the inventory project and its results.
- Part II contains conceptual drawings and cost estimates for three erosion sites.

Part I:
Stream Bank Erosion Inventory, Site Prioritization Summary, and Inventory Results

1. INTRODUCTION

Part I of this report presents a summary of the Stream Bank Inventory Project for stream and river reaches in the portions of the Upper River Rouge Subwatershed located within the limits of the City of Farmington Hills. Limno-Tech, Inc. (LTI) conducted the inventory and prioritization in early 2006.

Part I is organized into the following major sections:

Section 1	Introduction
Section 2	Inventory Scope
Section 3	Inventory and Scoring Methodology
Section 4	Inventory and Site Prioritization Results
Section 5	Sites Selected for Conceptual Designs

The following sections in this Introduction present a description of the project and the specific project objectives.

1.1 PROJECT OVERVIEW

The purpose of this project was to identify and prioritize stream bank erosion sites in the Upper Branch of the River Rouge within the City of Farmington Hills, and make recommendations for incorporating best management practices to decrease sediment loading to the river.

This inventory project was modeled after the completed Main River Rouge 1-2 Subwatershed Stream Bank Inventory Project (completed in 2004). Physical data and photographs were collected at each erosion site, and based on the field data, each site received a severity ranking. The severity index used was consistent with the existing Main 1-2 Project. Conceptual site drawings and cost estimates were developed for three high-priority sites, as requested by the City of Farmington Hills.

This project was funded in part through a grant from the U.S. Environmental Protection Agency as part of the Rouge River National Wet Weather Demonstration Project. The following participating partners contributed additional project funds or in-kind services:

- Oakland County Drain Commissioner's Office (OCDC)
- City of Farmington Hills

Completion of this project works toward the following long-term goals of the Upper River Rouge Management Plan:

- Restore and Maintain Aesthetically Appealing Conditions in the River;
- Improve and Maintain the River Ecosystem for Fish and Wildlife; and,
- Minimize the Amount of Soil Erosion and Sedimentation Occurring in the Subwatershed.

In addition, this project also addresses the following short-term goals in the Plan:

- Improve or Create Fisheries and Wildlife Habitat;
- Develop and Encourage the Implementation of BMPs for Park Lands, Golf Courses or Other Publicly Owned Lands; and,
- Identify Areas Along the River with Highly Eroded Banks and Evaluate Alternatives to Address Public and Private Sites Contributing Significant Amounts of Sediment to the River.

1.2 PROJECT OBJECTIVES

The specific objectives of the Streambank Inventory Project are as follows:

- Inventory stream bank characteristics within the Upper River Rouge Subwatershed, including documenting sites with Global Positioning System (GPS) coordinates and photographs.
- Develop a database of inventory results linked to a Geographic Information System (GIS) for mapping purposes.
- Score and rank sites based on the stream bank characteristics.
- Develop conceptual designs to mitigate stream bank erosion at select sites.

2. INVENTORY SCOPE

An estimate of stream reach lengths to be inventoried was initially based on U.S. EPA's Reach File Version 3. A better estimate was subsequently prepared using updated hydrographic data from OCDC.

Maps of the proposed inventory reaches were provided to Farmington Hills who then revised the suggested inventory reaches to include some additional reaches in the City and exclude hydrography designated as county drains. The final length of streams included in the inventory was 25.2 miles.

The final inventory study area is shown in Figure 2-1. The Upper River Rouge Subwatershed extends throughout the majority of the City of Farmington Hills. The exceptions include the northeastern portion of the City (comprised of the Rouge Main 1-2 Subwatershed), and a small western portion of the City (comprised of the Middle Rouge Subwatershed.

Aside from the main branch of the Upper River Rouge River, several additional tributaries within the subwatershed were included in the inventory, as shown on Figure 2-1.

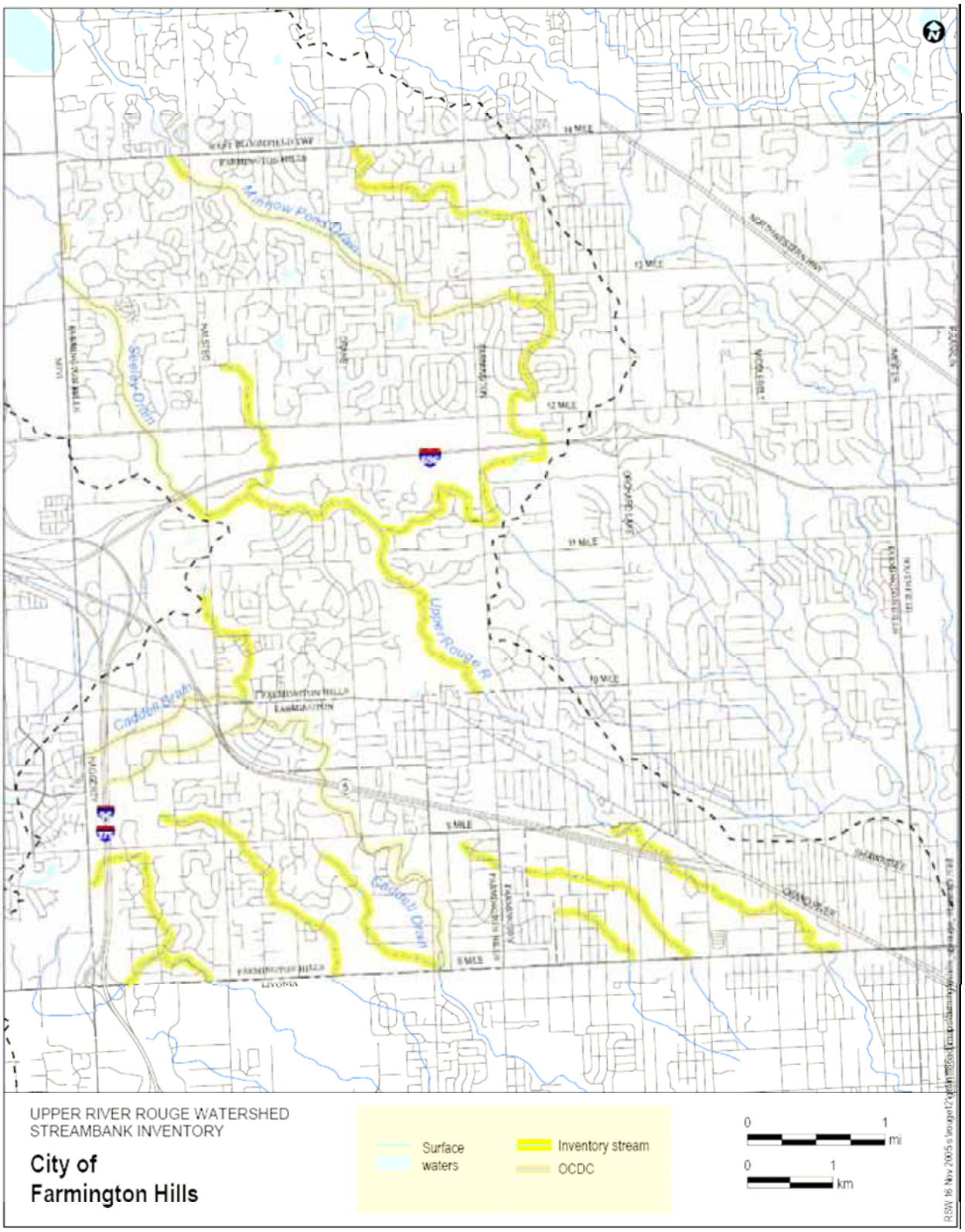


Figure 2-1: Study Area for the Upper River Rouge Stream Bank Erosion Inventory

3. INVENTORY AND SCORING METHODOLOGY

The methodologies used to characterize, score and rank stream banks for this project are presented in this section.

3.1 STREAMBANK INVENTORY METHODOLOGY

This section describes the basis and data collection methods for the inventory.

3.1.1 Basis of Inventory

The inventory system used for this project followed the same protocols as were performed on the Rouge Main 1-2 Subwatershed stream bank inventory in 2004, which was based on the inventory system previously developed for the Mitchell Creek, Au Sable River, and Clinton River watersheds. Because of the highly developed conditions present in most of the Upper River Rouge Subwatershed, additional information was collected regarding the presence of structures and the potential impact of stream bank erosion on those structures.

Similar to the Rouge Main 1-2 Inventory, two types of "sites" were recorded:

- Reaches – lengths of stream with similar stream bank characteristics, and
- Stations –more localized areas with eroding stream bank locations (relative to other reaches in the vicinity), or with structure(s) present.

The following categories of information were recorded for each station and reach:

- Location
- Bank characteristics (slope, height, vegetative cover, soil type)
- Condition of bank (type of erosion, trend)
- Causes of erosion
- Length of erosion
- Structures present (if applicable)

Figure 3-1 presents the detailed information collected at each station and reach. Digital photographs were taken at each reach and station.

Date _____ **Recorder's Name** _____

(*)Community _____ **(*)Stream or River** _____

Location

(*) Station (GPS location): _____

(*) Reach (starting GPS location):_____ (ending GPS location):_____

Location of Erosion

1. Left bank (looking upstream)
2. Right bank (looking upstream)
3. Both banks

Condition of Bank

1. Streambank is stable
2. Toe is undercutting; upper bank stable
3. Toe is stable; upper bank eroding
4. Toe and upper bank both eroding

Condition Trend

1. Stable – no apparent trend
2. Erosion severity is decreasing
3. Erosion severity is increasing

Bank Vegetation

1. 0% - 10% cover
2. 10% - 50% cover
3. 50% - 100% cover

Primary Cause of Erosion

1. Obstruction in river
2. Bend in river
3. Bank Seepage
4. Gullying of bank from side channels or outfall
5. Foot traffic
6. General erosion around structure
7. General erosion, no structure observed
8. Human encroachment on slope (buildings, utilities, etc.)
9. Other_____

Secondary Cause of Erosion

1. Obstruction in river
2. Bend in river
3. Bank Seepage
4. Gullying of bank from side channels or outfall
5. Foot traffic
6. General erosion around structure
7. General erosion, no structure observed
8. Human encroachment on slope (buildings, utilities, etc.)
9. Other_____

Bank slope

1. 4:1 or flatter
2. 3:1
3. 2:1
4. 1:1 or steeper

Bank Height

1. 0 – 5 ft.
2. 6 – 10 ft.
3. 11 – 20 ft.
4. 21 – 50 ft.
5. > 50 ft.

Length of Eroded Bank

1. 0 – 20 ft.
2. 21 – 50 ft.
3. > 50 ft.

Soil Texture

1. Clay
2. Loam
3. Silt
4. Stratified
5. Gravel
6. Sand

Structures

1. No critical structure present
2. Some erosion at structure but no imminent danger
3. Erosion near structure, future potential exposure
4. Structure exposed by erosion or other imminent danger
5. Structure failed due to erosion

Estimated distance from current erosion to structure_____

Type of structure (if present)_____

_____

Notes_____

_____

(*) Data is automatically recorded or is available within the ARCPAD files.

Figure 3-1: Stream Bank Inventory Data Collection Form for Stations and Reaches

3.1.2 Data Collection Method

Inventory data was recorded in the field using a Trimble GeoXT submeter GPS unit with ArcPad GIS software. The data collection forms (Figure 3-1) were created using ArcPad and loaded onto the Trimble, allowing for easy electronic recording of field data. The following GIS layers (obtained from Oakland County and the City) were also included on the Trimble to help guide the field teams:

- Municipal boundaries
- Hydrography
- City IDEP outfalls inventory
- Roads

Two-person LTI crews completed the inventory using the Trimble GPS unit. Every mile of the inventory streams was walked, characterized, and photo-documented.

Where readily visible, each road crossing, outfall, sewer or water line crossing, and manhole shown in the GIS within the immediate vicinity of the streams in the study area was visually inspected and documented. In addition, (and at the request of the City) crews also verified the locations of the City's IDEP outfalls, where visible; and also added additional outfalls to the City's existing IDEP outfall inventory, when they were observed in the field.

Data collected during the field surveys was downloaded from the Trimble unit, and a relational database of site characteristics was created using MS Access software. Recorded GPS site locations were imported into the project GIS.

The results of the field survey of erosion sites are presented in Section 4.

3.2 SITE SCORING METHODOLOGY

In order to rank the relative erosion at each of the recorded reaches and stations, a scoring system was developed to accompany the information collected on the forms. Scores assigned to each possible characteristic selection are shown in Table 3-1. Higher values indicate increased severity. Note that not all information collected at each site was assigned a score (such as locations, types of structure present, and notes).

For each site, individual scores were assigned to each field, and a total site score was calculated from the sum of these individual scores.

The results of the site scoring and prioritization are described in Section 4.

Table 3-1: Site Scoring for Stream Bank Data Inventory

Field	Selection	Score
Location of Erosion	Left bank	1
	Right bank	1
	Both banks	4
Condition of Bank	Streambank is stable	0
	Toe is undercutting; upper bank is stable	1
	Toe is stable; upper bank eroding	2
	Toe and upper bank both eroding	3
Condition Trend	Stable - no apparent trend	1
	Erosion severity decreasing	1
	Erosion severity increasing	5
Bank Vegetation	0% - 10% cover	5
	10% - 50% cover	3
	50% - 100% cover	1
Primary Cause of Erosion	Obstruction in river	1
	Bend in river	2
	Bank seepage	1
	Gullying from side channels or outfall	2
	Foot traffic	1
	General erosion around structure	4
	General erosion, no structure observed	3
	Human encroachment (buildings, utilities, etc.)	5
Bank Slope	4:1 or flatter	1
	3:1	2
	2:1	2
	1:1 or steeper	5
Bank Height	0 - 5 ft	1
	5 - 10 ft	3
	10 - 20 ft	5
	20 - 50 ft	7
	> 50 ft	10
Length of Eroded Bank	0 - 20 ft.	1
	20 - 50 ft.	3
	>50 ft.	5
Soil Texture	Clay	1
	Loam	1
	Silt	2
	Stratified	2
	Gravel	3
	Sand	3
Structures	No critical structure present	0
	Some erosion, but no imminent danger	5
	Erosion near structure, future potential danger	10
	Structure exposed by erosion or other imminent danger	20
	Structure failed due to erosion	30

4. INVENTORY AND SITE PRIORITIZATION RESULTS

A summary of inventory field observations, site scoring results, and the resulting most severe erosion sites are presented in this section.

4.1 INVENTORY SUMMARY

LTI completed the field data collection for the inventory in January and February 2006. The inventory covered 25.2 miles, and stream bank conditions were logged and photo-documented for 768 stations and reaches and 472 IDEP outfall locations. Figure 4-1 shows the location of station/reach sites within in the study area.

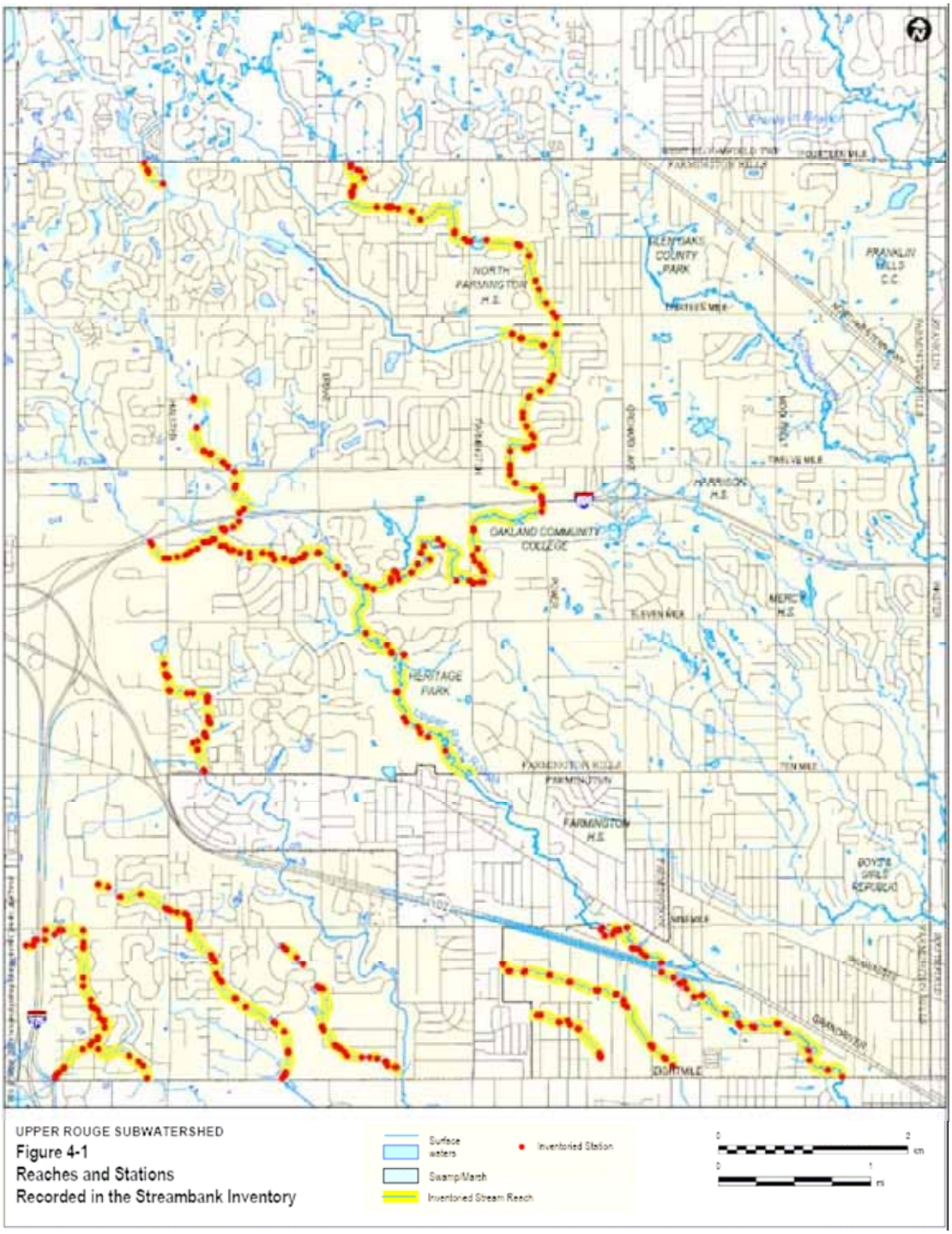


Figure 4-1: Summary of Reaches and Stations Recorded in the Stream Bank Inventory

4.2 INVENTORY RESULTS

This subsection presents the scoring results, as well as summary information on the characteristics of the stream bank and erosion conditions observed during the fieldwork.

4.2.1 Scoring Results

The site scoring system described in Section 3.2 was applied to the inventory. As mentioned above, 768 stations and reaches were characterized. Table 4-1 presents a summary of site scoring information. The lowest (least severe) site score was 11, and the highest (most severe) site score was 59.

Table 4-1: Summary Statistics of Site Scores

Site	No. Sites	Site Scores		
		Min.	Max.	Avg.
Stations	372	11	59	27.3
Reaches	396	11	48	22.5

Figure 4-2 presents the scoring distribution for the 768 characterizations.

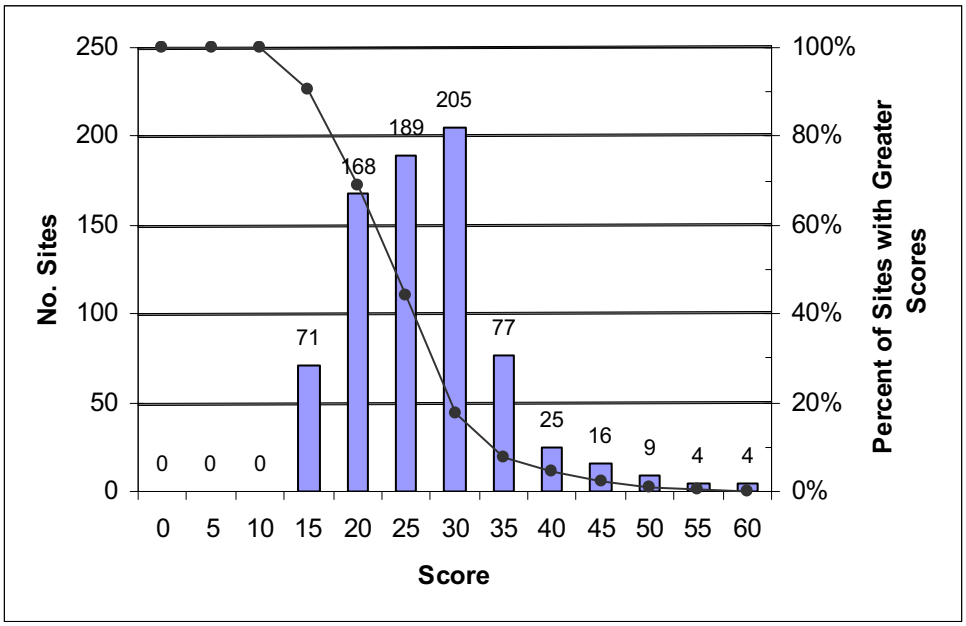


Figure 4-2: Distribution of Stream Bank Erosion Site Scores for the Upper River Rouge Subwatershed in Farmington Hills

Upon review, there is clearly a small subset of sites that scored significantly higher. As shown below, only four sites scored between 56 and 60, and an additional four sites scored between 51 and 55.

4.2.2 Stream Bank Characteristics

Most sites inventoried in Farmington Hills are characterized by steep slopes (2:1 or steeper), heavy vegetative cover (50-100%), and bank heights less than 10 feet. Figure 4-3 contains a series of bar-charts depicting some of the stream bank characteristics obtained during this project.

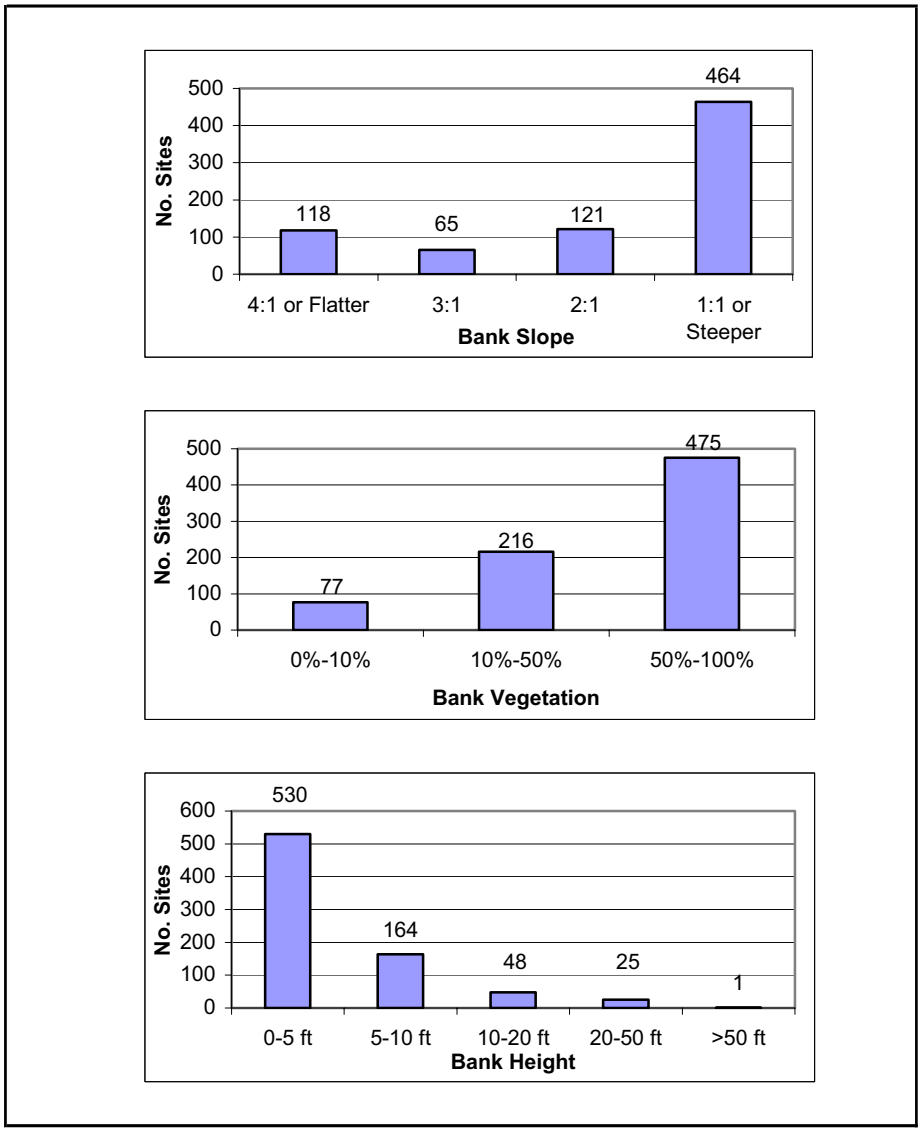


Figure 4-3: Stream Bank Characteristics of Inventoried Stations and Reaches

4.2.3 Erosion Characteristics

As shown on Figure 4-4 below, approximately 51% of stations and reaches in the City are stable or decreasing in erosion severity, while erosion severity is increasing at the remaining stations and reaches. The two primary causes of erosion at inventoried sites are bends in stream reaches (46%) and general erosion around structures (28%).

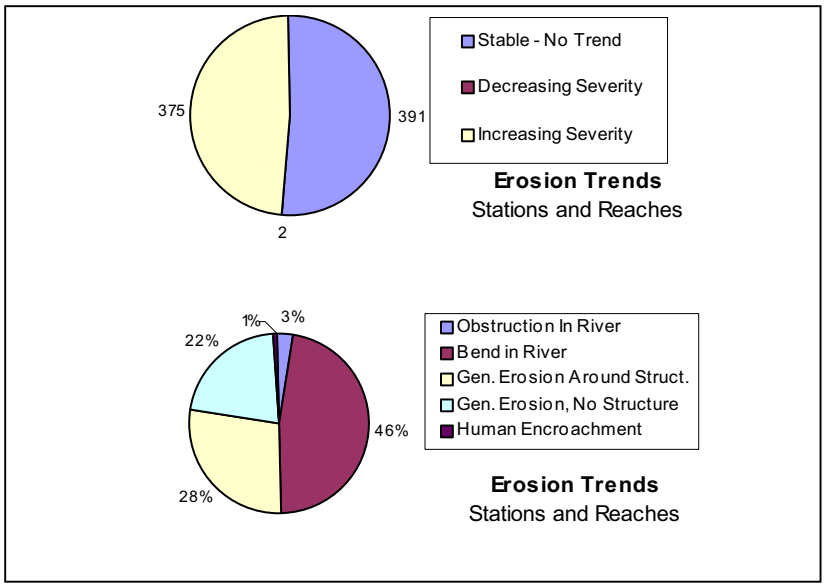


Figure 4-4: Erosion Characteristics of Inventoried Stations and Reaches

4.2.4 IDEP Outfall Information

The City of Farmington Hills requested that, during field activities, LTI verify the presence/absence of existing outfalls that were previously inventoried under the City's Illicit Discharge Elimination Program (IDEP). To this end, the City provided LTI with GIS shapefile information on previously inventoried IDEP outfalls.

In most every instance, LTI was able to field verify the presence of previously inventoried outfalls. LTI photographed each existing or new outfall when observed, and recorded the following additional information:

- Verification of the information provided by Farmington Hills (size, material).
- Determination of whether flow was observed, and if so, the visual condition of that flow.
- Whether erosion was present at the IDEP location.

In addition, LTI identified a total of 104 new outfalls within the study area. A revised shapefile and database information on the IDEP outfalls have been provided to Farmington Hills as part of this project (May 2006).

4.3 MOST SEVERE SITES

In addition to the eight highest scoring sites (i.e., with scores greater than 50), the next 25 sites (with scores between 41 to 50) were also reviewed to determine if any of those sites could also be considered 'severe'. This review is necessary, in large part, because there is always some subjectivity in the field during characterization. The review included re-evaluating the documented field characteristics, as well as review of the photographs.

Based on this review, three additional sites were also deemed to be 'severe'. As such, a total of eleven (11) 'severe' sites were identified. These sites are briefly summarized in Table 4-2. The locations of these eleven most severe sites are presented in Figure 4-5.

Table 4-2: Summary of Highest Scoring Stream Bank Erosion Sites for Farmington Hills

ID No.	Score	Structure Condition	SUMMARY	Location
5274	59	Structure failed due to erosion	24" concrete outfall is exposed, with the bell section failed.	Near 9-Mile, upstream of Orchard Lake Road
5364	59	Structure failed due to erosion	The downstream section of an existing concrete lined section of channel has broken up, is instream and causing a 3' grade drop in the stream.	Just south of I-696 between Halsted and Drake.
5549	57	Structure failed due to erosion	A retaining wall is failing due to undercutting at a bend in the stream.	North of 8-Mile, south of Grand River, East of Middlebelt.
5277	56	Structure failed due to erosion	The top of the top of a double-box concrete culvert has failed upstream.	South of 9-Mile, downstream of Orchard Lake Road.
5280	54	Structure exposed by erosion or other immediate danger	A newly constructed outfall is covered with fill from a construction project. A silt fence has failed.	South of 9-Mile, upstream of Orchard Lake Road
5554	53	Structure exposed by erosion or other immediate danger	A 12" CMP outfall is undercutting itself on a ~20' high bank. A parking lot is located at the top of the bank.	North of 8-Mile, south of Grand River, East of Middlebelt.
5730	53	Structure exposed by erosion or other immediate danger	A wooden footbridge has its footings exposed.	East of Halsted between 8- and 9-Mile Roads.
5148	51	Structure failed due to erosion	A 10' section of concrete retaining wall has collapsed into the stream. Remaining sections show siginificant bowing.	South of Oakland Community College, just east of Farmington.
5674	47	Structure exposed by erosion or other immediate danger	An apparent sanitary sewer manhole is exposed on a failed bank with erosion.	North of 8-Mile, West of Farmington
5120	45	Structure exposed by erosion or other immediate danger	Bank erosoin has exposed gray conduit associated with a cell tower. Fallen trees in stream has created obstruction which is eroding the bank.	South of 12-Mile, between Farmington and Orchard Lake
5466	44	Structure exposed by erosion or other immediate danger	Erosion has exposed footings of 8' wide footbridge, as well as the corner of an apartment building.	East of Halsted between 10- and 11-Mile.

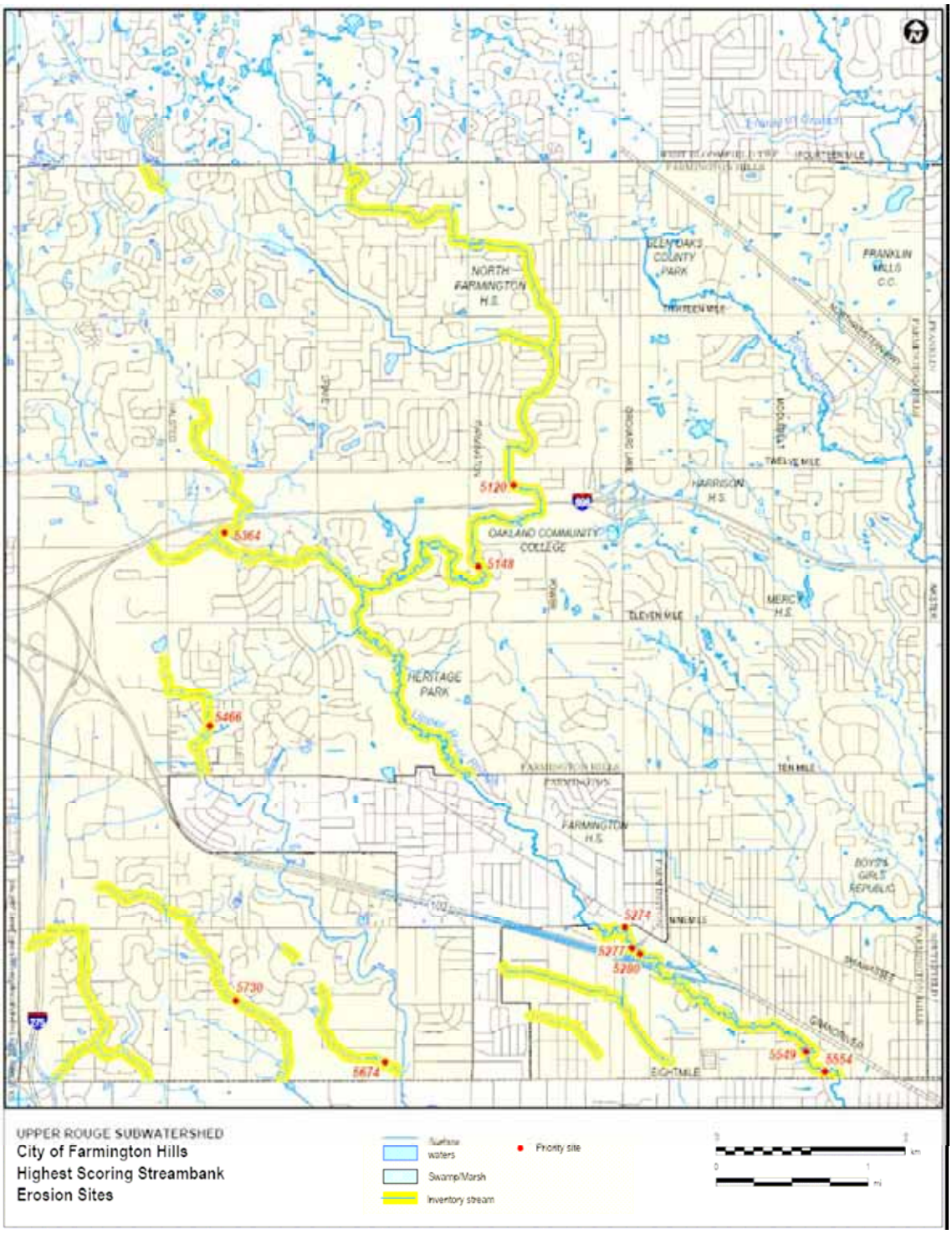


Figure 4-5: Locations of Highest Scoring Stream Bank Erosion Sites in the Upper River Rouge Subwatershed – Farmington Hills.

4.4 DATA VIEWER FOR INVENTORY RESULTS

LTI developed a data viewing application in ArcGIS that allows OCDC and Farmington Hills staff to view the results of the stream bank inventory project. The Upper River Rouge data viewer tool, shown in Figure 4-6, consists of an ArcGIS ArcMap document, and associated code (written in Visual Basic) linking the viewer to the database results and photos. The data viewer allows the user to interactively select a station and/or reach from a list or from the map and display stream bank documentation and scores on a site-by-site basis. The viewer also allows the user to view site photographs.

The following sections describe the options for selecting reaches and stations and the functionality available on the viewer's data display form.

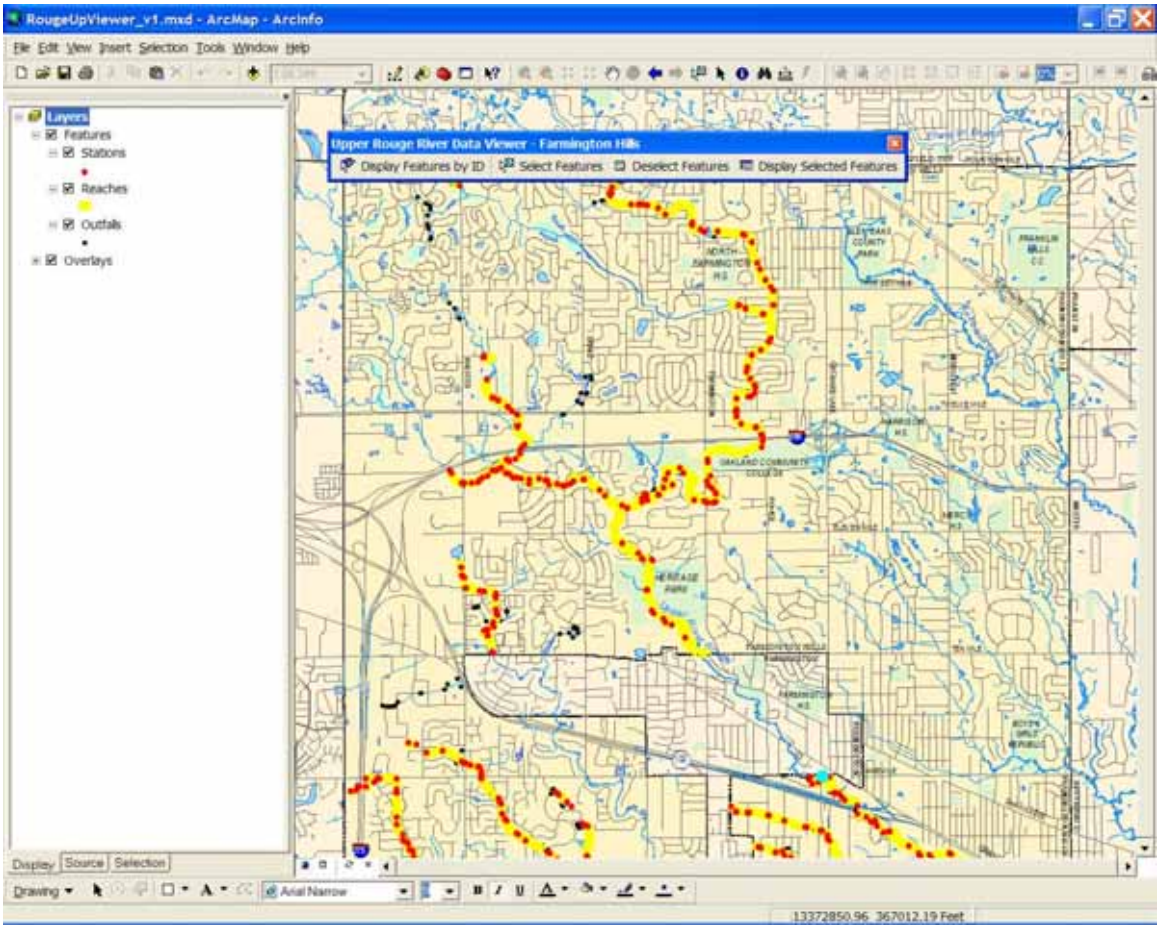


Figure 4-6: Upper River Rouge Subwatershed Streambank Inventory Viewer Base Map and Toolbar

4.4.1 Selection of Station and Reach Features

The data viewer provides two options for selecting and displaying the data display form for one or multiple site ID numbers. The first option allows the user to display site features by selecting site IDs from a pull-down list. The second option allows the user to select one or more reach/station sites from the viewer map itself.

4.4.2 Feature Data Display Form

The data display form presents the characteristics for the selected site as well as the site score, as shown in Figure 4-7. In addition, this form shows "thumbnails" of any available photographs for the selected feature.

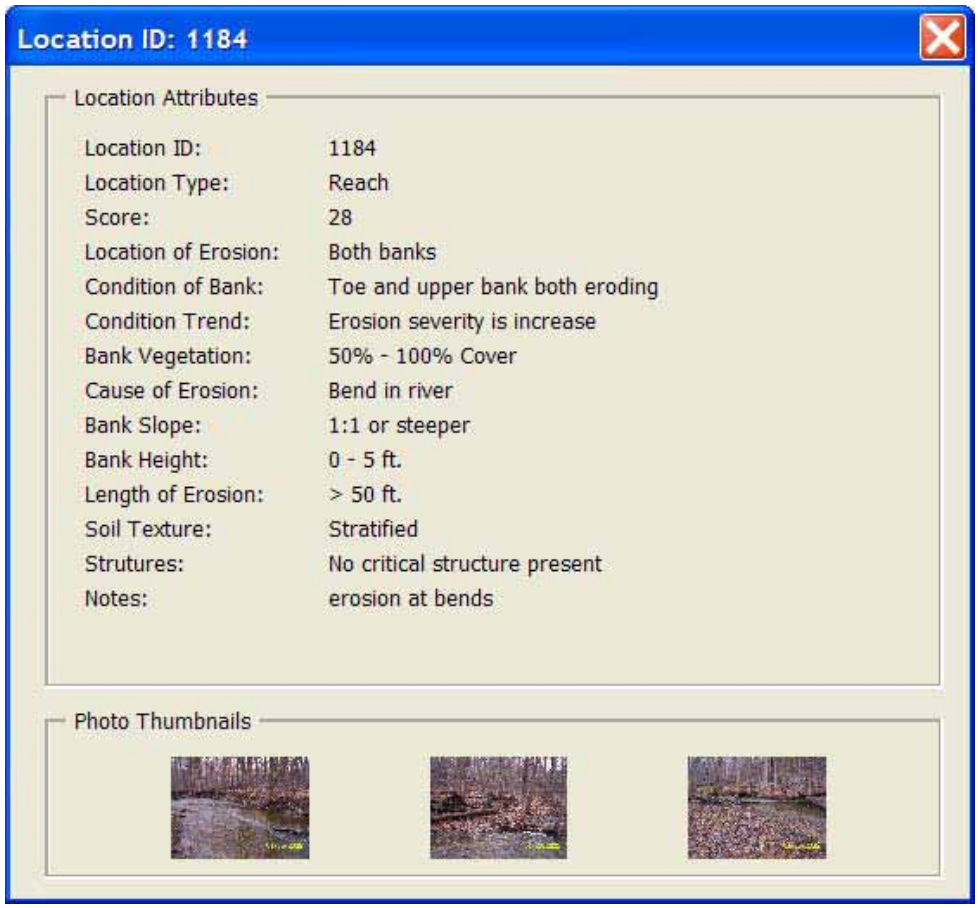


Figure 4-7: Feature Data Display Interface

Clicking on a thumbnail will generate a full-size view of the photograph and provide the option to scroll through the other photos associated with the selected feature, as shown in the example in Figure 4-8.

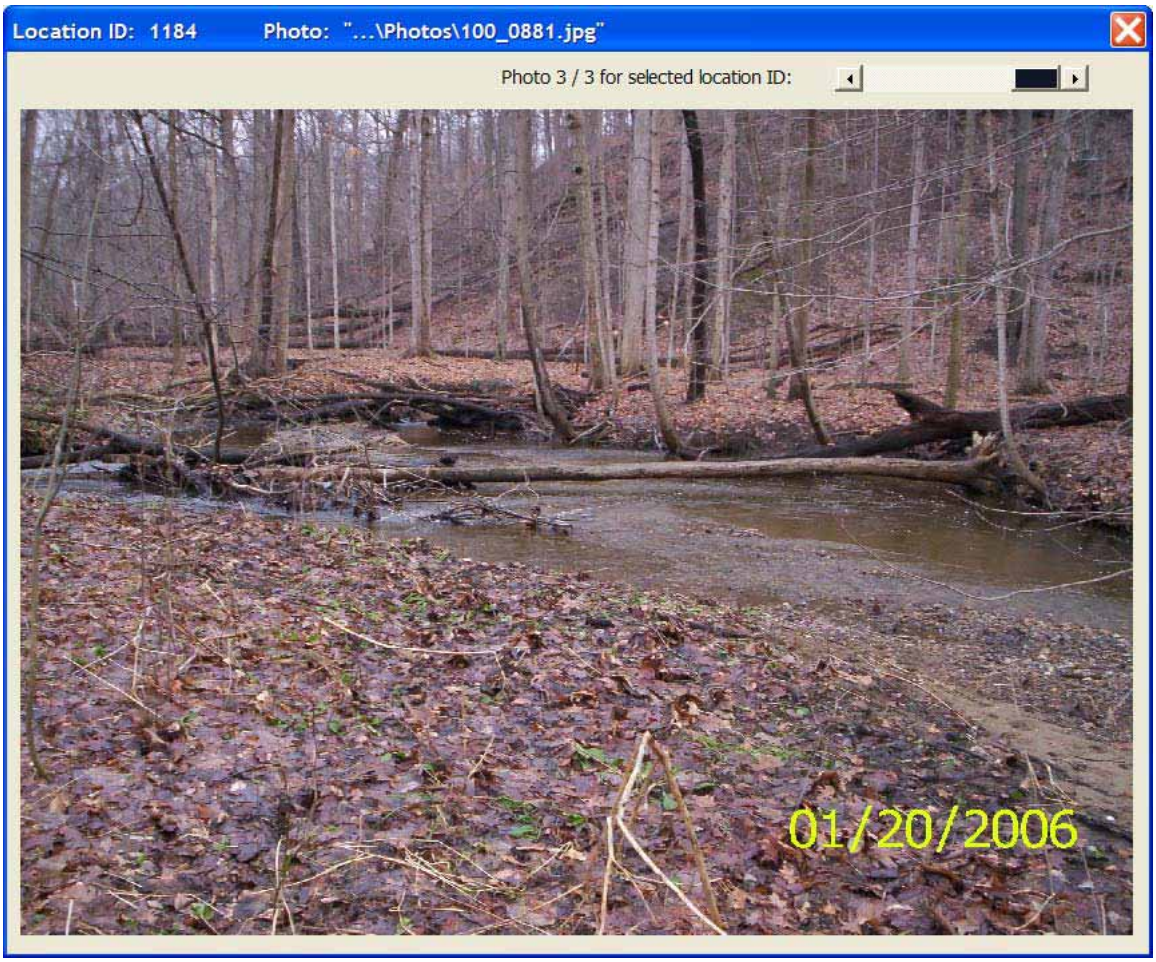


Figure 4-8: Full-Size View of Photograph for Selected Feature

The user can also 'toggle' between choosing to view stream bank erosion sites (reaches and stations) or IDEP Outfalls, which can be viewed in the same manner as described above.

5. SITES SELECTED FOR CONCEPTUAL DESIGNS

One goal of the stream bank inventory project was to identify sites for development of conceptual drawings and cost estimates for mitigating stream bank erosion. This section describes the process used for selection of these sites and presents the final list of priority sites for which designs were developed.

5.1 PROCESS FOR SELECTION

Initially LTI provided the City of Farmington Hills with the following information for the eleven 'severe sites' identified in Section 4.3:

- A map of the City showing the location of the eleven highest scoring sites (Figure 4-5);
- A summary table of the highest scoring sites (Table 4-2); and,
- Photographs of each inventory site.

The City's input on final site selection was critical, because a number of factors excluded the eleven sites from being of interest. These factors include (but are not limited to) the following:

- Private ownership/lack of jurisdiction to implement mitigation/repair
- An identified structure is abandoned or obsolete and, therefore, no longer of interest
- The site(s) is part of another project and does not need to be addressed by this project
- Many sites appeared to be similar to those identified in the Main 1-2 project where conceptual designs were already prepared and could be utilized for these eleven sites

As a result, information for additional sites was requested by the City, in an attempt to identify sites where the City had jurisdiction to implement improvements in the future. Based on the City's input, LTI provided additional information to the City for a total of 54 additional sites. The 54 additional sites were selected because they had the highest severity rating and were located on City property or right-of-way.

5.2 SITES FOR CONCEPTUAL DESIGNS

City staff reviewed the information provided and inspected several sites, and identified a total of three sites for which they requested conceptual restoration designs developed. LTI reviewed these three sites, and confirmed they were able to develop the requested conceptual drawings and cost estimates.

Locations of the specific sites requested are shown in Figure 5-1. Conceptual designs for these sites are presented in Part II of this report.



Figure 5-1: Locations of Priority Sites for Conceptual Stream Bank Restoration Designs

PART II:
CONCEPTUAL DESIGNS

INTRODUCTION

This section presents conceptual stream bank stabilization designs for three sites, as identified in Section 5 of Part I of this report. These conceptual designs are intended to illustrate potential methods for mitigating stream bank erosion problems at these sites and to provide some idea as to the cost of the stabilization projects.

PRELIMINARY HYDRAULIC ANALYSIS

Stream bank stabilization design requires a thorough understanding of stream hydraulics at the project site. Velocities, shear stresses, and water depth under design flow conditions are the primary parameters to be considered in selecting appropriate stabilization measures[1]; typically, bioengineering stabilization methods can be used for design velocities under 8 feet per second (fps), while design velocities greater than 8 fps require hard armoring (Fischenich, 2001). Because of their importance, a hydraulic analysis was performed to estimate these parameters for the sites of interest.

After selecting the three sites for conceptual design, a preliminary hydraulic analysis was conducted to estimate design flow velocity, shear stress, and depth of flow. The hydraulic analysis involved use of existing hydraulic models from Federal Emergency Management Agency (FEMA) flood studies to generate the parameters of interest. The existing hydraulic models for Minnow Pond Drain (Upper River Rouge) and Seeley Drain were obtained from the Michigan Department of Environmental Quality (MDEQ) Hydrologic Studies Unit. These models were developed in 1979 by Johnson & Anderson, Inc. Consulting Engineers, using the HEC-2 hydraulic model developed by the U.S. Army Corps of Engineers (USACE).

To facilitate the preliminary hydraulic analysis, the existing HEC-2 models were imported into HEC-RAS (River Analysis System) model, which is the hydraulic modeling package developed by the Corps to replace HEC-2. The existing models were then revised to look at only the reaches of interest for the three sites of interest. The revised models covered the following reaches:

- Minnow Pond Drain: The revised model extends from the I-696 bridge down to the confluence with Seeley Drain.

- Seeley Drain: The revised model extends from the Halsted Road bridge down to the confluence with Minnow Pond Drain.

After developing the revised models, the cross-section descriptions contained in the models from 1979 were qualitatively compared to observed stream conditions around the sites of interest to determine whether gross differences existed between current and past conditions, such as the addition or removal of structures. In the case of

[1] It should be noted that the orientation of the eroded bank with respect to oncoming flow, the presence of in-stream structures, and other factors must also be taken into account in specifying stabilization methods.

Minnow Pond Drain, no significant structural differences were noted, although the presence on ongoing bank erosion indicates that river cross-sections should be resurveyed before a final hydraulic analysis can be conducted.

In the case of Seeley Drain, significant structural differences were noted, including the presence of sheet pile weirs in the vicinity of the site of interest. Two sheet pile weirs upstream of the site of interest on Seeley Drain have been constructed since the existing hydraulic model was developed in 1979 and one sheet pile weir has been constructed downstream. In addition to the placement of the sheet piling, the channel upstream of the weirs has apparently been widened by excavation to create small impoundments. The channel widening and grade alteration caused by these structural activities has a significant effect on the flow through and in the vicinity of the site of interest on Seeley Drain. Because of this, resurveying of the channel and modification of the hydraulic model to incorporate the new survey data are recommended for final hydraulic analysis. It was not, however, within the scope of work for this project to conduct these activities.

The HEC-RAS hydraulic models were run in steady state mode to estimate the hydraulic conditions relevant to conceptual design of bank stabilization measures. This required specification of flow at the upstream boundary of each revised model. These flows were obtained from the MDEQ hydrologic studies unit and are presented in Table 1.

Location	Flow (cfs) by Event Return Interval			
	2-yr	10-yr	50-yr	100-yr
Seeley Drain at Halstead Road	150	260	430	610
Minnow Pond Drain at I-696	600	1000	1400	1600

Table 1: Flow Estimates for Conceptual Design Sites

A range of flows was modeled to give some understanding of the range of conditions possible for each site, but for conceptual design purposes, the 10-year flow event was chosen. Although channel-forming discharge is much closer to the 2-year recurrence interval in most cases, it is expected that a capital improvement project with a 2-year design life would be unacceptable. Using the 10-year flow, the flow depth, average velocity, and shear stress under design conditions were calculated by the model. The hydraulic parameter estimates for each site are provided with each conceptual design.

It should be noted that the hydraulic analysis presented here was only intended as a preliminary analysis to support conceptual design. Final site designs for stream bank stabilization should be supported by a complete site survey and thorough hydraulic analysis, using updated stream channel surveys to support the computer modeling.

COST ESTIMATES

Cost estimates are provided for the stream bank stabilization measures recommended in each conceptual design. These cost estimates were developed using unit costs from current technical references and quantity estimates based on site inspection. The unit costs used herein are summarized in Table 2.

Stabilization Method	Unit	Unit Cost	Explanation	Reference
Bioengineering Methods				
brushlayering	ft^2	$1.10 to $2.20	(with staff and/or volunteers)	Allen and Fischenich, 2001
	ft^2	$2.30 to $4.60	(with contractor)	"
vegetated geogrid	l.f.	$105		Allen and Leech, 1997
	s.f.	$15 to $35		Sotir and Fischenich, 2003
coir roll	l.f.	$12 to $36		Allen and Fischenich, 2000
live fascines	l.f.	$10 to $30		Sotir and Fischenich, 2001
live stakes	ea.	$1.50 to $3.50		Gray and Sotir, 1996
joint planting	ea.	$2.00 to $9.00		"
live crib wall	ft^2	$10 to $25	4 ft^2 per l.f. of bank typ.	"
plant plugs	ea.	$1.50		typ.
Armoring Methods				
gabions	yd^3	$150 to $450		Freeman and Fischenich, 2000
	l.f.	$20 to $30	for 1' x 3' basket	Rouge, 2001
riprap	s.y.	$25 to $35	for plain 8" riprap	"
	s.y.	$30 to $45	for plain 16" riprap	"
	ton	$20	includes delivery & placement	Allen and Leech, 1997
	c.y.	$44	assumes 165 lb/ft^3 and $20/ton	Allen and Leech, 1997

Table 2: Unit Costs for Stream bank Stabilization Measures

It should be noted that these unit costs represent total installed costs, which include materials, labor and equipment. Stabilization measures will typically be less expensive if installed by municipal crews and more expensive if installed by private contractors. Furthermore, these costs do not include other project costs such as engineering design, permitting, easements, service procurement, ancillary construction costs, and project management.

USE OF CONCEPTUAL DESIGNS

The conceptual designs presented in this report are intended to illustrate potential solutions for repair and mitigation of stream bank erosion problems at the sites of interest. The conceptual designs are not intended to support project construction; in all cases additional data and analysis are required to complete a final design. Finally, it should be recognized that, in some cases, multiple stabilization techniques may be applicable and the conceptual designs presented here are not the only possible mitigation design.

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Site Nos. 5158 & 5159 (Minnow Pond Drain, Farmington Hills)

Problem Description

Sites No. 5158 and No. 5159 are located at the crossing of Farmington Road and Minnow Pond Drain in Farmington Hills. Site No. 5158 is located on the upstream (east) side of the crossing and 5159 is located on the downstream (west) side. At the west location, Minnow Pond Drain crosses under Farmington Road and a wooden foot bridge that parallels Farmington Road, by way of a 15-foot CMP culvert. The sites are described below.

Site No. 5158: Upstream of Farmington Road Crossing

At this site, which is depicted in Figure 1, upstream flow enters the CMP culvert beneath Farmington Road. Bank erosion is evident on the south side (left side of the culvert in the photo) and is apparently caused by flow impingement on the bank, exacerbated by runoff from Farmington Road. Some of the erosion damage may also be caused by ice impingement during the winter, but this cannot be conclusively determined without further observation.



Figure 1. Erosion at Site No. 5158.

Site No. 5159: Downstream of Farmington Road Crossing

Site No. 5159 is depicted in Figure 2 and flow daylights from the CMP culvert beneath Farmington Road. Bank erosion is evident on the north side (left side of the culvert in the photo). Closer inspection of the site indicates that the main cause of the erosion is runoff from Farmington Road.

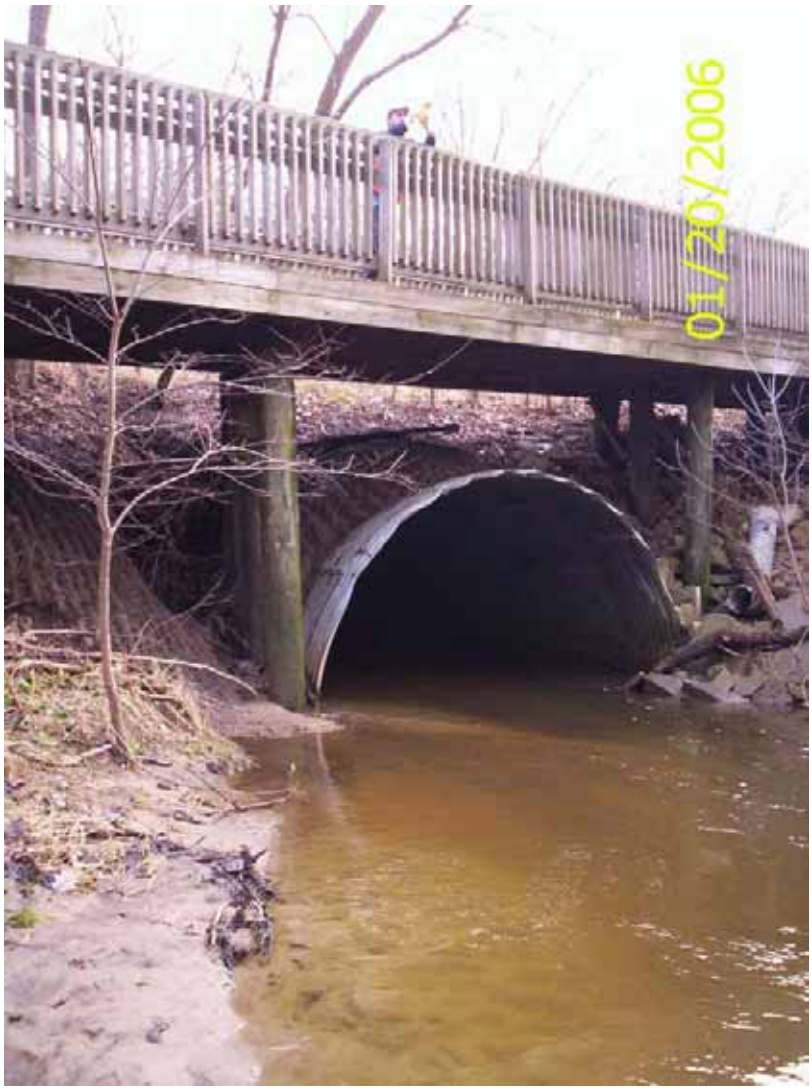


Figure 2. Erosion at Site No. 5159.

Hydraulic Conditions for Design

The hydraulic conditions under the design flow (10-year flow event) were determined using the existing model, as described in the beginning of Part II of this report and area summarized for this site in Table 1.

Hydraulic Parameter or Design Condition	VALUE FOR SITE NO. 5158	VALUE FOR SITE NO. 5159
Flow (cfs)	1000	1000
Depth, center (ft)	10.9	5.9
Velocity, ave. (ft/sec)	6.1	11.8
Shear stress, ave. (lb/ft^2)	0.64	6.0

Table 1. Hydraulic Design Conditions for Site Nos. 5158 & 5159.

These hydraulic conditions are noteworthy. At Site No. 5158, the depth, average velocity, and shear stress under design conditions are all relatively high. On the downstream side of the crossing, the average velocity and shear stress are extremely high.

Recommended Stabilization Designs

Site No. 5158: Upstream of Farmington Road Crossing

Although the estimated velocity and shear stress under design conditions are within the range for potential application of bioengineering techniques, the high water level, and the added erosive factors of roadway runoff and potential ice erosion indicate that armoring is appropriate at this site. A riprap surface could be constructed with a gravel drain running beneath the riprap to convey the road runoff downslope without exacerbating runoff. This conceptual design is depicted in Figure 3.

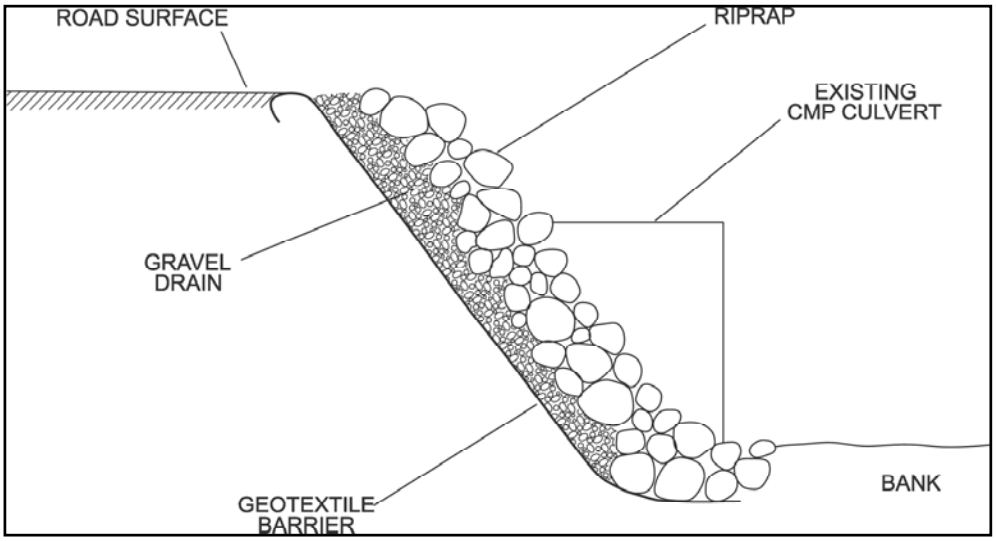


Figure 3. Conceptual Approach for Stabilizing Site No. 5158 Using Riprap With Gravel Layer for Drainage.

Site No. 5159: Downstream of Farmington Road Crossing

It appears that roadway runoff is the primary factor in causing erosion at this site, based on the location of the erosion and the evident gullying of the slope. As such, the primary function of the stabilization design will be to convey runoff down the slope without eroding the slope. The very high flow velocities and shear stresses predicted by the model are likely manifested immediately downstream and, while they may contribute to other erosion problems, probably do not contribute significantly to the erosion beneath the foot bridge. This site presents significant limitations. The foot bridge pilings limit access with heavy equipment, so much of the work may require manual labor. The foot bridge itself shades the slope, making the viability of plant growth, and therefore bioengineering approaches, questionable. One viable approach may be to use gabion baskets, which can be fabricated and filled on site. The slope can be excavated to accommodate the baskets, and a geotextile layer can be installed between the earth and the baskets to stabilize the underlying earth. The gabion basket will stabilize the slope while allowing drainage.

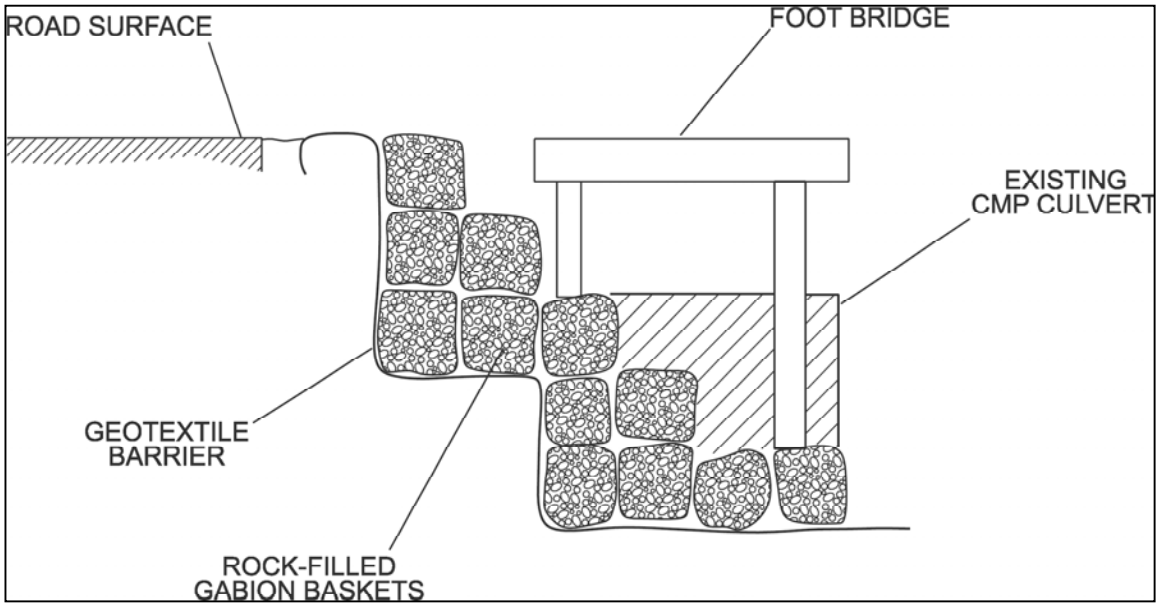


Figure 4. Conceptual Approach for Use of Gabion Baskets to Stabilize Site No. 5159

Estimated Stabilization Costs

The estimated costs for the bank stabilization options described above are comparable and are summarized below.

Site No. 5158: Upstream of Farmington Road Crossing

Item	Unit	Unit Cost	Qty.	Subtotal
Site Preparation	l.s.	-	1	$3,000
Geotextile	s.y.	$2.50	42	$105
Gravel	ton	$3.00	34	$102
Riprap	ton	$2.50	48	$120
			Total:	$3,327

Site No. 5159: Downstream of Farmington Road Crossing

Item	Unit	Unit Cost	Qty.	Subtotal
Site Preparation	l.s.	-	1	$3,000
Geotextile	s.y.	$5.00	20	$100
Gabion Basket	s.y.	$100	20	$2,000
			Total:	$5,100

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access, contingency, and project management.

UPPER RIVER ROUGE WATERSHED
STREAMBANK EROSION INVENTORY

Sites 5158 and 5159

City of Farmington Hills, Michigan

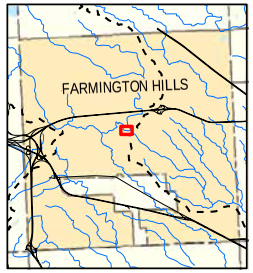
Minnow Pond Drain

SHEET 1

PROBLEM DESCRIPTION



Bank and slope erosion noted upstream of CMP culvert leading to soil loss, trees falling into stream. Slope erosion also noted on downstream side of embankment, leading to exposure of culvert and foot bridge pilings.



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Limno-Tech, Inc.
Ann Arbor, Michigan

Site No. 5423 (Seeley Drain, Farmington Hills)

Problem Description

Site No. 5423 is located on Seeley Drain in Farmington Hills, approximately 620 feet downstream from Halsted Road. Significant erosion of the south bank was noted immediately downstream of the foot bridge, extending from the southeast bridge abutment to a small impoundment located approximately 30 feet downstream. The attached figure shows an aerial view of the site vicinity, as well as site photographs depicting the erosion problem. The site is located in a golf course, near a residential area and is depicted in Figure 1.



Figure 1. Bank Erosion at Downstream Bridge Abutment at Site No. 5423.

At this site, upstream flow is slightly directed toward the south bank due to the non-perpendicular alignment of the foot bridge. This by itself would be sufficient to cause excessive erosion of the south bank. This condition is exacerbated by the fact that brush, tree limbs, and other large woody debris have accumulated in the channel downstream, creating a flow obstruction. Under storm flows, this obstruction likely causes sudden flow deceleration, accompanied by increased turbulence upstream of the obstruction. The combination of flow impingement on the bank and excessive turbulence due to downstream channel blockage are likely the cause of the observed streambank erosion.



Figure 2. View Downstream of Foot Bridge at Site No. 5423, Showing Erosion on South bank and Large Woody Debris Obstructing Channel.

Hydraulic Conditions for Design

As previously described, significant structural differences were noted between current stream conditions and 1979 model conditions, including the presence of two sheet pile weirs upstream of the site of interest and one sheet pile weir downstream. In addition to the placement of the sheet pile wiers, the upstream channels have apparently been widened by excavation to create small impoundments. These channel modifications are likely to have a significant impact on stream hydraulics in the vicinity of the site. A new survey of the channel and nearby structures is recommended to update the hydraulic model for final hydraulic analysis. It was not, however, within the scope of work for this project to conduct these activities.

The hydraulic conditions under the design flow (10-year flow event) were determined using the existing model, as described in the beginning of Part II of this report and area summarized for this site in Table 1.

Hydraulic Parameter or Design Condition	SITE VALUE
Flow (cfs)	260
Depth, center (ft)	4.9
Velocity, ave. (ft/sec)	4.4
Shear stress, ave. (lb/ft^2)	0.08

Table 1. Hydraulic Design Conditions for Site No. 5423.

Recommended Stabilization Design

The velocity estimated by the preliminary hydraulic analysis (4.4 ft/sec) is within the range for bioengineering methods, therefore hard armoring of the banks would not normally be necessary. However, as described above, the alignment of the foot bridge is such that oncoming flow is directed slightly toward the south bank. This condition suggests that additional armoring is justified in the stabilization design. Two options exist for accomplishing this: riprap and combined riprap and bioengineering. These options are described below.

Option 1: Riprap

The existing bank slope, or something very close to it, can be maintained and armored using conventional riprap. This alternative would include armoring from the toe of the embankment to the top of the bank slope, with geotextile placed beneath the riprap. Some bank slope modification would be necessary to achieve a stable condition. This option would be reliable and relatively simple to install, but would not provide aesthetic or habitat benefits, which may be desirable for a golf course setting.

Option 2: Combined Riprap and Bioengineering

Under this option, riprap armoring would be used on the lower slope and the upper slope of the bank would be stabilized using bioengineering techniques. This option would likely require some channel modification to widen the section and reduce the slope of the banks. On the lower portion of the bank, conventional riprap would be placed and keyed in to provide toe protection, while the upper slope would be vegetated using seeding and live stakes. This option would require more earthwork and construction, and thus would not be as simple as riprap alone, but the upper vegetated bank slopes would provide aesthetic and habitat benefits. This approach is conceptually depicted in Figure 3.

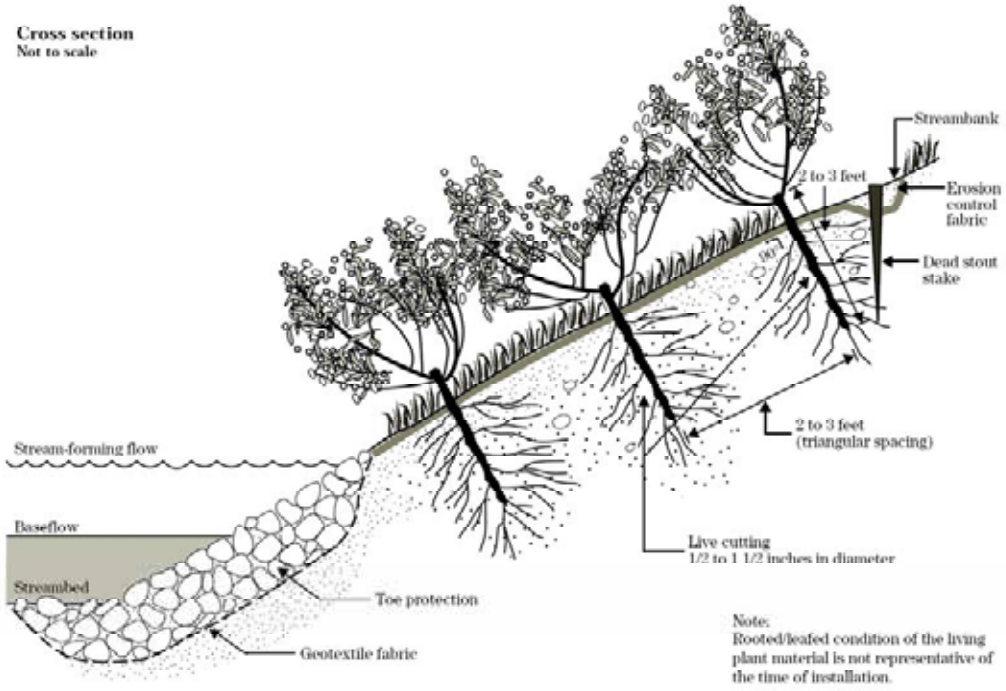


Figure 3. Typical Design for Live Stakes with Erosion Control Blanket for Streambank Protection (Source: NRCS, 1996).

Estimated Stabilization Costs

The estimated costs for the bank stabilization options described above are comparable and are summarized below.

Option 1: Riprap

Item	Unit	Unit Cost	Qty.	Subtotal
Site Preparation & Restore	l.s.	-	1	$5,000
Riprap	ton	$30	40	$1,200
Geotextile	s.y.	$2.50	40	$100
			Total:	$6,300

Option 2: Combined Riprap and Bioengineering

Item	Unit	Unit Cost	Qty.	Subtotal
Site Preparation & Restore	l.s.	-	1	$5,000
Earthwork	c.y.	$5	60	$300
Riprap	ton	$30	20	$600
Geotextile	s.y.	$2.50	6	$15
Native Seed	¼ acre	$100	1	$100
Live stakes	ea.	$2.50	300	$750
Erosion control blanket	s.y.	$2.50	6	$15
			Total:	$6,780

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access, contingency, and project management.



UPPER RIVER ROUGE WATERSHED
STREAMBANK EROSION INVENTORY

Site 5

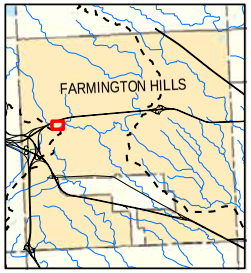
City of Farmington Hills, Michigan

Seeley Drain

SHEET 1

PROBLEM DESCRIPTION

0 50 100 150 ft



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Limno-Tech, Inc.
Ann Arbor, Michigan

A case study on the use of LEED, LID, and BMPs in the redevelopment of a Midwestern urban campus.

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Abstract:

Lawrence Technological University is a private university located on a 120-acre campus in highly urbanized Southfield, Michigan (Detroit Metropolitan Area). The campus was primarily developed over the last several decades with limited or no stormwater controls as was customary with regulations of the time. However, an updated campus master plan (2003) and the opening of a student services center in 2005 provided the opportunity for the campus to commit itself to green design and the use of low impact development (LID) techniques. The 40,000 square-foot A. Alfred Taubman Student Services Center (Center) consolidated all student service functions under one roof and provided a unique opportunity to showcase sustainable and energy efficient technologies. As such, the Center provides a living laboratory for Lawrence Tech architecture and engineering students, local municipal officials, community planners, and design engineers to learn about LID techniques and LEED certification. Concurrently, University officials reviewed the existing stormwater system and identified areas for retrofit with innovative stormwater best management practices (BMPs) and LID techniques.

Introduction

Low Impact Development (LID), also known as conservation site design, is a process of sustainable development and redevelopment that conserves natural resources. The LID process holistically considers the landscape during design and construction to protect the environment through practices that enhance water and air quality while preserving open green space. LID is especially important in urban and urbanizing areas such as southeast Michigan, where it is crucial to protect our waterways and remaining green space. In addition, as regions undergo economic redevelopment, it's attractive for companies to build "green" because of the long-term economic and environmental advantages of these practices.

To widely implement LID practices in the Great Lakes region, a significant educational effort that includes demonstration projects, research and outreach is necessary. Accordingly, Universities should take a leadership role in educating a broad spectrum of the population including students, citizens, public policy makers, community planners, landscape architects, horticulturists and engineers.

At Lawrence Technological University, located in the heart of the Great Lakes Basin in the Rouge River Watershed (Figure 1), the process of retrofitting our urban campus

has begun by utilizing innovative stormwater management systems to create a full-scale living laboratory that promotes understanding of important LID practices. In addition, important research and dissemination is under way that will lead to greater acceptance and implementation of these techniques.

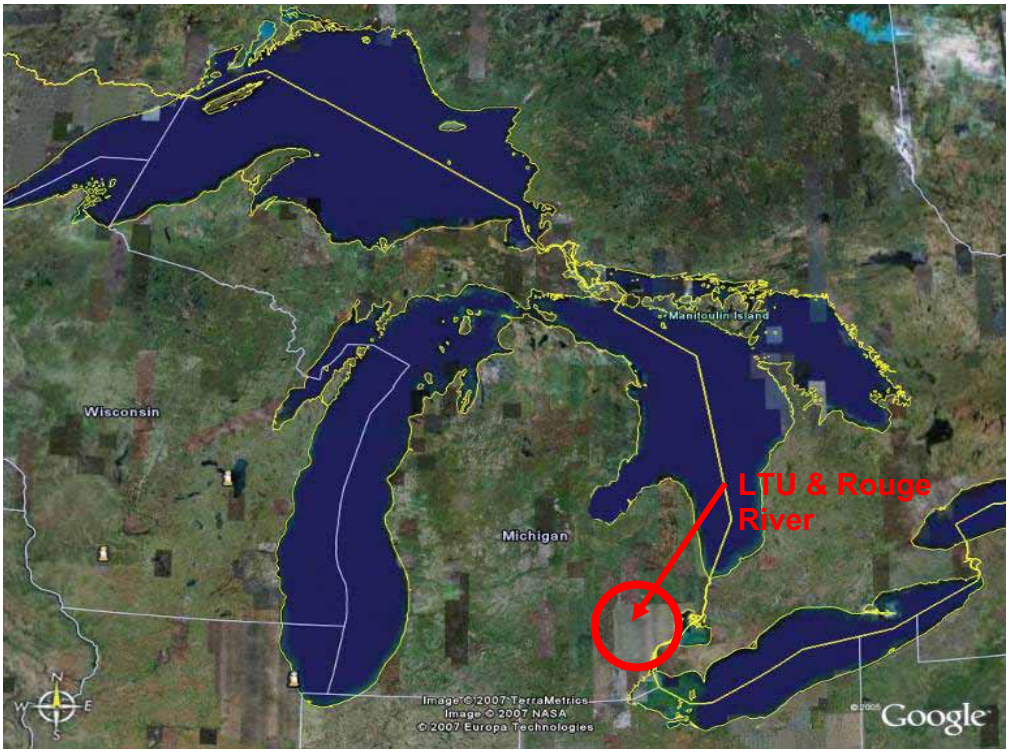


Figure: 1 Rouge River Watershed and Lawrence Technological University.

Establishing a Higher Standard

The modified runoff and sediment conditions associated with urbanization have resulted in the degradation of urban streams and watersheds. In response to degraded systems, local, state and federal laws have been passed to mitigate the impact of urbanization through the use of stormwater best management practices (BMPs). Specifically, in 1999, the U.S. Environmental Protection Agency published the Phase II Final Rule of the National Pollutant Discharge Elimination System (NPDES), which intensified the requirements associated with obtaining an NPDES permit and brought additional focus to implementing innovative stormwater BMPs.

In 2003, the Great Lakes congressional delegation and governors identified priorities for Great Lakes restoration and protection and set about creating a broad based plan for implementation. In May 2004, President Bush issued an executive order recognizing the Great Lakes as a “national treasure”, although locals argue it’s an international treasure, and created the federal Great Lakes Interagency Task Force to improve coordination on the Great Lakes. This collaborative process led to the development of the Great Lakes Regional Collaboration Strategy, released in

December 2005, which calls for limiting the effects of non-point source pollutants including phosphorus, nitrogen, and sediment through stormwater BMPs as well as for restoring hydrology in altered watersheds. The plan specifically calls for $18 million to be spent fixing altered hydrology in 10 urban watershed or sub-watersheds, including one or more in Detroit. The plan also calls for between $500 million and $1 billion to be spent restoring wetlands over the next five years with a focus on the western and central Lake Erie basin. Finally, the regional strategy calls for more emphasis on sustainable development and provides funding for educational strategies that promotes sustainability.

Like many larger scale property owners in urban areas, Lawrence Tech developed its' site over a long period of time with few stormwater controls and little thought for the environment as was customary during the time. By the 1990s, the university realized that it had to be a better steward of the environment and that the current approach was no longer good enough. This new approach was reflected in the creation of Lawrence Tech's updated campus master plan in 2003 and the opening of the A. Alfred Taubman Student Services Center in 2006.

Taubman Student Services Center

The 42,000-square-foot Taubman Center (Figure 2) not only meets the requirements of provided important student services, it is also a "living laboratory" of sustainable design and engineering. Built to U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) specifications, it was awarded a Silver Certification in 2007. The Taubman Center addresses the LEED criteria of sustainable site development and construction, water and energy efficiency, recycled materials selection, and indoor environmental quality.



Figure 2: Taubman Student Services Center with quadrangle bioswale in the foreground.

The Center features a 10,000-square-foot living green roof (Figure 3) which is created with layers of insulation, roof membrane, drainage fabric, and a four-inch granular composition supporting the planting of nine different species of sedum ground cover (Figure 4). The green roof offers more effective insulation than traditional roofs and is expected to last approximately 40 years, more than twice the lifespan of traditional materials. With normal rainfall, the green roof retains between 60 and 90 percent of rainfall depth with the remainder draining into a 10,000-gallon cistern to be used as "gray" water for flushing toilets.



Figure 3: Taubman Student Services Center green roof.

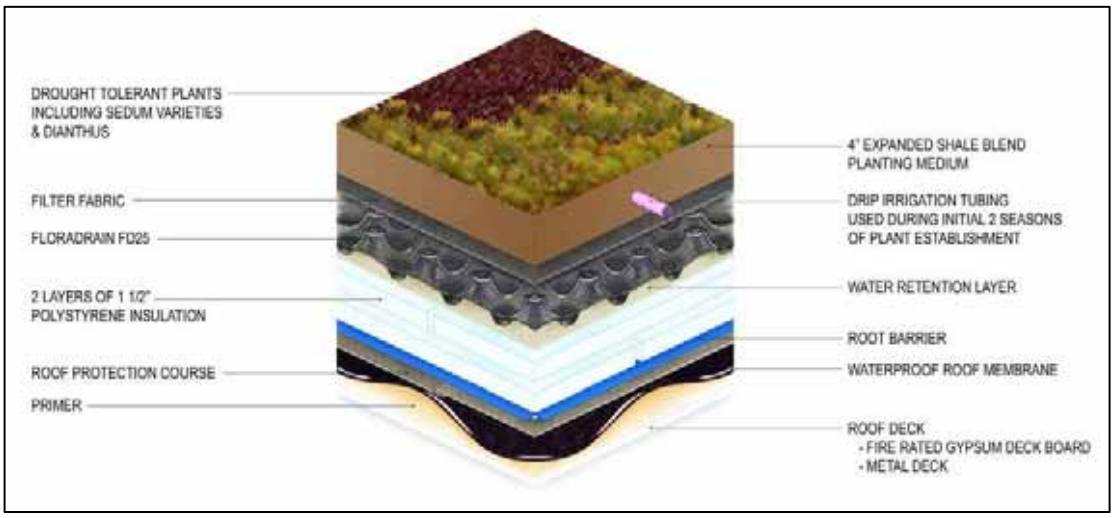


Figure 4: Taubman Student Services Center green roof cross-section.

The most complex and sustainable aspect of the Taubman Center is the heating and cooling system which is fed by a field of 88 geothermal wells sunk 300 feet under the campus quad. A system of polyethylene tubing, pumps, and fans connected to the wells utilizes water to heat and cool the building, which has no boiler, furnace, or even a gas meter. The heating, ventilating, and air conditioning systems contain no CFC-based refrigerants, HCFC's, or Halons. Lighting in the Taubman Center is controlled by sensors and astronomically-synchronized timers that adjust three minutes a day to accommodate seasonal lighting needs. The floors consist of recycled concrete tiles throughout the building which are raised 18 inches, making all wiring and piping easily accessible by lifting panels of the completely modular floor. For education, many of the heating, ventilation, and air conditioning controls and mechanisms are visible for study by students either overhead or through Plexiglas floor panels occasionally substituted for the concrete ones.

Stormwater BMPs

Concurrently with Taubman Center design, university administrators and faculty reviewed the existing stormwater system and identified areas where innovative LID techniques and best management practices could be utilized. As an example, Figure 5 is a schematic of the campus drainage plan which was used to determine where excessive run-off existed and where stormwater BMPs could be placed. It should be noted that Figure 5 is not intended to be clearly discernible – it's meant to display how the campus was analyzed on a small sub-watershed scale).

Figure 6 indicates the existing and proposed stormwater BMPs on the Center of campus. In addition to the green roof, cistern, and bioswale completed as part of the Taubman Center, the University has recently constructed two bioretention cells (Figure 7) with more planned for 2008 or 2009, a naturalized detention basin (Figure 8), a native grow zone/riparian buffer, and porous pavers (Figure 9). In addition, these techniques are strategically placed in the center of campus to provide for a compact educational experience while addressing current stormwater retrofit needs.

As such, the University has become a regional case study for LID retrofitting in an urban environment and a living laboratory of innovative stormwater best management practices (BMPs) for education, outreach, and research.

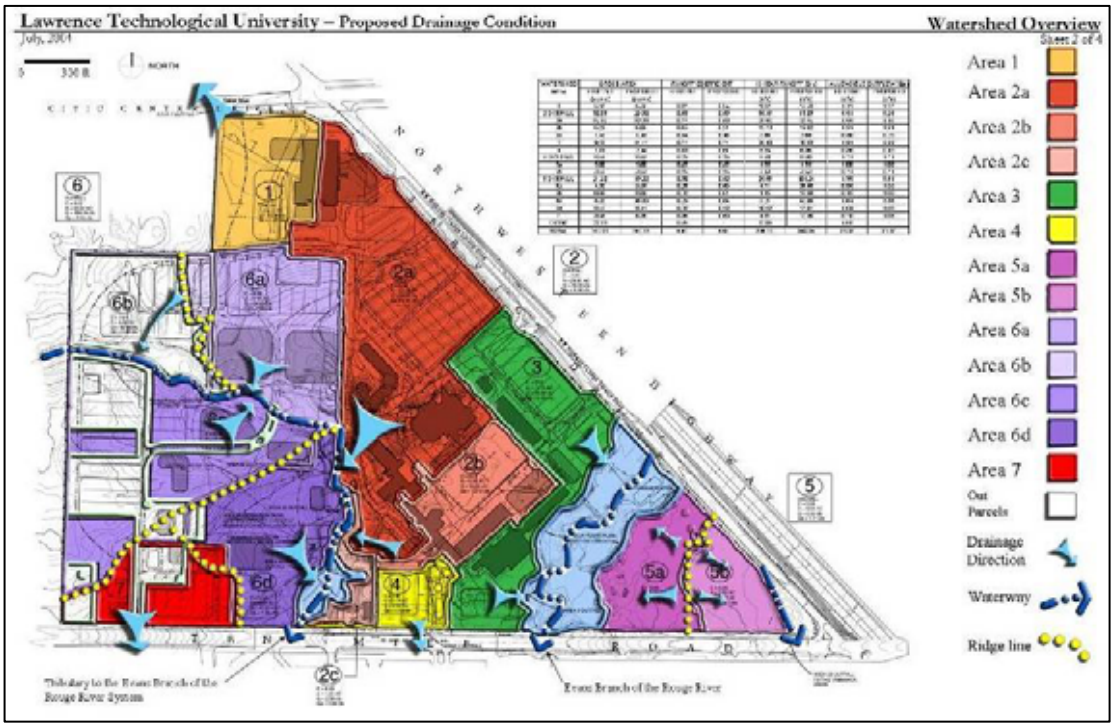


Figure 5: Lawrence Technological University campus watershed analysis.

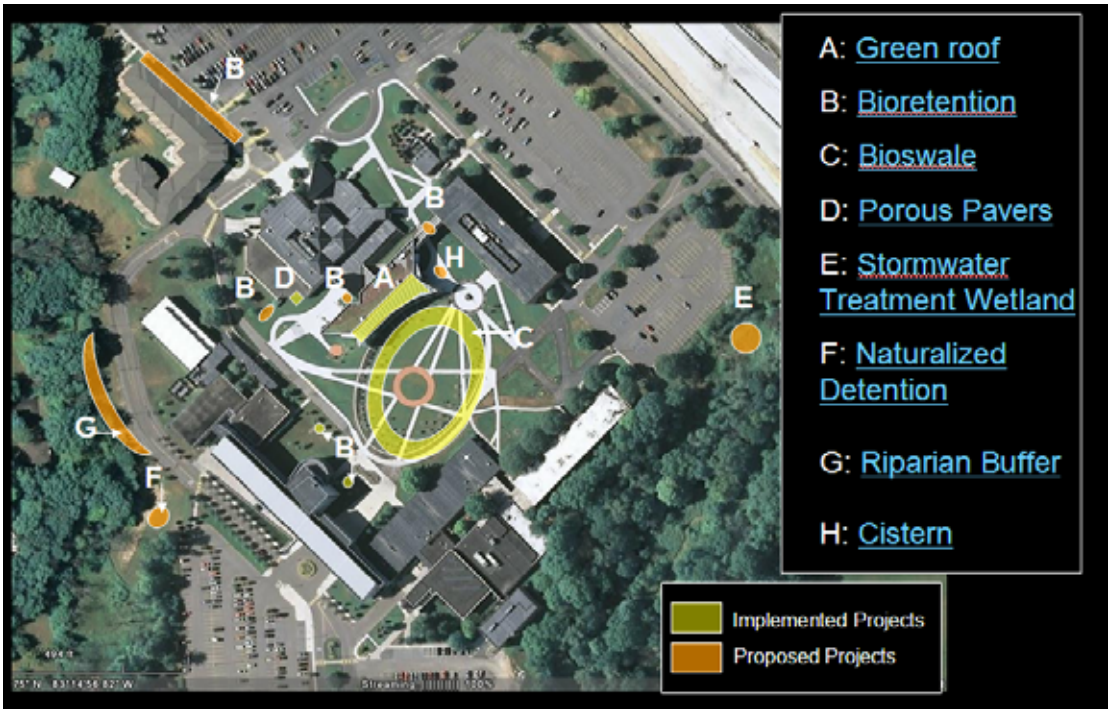


Figure 6: Stormwater BMPs on Campus (implemented and proposed).



Figure 7: Bioretention cell with research monitoring equipment.



Figure 8: Naturalized detention basin with outlet structure in foreground.



Figure 9: Outdoor dining patio with Unilock Eco-stone porous paving system.

Research and Outreach

There are several ongoing research projects at Lawrence Tech including measuring stormwater runoff quantity and quality from the green roof (Figure 10). Flumes and pressure meters in roof drains give us continuous hydrographs of stormwater runoff. In addition, episodic monitoring of water quality is facilitated by siphoning off a sample during heavy rain to test for nitrogen, phosphorous, acidity, temperature, dissolved oxygen and total suspended solids. The same sensors and equipment have been placed on rock-ballasted and black-asphalt roofs on campus to allow for quantification of how much better the green roof is for the environment.

A similar measurement system is in place to determine the hydrologic performance of the campus bioretention cells which were intentionally constructed using two different planting mixture designs to determine effectiveness at capturing and treating runoff. In addition to measurement of outlet discharge, the cells are be artificially loaded with nutrients using simulated storms. Finally, soil moisture and temperature sensors are embedded in both cells to determine seasonal performance.

The university has become a recognized regional case study for LID retrofitting in an urban environment as well as a living laboratory of innovative stormwater BMPs for education, outreach and research. As such, Lawrence Tech is working with the State of Michigan's LID Technical Implementation Committee, which is responsible for

guiding and implementing the new LID manual scheduled for release in fall of 2008. This committee includes engineers, planners, and managers from public and private organizations across the state and is being facilitated by the Southeast Michigan Council of Governments (SEMCOG).



Figure 10: Flow meter (flume) and water quality sampler attached to green roof drainage pipe.

In a related effort, Lawrence Tech recently released a pilot version of the Southeast Michigan LID Techniques Interactive Google Mapping Database to increase public awareness and facilitate visits to demonstration projects (Figure 11). The site is publicly accessible and provides location and design information for LID techniques. Once the pilot version has gained approval, a statewide version with more comprehensive information will be released.

As of July of 2008, future education and outreach plans will occur through several avenues including:

- Developing a walking trail with signage about the stormwater BMPs implemented on campus. This walking trail and accompanying literature will be distributed to a broad audience.
- A booklet designed and published about the project as well as the benefits associated with conservation site design, low impact development, and integrated stormwater management.
- Continued integration of BMPs into undergraduate and graduate engineering, architecture, and science courses.

- Development and offering of workshops and professional short courses to engineers, planners, and architects.
- A public electronic kiosk in the A. Alfred Taubman Student Services Center that will describe the BMPs implemented on campus.
- A website dedicated to the project which will include design information and research results on BMP performance.

With this hands-on approach, Lawrence Tech is educating the next generation of civil and environmental engineers, citizens and community leaders on the critical issues associated with restoring developed watersheds. Continuing research on the performance of these retrofitted features is critical for wide-scale acceptance of the restoration efforts called for in the Great Lakes Regional Collaboration Strategy.

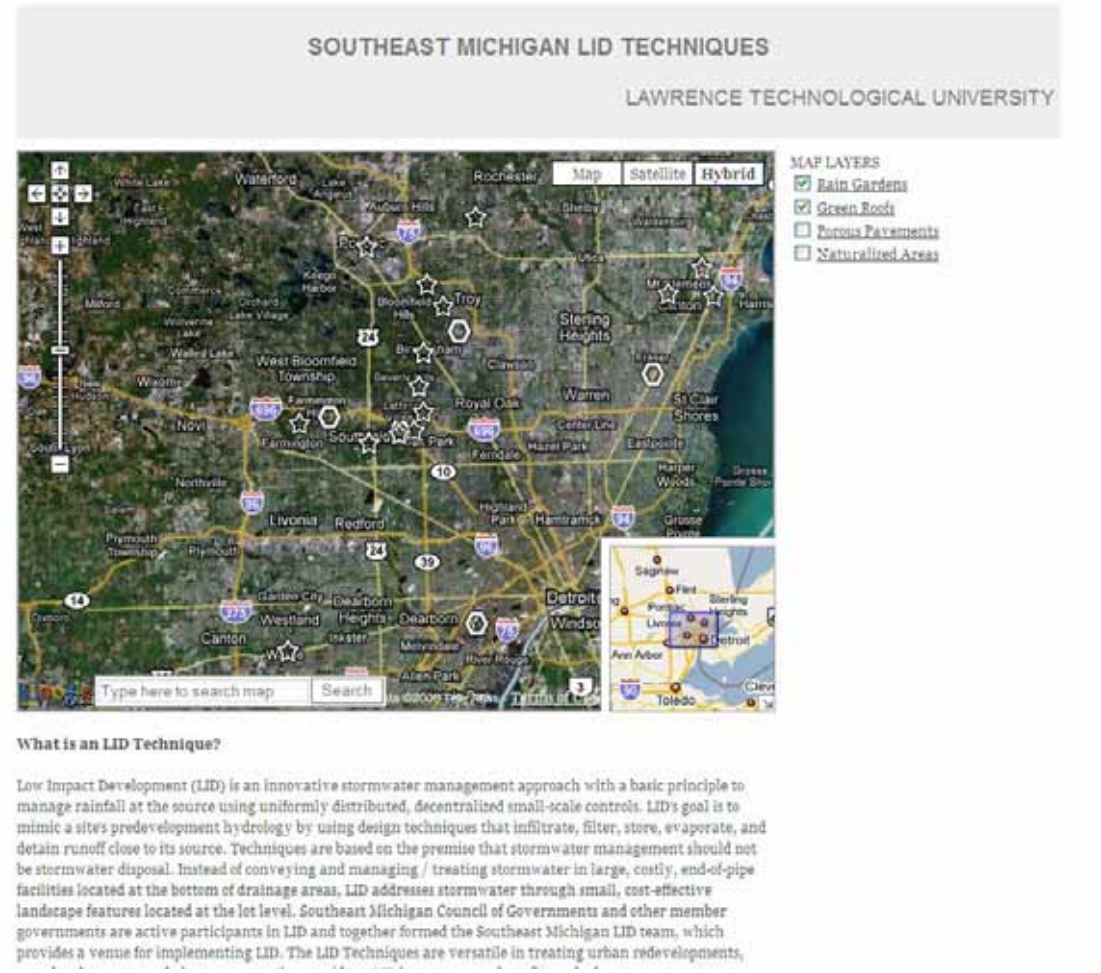


Figure 11: Lawrence Technological University LID Mapping Database (web screenshot).

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1.0 EXECUTIVE SUMMARY

The City of Livonia Stormwater Management Plan (SMP) is a comprehensive document containing a review of the City's existing stormwater system and storm management practices, identification of stormwater problems and concerns, and recommendations for physical improvements, policy amendments and funding options. The purpose of the SMP is to provide a planning tool to assist the City with meeting stormwater management goals and objectives and stormwater permit responsibilities.

1.1 Overview

1.1.1 Stormwater Concerns

The stormwater problems and concerns discussed in the SMP were identified through two mechanisms. First, City staff identified drainage concerns and other problems based on personal knowledge and/or complaints received from residents. These are described as the "Nine Known Problem Areas" throughout the report. Second, an extensive field inventory of the open drainage courses in the City was conducted. This Open Drain Inventory documented existing conditions including erosion, log jams and water quality.

The most significant stormwater concern facing the City is streambank erosion resulting from excessive peak flows. Erosion can threaten homes and property, topple trees resulting in flow obstructions, destroy fish and wildlife habitat and impair water quality. The Open Drain Inventory documented widespread erosion on the open watercourses throughout the City. Erosion was classified as moderate, severe or critical where critical indicates that property damage may occur if the condition is not corrected.

Streambank erosion is not unique to the City of Livonia. Excessive peak flows and resulting streambank erosion have been identified as problems throughout much of the Rouge River watershed.

1.1.2 Recommendations for Physical Improvements

It is recommended that the City design and construct regional stormwater storage basins to attenuate excessive peak flows and minimize resulting streambank erosion. Of twenty-four potential basin locations investigated, 14 sites appear to be feasible for siting regional storage facilities. Preliminary budget estimates range from $75,000 to $950,000 per basin, depending on size and construction considerations. Further evaluation of these sites is necessary to accurately assess storage volume available, detailed construction costs, and availability of land. Additional detail regarding the proposed basin sites is provided later in this

section and in Section 5. Many of the proposed basin locations will address one or more of the Nine Known Problem Areas.

In addition to construction of these regional stormwater storage basins, the City is encouraged to investigate the potential of obtaining needed stormwater storage as part of new development and redevelopment projects proposed in the City. Creation of stormwater storage through the development process may provide short-term relief to some of the flooding and excessive flow problems.

Additional recommended physical improvements include streambank stabilization in critical erosion areas, and removal of logjams that could cause flooding and result in property damage.

1.1.3 Recommendations for Policy Amendments

Recommended policy improvements were developed from review of the City's existing stormwater policies such as ordinances, design standards, and operation and maintenance procedures, as well as discussions with City staff.

It is recommended that the City adopt a comprehensive stormwater ordinance to address both stormwater quantity and quality. While the City currently requires on-site retention of stormwater for new developments, its policy does not address water quality and is not as restrictive for quantity as it could be. In addition, the ordinance should address on-site stormwater retention requirements for redevelopment projects as well as new development projects. The City should review Wayne County's recently enacted ordinance as a basis for drafting its own ordinance. An up-to-date and comprehensive ordinance is critical for addressing excessive flows.

Relative to operation and maintenance, it is recommended that the City do the following: develop a Woody Debris Management Program for logjam removal in conjunction with Friends of the Rouge, MDEQ and other Rouge watershed communities; locate inlet grates and outfall structures by Global Positioning Survey (GPS) and update the City's GIS stormwater layer so staff can better manage ongoing inspection programs and the Illicit Discharge Elimination Program; and increase street sweeping frequencies to reduce pollutant loading to the Rouge River.

Additional policy amendments are discussed in Section 5.

1.1.4 Funding

This report contains a summary of current funding sources utilized by the City to cover costs associated with minor stormwater maintenance activities and used to

pay for stormwater related capital improvement projects undertaken in the past. Options available for future funding for maintenance and larger capital projects are outlined as well. The report recommends increased annual maintenance activities, which, if implemented, will require increased annual budget appropriations. Long-term funding considerations for large storm-related projects will no doubt require coordination with all of the City's future capital improvement funding needs.

1.2 RECOMMENDATIONS

1.2.1 Physical Improvements

Recommended Physical Improvements include the following categories:

- Regional Stormwater Storage Basins
- The "Nine Known Problem Areas"
- Stream Bank Stabilization
- Outfalls
- Logjams

Regional Stormwater Storage Basins

Streambank erosion was found to be a significant problem throughout much of the City's open drainage system. Regional stormwater storage basins are needed to reduce the excessive flows that cause erosion. Excessive flows result in channel erosion, which can threaten homes and property, topple trees resulting in logjams, destroy fish and wildlife habitat and impair water quality. Twenty-four locations were investigated for the suitability of constructing a regional stormwater storage basin. Of those locations, 14 sites appeared feasible to construct a basin. These sites should be further evaluated in order to obtain an accurate storage volume estimate, cost of construction, availability of land and possible joint project with the current landowner. In addition, to accurately assess the basin's benefits, a detailed study identifying the limits of the watershed and anticipated peak storm flows including those from adjacent communities would need to be conducted. Table 1.2.1.a summarizes the recommended regional stormwater storage basin locations and the preliminary estimated cost listed in order of recommended priority.

Table 1.2.1.a: Recommended Regional Stormwater Storage Basins and Anticipated Cost

Priority #	Basin #	Basin Location Site	Anticipated Cost*
1	2	St. Mary's Hospital	$875,000 - $925,000
2	19	Ardmore Site	$700,000 - $750,000
3	7	East of Victor Parkway	$900,000 - $950,000
4	16	Intersection of West Bell Branch & Bell Branch	$625,000 - $675,000
5	13	Whispering Willows along West Bell Branch	$325,000 - $375,000
6	10	St. Martins Avenue	$200,000 - $225,000
7	9	Whispering Willows near Bretton	$200,000 - $225,000
8	14	Bicentennial Park-Soccer Fields	$650,000 - $700,000
9	6	Victor Parkway Basin	$200,000 - $225,000
10	17	Glen Eden Cemetery	$200,000 - $225,000
11	22	Sunset Park	$ 75,000 - $100,000
12	15	Curtis Road E. of Wayne	$125,000 - $150,000
13	5	Merriman Road between 5 & 6 Mile Roads	$125,000 - $150,000
14	4	Stevenson High & Marshall Elementary Schools	$150,000 - $175,000

* The anticipated cost includes design, construction, contract administration and inspection. It does not include land acquisition, easements or financing.

The "Nine Known Problem Areas"

When this project began, the City identified nine areas with stormwater management problems. The problems involved flooding, excessive erosion and logjams. These areas were further studied during the course of this project. Table 1.2.1.b summarizes the nine known problem areas and the proposed recommendations to help resolve the problems.

Table 1.2.1.b: Nine Known Problem Areas with Proposed Recommendations

	Problem Area	Proposed Recommendations
1	Bretton east of Newburgh Road	• Construction of Basin 9 (Whispering Willows near Bretton • Construction of Basin 10 (St. Martins Avenue)
2	Fitzgerald Avenue north of 7 Mile Road	• Construction of Basin 10 (St. Martins Avenue)
3	7 Mile/Wayne Road Area near Bicentennial Park	• Construction of Basin 13 (Whispering Willows along West Bell Branch) • Construction of Basin 14 (Bicentennial Park – Soccer Fields)
4	5 Mile/Levan Road area	• Construction of Basin 2 (St. Mary's Hospital) • Rennolds' Ravine Bank Stabilization Project
5	5 Mile/Gary Lane and Riverside	• Construction of Basin 2 (St. Mary's Hospital) • Construction of Basin 13 (Whispering Willows along West Bell Branch) • Construction of Basin 14 (Bicentennial Park – Soccer Fields) • Construction of Basin 15 (Curtis Road E. of Wayne) • Construction of Basin 16 (Intersection of West Bell Branch & Bell Branch) • Bank Stabilization (Gary Lane & Riverside Drive)
6	West of Gill Road	• Construction of Basin 17 (Glen Eden Cemetery) • Construction of Basin 18 (Pembroke Drive)
7	Tarabusi Creek east of Merriman Road	• Construction of Basin 19 (Ardmore Site) • Construction of Basin 22 (Sunset Park)
8	Woodside/Westbrooke near 6 Mile and Levan	• Construction of Vargo Woodside Relief Storm Sewer
9	Munger Court west of Levan Rd	• Sanitary Sewer Problem-will be dealt with by DPS (no recommendation)

Stream Bank Stabilization

A primary focus of the Open Drain Inventory (Activity 1.2) was to document the condition of the open drains. This included an evaluation of stream bank erosion. Erosion has been classified as critical, severe and moderate. Critical erosion indicates that there is complete bank failure and personal property damage may occur if the condition is not corrected. Table 1.2.1.c summarizes the critical erosion areas and the anticipated repair costs.

Table 1.2.1.c: Critical Erosion Areas and Anticipated Repair Costs

Area*	Description	Length (ft)	Total Project Cost**
1	5 Mile Rd & Levan Rd	250	$ 105,000
2	Tarabusi Creek S. of 8 Mile Rd	3,500	$2,100,000
3	8 Mile Rd & Newburgh Rd	250	$ 150,000
4	Myrna Avenue & Hubbard	1,300	$ 780,000
5	Idyl Wyld Golf Course	1,100	$ 320,000
6	1-275 & Hix Rd	1,100	$ 660,000
7	Tarabusi Creek & North Bell Branch Intersection	650	$ 390,000
8	6 Mile Rd & Francavilla Drive	100	$ 60,000
9	Gary Lane & Riverside Drive	1,000	$ 600,000
10	Bell Creek Court	250	$ 150,000
	Total	9,500	$5,650,000

* Area 1 (Rennolds' Ravine) cost estimate is based on gabion stabilization along 1 side of the drain. Area 5 (Idyl Wyld) cost estimate is based on a variety of stabilization techniques. The total project cost of the remaining areas was based on an average of $600 per linear foot (stabilization along both sides of the drain).
** The Total Project Cost includes design and construction engineering, but not permit or easement costs.

Areas with complete bank failure, but where personal property damage is not likely to occur, were listed as severe. Areas with significant erosion and where complete bank failure is likely to occur unless corrective measures are taken, were listed as moderate. Table 1.2.1.d summarizes the length of severe erosion and moderate erosion documented during the field investigation. Map 5.1.4 located at the end of this report shows the location of all the identified erosion sites.

Table 1.2.1.d: Additional Streambank Erosion and Anticipated Repair Cost

Erosion Type	Length (ft)	Total Project Cost*
Severe Erosion	40,500	$24,300,000
Moderate Erosion	9,000	$ 2,700,000

* Severe erosion was calculated at $600 per linear foot and moderate erosion was calculated at $300 per linear foot to repair. The Total Project Cost includes design and construction engineering, but not permit or easement costs.

Outfalls

As part of the Open Drain Inventory (Activity 1.2) observations of the outfalls were made and documented. The presence or absence of color, odor, turbidity, oil and/or foam were documented to determine the qualitative water quality of the open drainage system of the City of Livonia. The areas in Table 1.2.1.e require further investigation to determine if an illicit discharge is contributing to the problem.

Table 1.2.1.e: Outfalls with Potential Illicit Discharge

Drain	Location	Description
Tarabusi Creek	North of intersection of Stanford and Fonville Drive	Foam on the water surface
Tarabusi Creek	North of Seven Mile Road	Rusty orange flow
Tarabusi Creek	South of Six Mile Road	Brown foam from Fulton Pines Court outfall
West Bell Creek	Whispering Willows Golf Course	Oil on water surface
West Bell Creek	Whispering Willows Golf Course	Rusty orange flow
West Bell Creek	South end of Curtis Road	Scum on water surface
North Bell Creek	South of Eight Mile Road	Rusty orange flow from outfall
North Bell Creek	South of Eight Mile Road and north of Purlingbrook	Scum on water surface
North Bell Creek	South of Dardanella Avenue	Oil on water surface
North Bell Creek	Woodridge Apartments	Oil on water surface
North Bell Creek	Downstream of Woodridge Apartments adjacent to cemetary	Oil on water surface
North Bell Creek	Lathers Drive north of Six Mile Road	Scum on water surface
North Bell Creek	Rougeway Drive west of Inskter Road	Scum on water surface
North Bell Creek	Just west of Inkster Road	Sanitary odor
Upper Rouge River	Angling Road between Long and Norfolk Avenues	Blue-green flow from an unidentified outfall
Upper Rouge River	West of the intersection of St. Francis and Bridge Avenue	Oil on water surface
Beitz Drain	Drain intersection west of Pembroke Avenue	Odor of decay
Denmar Drain	East of Victor Parkway and north of Seven Mile Road	Scum on water surface
Denmar Drain	East of Newburgh Road	Algae near outfall from Dardanella Avenue
Bell Branch	Parkhurst Avenue and Stonehouse Circle	Scum on water surface
Bell Branch	Myrna Avenue east of Hubbard Road	Oil on water surface
Bell Branch	Greenland Avenue west of Middlebelt Road	Sanitary odor

Logjams

Logjams were classified in a similar manner as erosion. There are four categories for logjams, critical, severe, moderate and slight. Critical logjams are logjams blocking more than 75% of the channel flow and where personal property could be damaged when flooding occurs. Severe logjams also block more than 75% of the channel, but personal property damage is not likely. Moderate logjams block between 50% and 75% of the channel and slight logjams block less than 50% of the channel. Table 1.2.1.f summarizes the critical logjams found during the field investigation.

Table 1.2.1.f: Critical Logjams

Drain Name	Location of Critical Logjam
Bell Branch	• Just south of drain intersection at Alpine and Riverside Drives • End of Greenland Court • East of Merriman Road • East of Middlebelt Road • South of Grove and west of Savoie • Terrence Avenue west of Tarabusi Creek • Terrence Avenue east of Tarabusi Creek
West Bell Creek	None
North Bell Creek	• West of Inkster Road
Tarabusi Creek	• End of Myron Drive • South of Seven Mile Road • Yorkshire Drive and Hillbrook Avenue • West of Merriman Road • Northeast corner of Middlebelt Road and Six Mile Road • South of Six Mile Road • Stanmoor Drive and Harrison
Denmar Drain	None
Beitz Drain	None
Upper Rouge River	• Intersection of open drain behind Brentwood Avenue and the enclosed drain from Angling Road • Angling Road between Norfolk and Long Avenues • Angling Road just south of Norfolk Avenue • Angling Road and Pembroke Avenue • Angling Road south of Vassar Avenue • West of the intersection of St Francis and Bridge Avenue
Middle Rouge River	None

1.2.2 Policy Amendments

Recommended Policy Amendments include the following categories:

- Stormwater Engineering Design Standards and Stormwater Ordinances
- Stormwater Operation and Maintenance
- Illicit Discharge Elimination Program
- Public Education Plan
- Adjacent Community – Regional Flow Control

Stormwater Engineering Design Standards and Stormwater Ordinances

The following are recommendations for inclusion in the City's engineering design standards, stormwater ordinance and general stormwater policies.

- Develop a set of engineering standards that address both stormwater quantity and stormwater quality.
- Continue to work with the subwatershed advisory groups to implement the City's stormwater pollution prevention initiatives (SWPPIs).
- Review and adopt a comprehensive stormwater ordinance such as the Wayne County stormwater ordinance.
- Work cooperatively with the residents, school district, and private developers to encourage stormwater partnerships.

Stormwater Operation and Maintenance

The following are recommendations for stormwater operation and maintenance. Recommendations are provided for both open drains and enclosed storm sewers.

1. Open Drains
   - GPS all new inlet grates and enter into the City's GIS system.
   - Inspect all inlet grates on a routine basis.
   - Create an inspection form to keep a record of inlet inspections and problems encountered.
   - Take corrective action for inlets that are continuously blocked or have other problems.
   - Inspect the open drains as part of the City's illicit discharge and elimination program (IDEP).
   - Prioritize and address severe rated stream bank erosion.
   - Perform woody debris management assessment on logjams and prioritize logjams that need to be removed.
   - Note and record any additional outfalls found.
2. Enclosed Storm Sewers
   - Storm sewers should be televised for illicit connections if identified by the IDEP program.
   - The City's GIS should be upgraded to include all new storm sewer and any replacement storm sewer.
   - When a street is repaved, the storm sewer should be evaluated at that time to determine its structural integrity.
   - Increase the frequency of street sweeping for residential and major streets.
   - Encourage or require commercial and industrial property owners to sweep their parking lots on a routine basis.

- Consider the purchase of high-efficiency sweepers when replacing existing sweeping equipment and/or purchasing additional equipment.
- Maintain current catch basin cleaning at once every 2.5 years.

The following recommendations will benefit both open drains and enclosed storm sewers:

3. Open Drains & Enclosed Storm Sewers
   - Create drain map that correctly shows open drains and enclosed storm sewers, including those on school property.
   - Identify appropriate agency responsible for drain maintenance (county drain versus city drain).

Illicit Discharge and Elimination Program (IDEP)

The following are recommendations for the IDEP:

1. Continue to implement the Illicit Discharge Detection/Elimination Program activities identified in the City's SWPPI, dated November 28, 2001. The SWPPI commits to conducting dry weather outfall inspections at 20% of outfalls annually.
2. Review and re-evaluate the Illicit Discharge Detection/Elimination Program activities as part of the SWPPI review and update.
3. Implement a program to GPS all the stormwater outfalls and to update the GIS to include the GPS locations.
4. Establish a numbering system for the stormwater outfalls and mark them in the field.
5. Continue the current program to eliminate pollution caused by on-site sewage disposal systems by:
   - Update map of areas within the City that are served by on-site disposal systems bi-annually.
   - Continue to work with Wayne County and residents to enforce County On-Site Disposal System (OSDS) ordinance.
   - Visually (only) inspect all known properties with OSDS for obvious signs of system failure annually.
   - If visual inspection indicates a failure, refer to Wayne County Health Department.

Public Education Plan (PEP)

The following are recommendations for the PEP:

- The City should continue to implement the public education activities identified in its SWPPI.
- The City should monitor the effectiveness of its public education activities, in conjunction with the Upper and Middle-3 Subwatershed Advisory Groups.
- The City should review and re-evaluate its public education activities as part of its SWPPI review and update.

Adjacent Community – Regional Flow Control

The following are recommendations for addressing flow from adjacent communities:

- The City should work cooperatively with its neighboring communities in developing and implementing a program to address excessive flows entering the City's borders. The program should address the types of improvements necessary and a method of sharing responsibility and cost.

1.2.3 Funding

Funding is needed in order to implement the recommendations discussed in this report. A detailed discussion of funding is included in Section 6. Table 1.2.3 is a summary of the proposed stormwater activity and the corresponding funding source option(s).

Table 1.2.3: Stormwater Activity and Funding Sources

Stormwater Activity	Funding Sources
Annual Maintenance of enclosed storm sewers and open drainage courses	Public Services Annual Budget
Major storm drain improvement projects (involving only the City of Livonia)	• Voter approved designated millage • Voter approved bond issue • Special Assessment Improvement Districts • Water and Sewer Fund (for projects benefiting the sanitary sewer system) • Michigan Drain Code (Chapter 4,6,8,20) • Grants (CMI, RPO, State Revolving Fund, others)
Major stormwater construction projects involving neighboring communities	Michigan Drain Code (Chapter 4,6, 8,20)

The Department of Public Services Annual Budget is identified as the only funding source for performing all the maintenance of the stormwater system. The types of activities funded by this source include: street sweeping, catch basin cleaning, open drain maintenance, outfall inventory, illicit discharge elimination program activities, and public education. Currently, this fund is inadequate to meet the City's needs. It is recommended that the current budget be increased in the range of $100,000 to $250,000 in order for these items to be fully addressed.

The recommended Physical Improvements and Policy Amendments in this SMP are further classified as an Immediate, Short Term or Long Term need in order to help the City prioritize the improvements. The suggested priority listing is provided below.

Immediate Needs

Physical Improvements

1. Regional Stormwater Storage Basins
    - Begin negotiations/discussion with landowners of property identified as desirable for construction of a stormwater storage basin Table 1.2.1.a.
    - Review recommended basin location site priority listing.
    - Perform more detailed analysis of recommended basin location sites 1-5 to further define storage capacity and benefit for flow reduction/reduced erosion.
    - Identify funding sources for basin study, design and construction and apply for funding as appropriate.
2. Prioritize and address the "Nine Known Problem Areas" as listed in Table 1.2.1.b.
3. Repair critical erosion sites as listed in Table 1.2.1.c.
4. Investigate outfalls listed in Table 1.2.1.e to determine if an illicit connection exists.
5. GPS and create numbering system for all City outfalls and add to GIS database.
6. Address critical logjams as listed in Table 1.2.1.f.

Policy Amendments

1. Begin discussions with neighboring communities on how to address regional excessive flows.
2. Incorporate the recommendations presented under Stormwater Operation and Maintenance.
3. Incorporate the recommendations presented under Illicit Discharge Elimination Program.
4. Incorporate the recommendations presented under Public Education Plan.

Short Term Needs

Physical Improvements

1. Regional Stormwater Storage Basins
    - Acquire property either through ownership or long-term easement for basin locations identified through detailed study as needed for stormwater storage.
    - Prepare plans and specifications for basin construction.
    - Perform more detailed analysis of recommended basin location sites 6-14 to further define storage capacity and benefit for flow reduction/reduced erosion.
    - Identify funding sources for basin study, design and construction and apply for funding as appropriate.
2. Prioritize and repair severe erosion sites as listed in Table 1.2.1.d and shown on Map 5.1.4.
3. Monitor mild erosion sites as listed in Table 1.2.1.d and shown on Map 5.1.4.
4. Remove any outfalls listed in Table 1.2.1.e that are determined to be illicit connections.
5. GPS and create database for Woody Debris Management for remaining City logjams.

Policy Amendments

1. Develop program for addressing excessive flows at City borders with neighboring communities.
2. Update Stormwater Engineering Standards and Stormwater Ordinance.
3. Continue to implement the recommendations presented under Stormwater Operation and Maintenance.
4. Continue to implement the recommendations presented under Illicit Discharge Elimination Program.
5. Continue to implement the recommendations presented under Public Education Plan.

Long Term Needs

Physical Improvements

1. Regional Stormwater Storage Basins
    - Continue to acquire property either through ownership or long-term easement for basins locations identified through detailed study as needed for stormwater storage.
    - Continue to prepare plans and specifications for basin construction.
    - Continue to identify funding sources for basin study, design and construction and apply for funding as appropriate.

2. Prioritize and repair mild erosion sites as listed in Table 1.2.1.d and Map 5.1.4 as needed.
3. Continue to locate with GPS new logjams and outfalls and add to GIS database as noted during routine inspections.

Policy Amendments

1. Implement program for addressing excessive flows at City borders with neighboring communities.
4. Review and update Stormwater Engineering Standards and Stormwater Ordinance as needed.
3. Continue to implement the recommendations presented under Stormwater Operation and Maintenance.
4. Continue to implement the recommendations presented under Illicit Discharge Elimination Program.
5. Review the PEP and revise as necessary to reach the appropriate audience.

2.0 INTRODUCTION

The Joint Venture (JV) of Hubbell Roth & Clark, Inc. and Orchard Hiltz & McCliment, Inc. was retained by the City of Livonia in late January of 1999 to perform a comprehensive stormwater management study. The results of the study are contained in this Stormwater Management Plan (SMP) report. The purpose of the overall study is to provide the City with a planning tool that will assist them in meeting their stormwater management goals, objectives and MDEQ Voluntary General Stormwater permit responsibilities. The study is comprised of twelve separate activities that are discussed in detail throughout this report. The activities and a brief description are listed below:

- Activity 1.1: Review Stormwater Management Plan
- Activity 1.2: Review Stormwater & Drainage Concerns
- Activity 1.3: Plan & Design Off-Line Regional Facility at Idyl Wyld Golf Course
- Activity 1.4: Evaluate Effectiveness of Maintenance/Cleaning Program
- Activity 1.5: Develop Plans and Specifications for Waste Transfer Facility
- Activity 1.6: Provide Technical Assistance for Compliance with MS4 Permits
- Activity 1.7: Refine and Implement Illicit Discharge Elimination Program (IDEP)
- Activity 1.8: Provide Technical Assistance in Developing Public Education Program
- Activity 1.9: Prepare all Requests for Reimbursements of Federal Grant Funding
- Activity 1.10: Update Stormwater Management Plan
- Activity 1.11: Investigate Additional Funding Sources to Support Plan
- Activity 1.12: Provide Technical Assistance on Future Stormwater Projects Related to this Project

Activity 1.1: Review Stormwater Management Plan

The current stormwater management situation was researched and summarized through Activity 1.1. This activity focused on the administrative role in stormwater management. Stormwater policies such as design standards, ordinances, funding mechanisms and operation and maintenance procedures were reviewed and documented.

As part of this activity, surveys were conducted for City staff and for City engineering. These surveys provided valuable information regarding operation and maintenance of the open and enclosed storm drainage systems. Also, the surveys indicated that more information was needed regarding which drains are county drains, a description of the school drainage system, and the need for an updated map showing which drains have been constructed.

Activity 1.2: Review Stormwater & Drainage Concerns

Activity 1.2 involved an extensive field inventory of the open drainage courses in the City including a review of nine specific problem areas identified by City staff. The inventory focused on documenting stream bank erosion, logjams, visual water quality, outfalls and the general characteristics of each drain. A digital camera was used to document the condition of the drains at various locations for future reference. Approximately 1,000 pictures of drain attributes were taken during the field inventory.

Activity 1.3: Plan & Design Off-Line Regional Facility at Idyl Wyld Golf Course

The City has obtained a Rouge River National Wet Weather Demonstration Project grant to plan and design a regional stormwater management facility. The goal of this grant is to demonstrate the effectiveness of a regional stormwater retention facility in reducing the negative impacts of stormwater runoff by reducing flow surges, reducing pollutant loads, and providing habitat enhancement. The results of this demonstration project will provide useful information to Livonia and other Rouge communities that are considering additional retention basins to control surge flows and improve water quality.

The City has also obtained additional Rouge River National Wet Weather Demonstration Project grant funding for construction of the basin.

Activity 1.4: Evaluate Effectiveness of Maintenance/Cleaning Program

Activity 1.4 included a pilot study of various street sweeping and catch basin maintenance practices in two residential, one commercial parking and one recreational pilot areas in the City. Monitoring was conducted to determine the rate of pollutant accumulation on paved surfaces in the pilot areas and computer modeling – using the Simplified Particulate Transport Model (SIMPTM) – was conducted to simulate the removal of pollutants for various street sweeping frequencies. Based on the modeling results, recommendations for future operation and maintenance procedures were made. This was the first application of the SIMPTM model in Michigan. Results of this study will be shared with other Rouge communities.

Activity 1.5: Develop Plans and Specifications for Waste Transfer Facility

Activity 1.5 involved the design of a waste transfer facility to store street sweepings, catch basin cleanings and other waste material. A pedestrian drop-off feature was also incorporated to facilitate residential access for disposal of yard waste.

Activity 1.6: Provide Technical Assistance for Compliance with MS4 Permits

As part of the City's application for a Michigan Department of Environmental Quality's Voluntary General Stormwater Permit, the JV has assisted the City with developing a Subwatershed Management Plan (SWMP) in conjunction with other Upper and Middle 3

subwatershed communities. The JV is also in the process of assisting the City in developing their Stormwater Pollution Prevention Initiatives (SWPPI).

Activity 1.7: Refine and Implement Illicit Discharge Elimination Program (IDEP) and
Activity 1.8: Provide Technical Assistance in Developing Public Education Program (PEP)

The City of Livonia developed an Illicit Discharge Elimination Program and Public Education Program as part of their application for the Voluntary General Stormwater Permit. The JV has assisted the City in refining and implementing these existing plans through the following activities:

- Developing educational information for newsletter articles
- Creating a Rouge River education page for the City's web-site
- Planning public participation meetings
- Identifying and prioritizing storm outfalls for inspection
- Training City staff to conduct storm outfall inspections
- Reviewing sampling data from outfall inspections

Activity 1.9: Prepare all Requests for Reimbursements of Federal Grant Funding

As part of the Rouge River National Wet Weather Demonstration Project grants, the City is required to submit monthly progress reports and invoices. The JV has performed this service for 4 separate grants for the City under this activity.

- Idyl Wyld Regional Retention Facility
- Waste Transfer Facility
- Storm Sewer Maintenance Study
- IAA General Permit Activities

Activity 1.10: Update Stormwater Management Plan and
Activity 1.11: Investigate Additional Funding Sources to Support Plan

This report serves as the updated Livonia Stormwater Management Plan (SMP). Although this document is a specific activity in the overall stormwater management study, the recommendations found in this report were based on the findings of the first eight activities. Therefore, references will be made throughout this document to the other activities with specific conclusions and recommendations becoming part of this report.

The updated SMP is intended to be a complete and comprehensive document describing the City of Livonia's current stormwater management system both administratively and physically. In addition to documenting the current condition, this report will provide recommendations for physical improvements, costs, operation and maintenance procedures, IDEP, PEP and

administrative policies and procedures. The results from Activity 1.11 will provide information regarding funding mechanisms that can be used to pay for the recommendations in this report.

Activity 1.12: Provide Technical Assistance on Future Stormwater Projects Related to this Project

Activity 1.12 was created to allow for a provision for the JV to assist the City with future stormwater work during the course of this study. To date, there has been no work under this activity.

2.1 Background

The City of Livonia is located in the Rouge River Watershed as shown on Figure 2.1.a. The watershed is further divided into subwatershed districts with Livonia being part of the Upper, Middle 1 and Middle 3 subwatersheds as shown on Figure 2.1.b. Much attention has been given to the Rouge River Watershed in the recent past due to noncompliance of the Rouge River with the Clean Water Act. In response to this noncompliance, the Rouge River National Wet Weather Demonstration Project was initiated to examine watershed management at the local level to eliminate or minimize non-point sources of pollution to the river.

Non-point source pollution has been identified as a major contributor to impairments in the Rouge River. Unlike point source pollution created by wastewater treatment plants, nonpoint source pollution caused primarily from stormwater runoff and illicit sanitary connections is not as visibly evident. Community involvement is necessary to determine where these impacts are occurring and how they should be resolved.

The Voluntary General Stormwater Permit was developed by the Michigan Department of Environmental Quality (MDEQ), in conjunction with the Wayne County Department of Environment and communities in the Rouge watershed, in response to concerns about non-point source pollution. The main goal of the Voluntary General Stormwater Permit is to implement a locally driven program that gives communities the ability to control their own stormwater systems and work cooperatively with other communities in their watershed. The Rouge Program Office (RPO) and the MDEQ are promoting the concept of local watershed management and are offering workshops and grant opportunities for communities that participate in this permit. The MDEQ and the U.S. EPA have indicated that the Voluntary General Stormwater Permit satisfies the NPDES Phase II stormwater requirements at least through year 2008. Many communities have decided to pursue the Voluntary General Stormwater Permit due to the opportunity to make the program flexible and custom fit to their watershed needs. An added incentive of this permit for communities is the ability to share program costs with neighboring communities within the same watershed. The City of Livonia is a participant in the Voluntary General Stormwater Permit and has been an active participant in both the Upper and Middle 3 subwatershed advisory groups (SWAGs)

As part of the Voluntary General Stormwater Permit, the City of Livonia has developed an Illicit Discharge Elimination Program and a Public Education Program. Recently, each SWAG has completed a Subwatershed Management Plan (SWMP). Each participant in the SWAG is currently in the process of developing SWPPIs to help them achieve the goals of the SWMP. Each community in the subwatershed will have their own SWPPI program.

2.2 Purpose

The purpose of this SMP is to provide the City with a planning tool that will assist them in meeting their stormwater management goals, objectives and MDEQ Voluntary General Stormwater Permit responsibilities. This report is not an update to the original 1957 stormwater management plan. The earlier plan was developed when the City was growing and emphasis was directed at preventing street flooding and allowing for urban development. Many of the recommendations from the original 1957 report were drain projects designed to convey the stormwater away from homes and businesses as quickly as possible.

Over the past 44 years, our society has become educated on the impact that stormwater is having on our rivers, lakes, steams, plants and wildlife. Many of our recreation areas are adversely impacted by the effects of stormwater runoff. This updated SMP contains information and recommendations on how to manage the stormwater quantity as well as to improve the stormwater quality. The success of this plan is dependent on public understanding and acceptance; therefore, education is a key component to the plan.

2.3 Scope

The SMP includes a comprehensive review of the City's existing stormwater system, the operation and maintenance systems, analysis of future needs, refinement of the existing IDEP and PEP, and a detailed discussion on financial means to fund required improvements. The SMP is the overall planning document that summarizes, incorporates and builds from the conclusions and recommendations of Activity 1.1 through Activity 1.8 of the stormwater management study.

2.4 Planning Area

The planning area includes the City of Livonia and those portions of the Upper and Middle 3 subwatersheds that lie outside the corporate boundary of the City. Most of the focus of this study will be within the City boundaries since this is the area where the City can achieve the most benefit. However, it is recognized that stormwater runoff is not jurisdiction based, but is instead watershed based. Therefore, the City will continue to support the SWAGs and the goals of the subwatershed management plans.

The City of Livonia is located in Southeast Michigan approximately 14 miles west of downtown Detroit. The City is 36 square miles in size and is roughly 50% residential, 20% open space, with the remaining land use industrial, commercial, institutional, transportation and communication.

The City's population has remained constant at slightly over 100,000 people since 1990 making it the second largest city in Wayne County and eighth largest in the state of Michigan. The Year 2000 population was 100,545 according the 2000 Census. SEMCOG's future Year 2020 population forecast for the City is 96,000 people. This indicates that the population base for the City is relatively stable.

The City of Livonia, like many southeast Michigan communities, enjoys relatively mild temperatures. The average low temperature in January is 15° F while the average high temperature in July is 83° F. The annual rainfall is approximately 30 inches per year.

The City of Livonia has been and continues to be a desired location for people to live and work. In 1997, the City was named the seventh safest city in the nation, and in 1999 the City was named America's most "Kid Friendly" suburb. This award was achieved partly because of the City's commitment to recreational opportunities. Livonia has over 40 parks in addition to golf courses, playgrounds, baseball diamonds, tennis courts, soccer fields and ice arenas. It is the City's commitment to families that gives the City the initiative to be proactive in protecting these resources by managing their stormwater runoff.

2.5 Previous Reports, Studies and Other Resources

Many previous reports, studies and other documents related to the City's stormwater management program were reviewed as part of this stormwater management study. Many of these documents were reviewed as part of Activity 1.1. Following is a list of the information that was reviewed:

- February 1958 Stormwater Master Plan
- February 4, 1957 Progress Report Stormwater Drainage City of Livonia, MI
- April 19, 1963 report titled "A Summary of Engineering Data for City of Livonia "Master Plan", storm drainage projects, 1954 to date"
- 1963 report titled "A Summary of Engineering Data for the Master Plan Projects"
- Management Study for the Bell Branch and Tarabusi Creek Subwatershed
- RPO Water Quality Baseline Report
- MDEQ GLEAS Report
- Design and Construction Records for open and enclosed stormwater systems
- Current Stormwater Design Standards
- Current Stormwater Ordinances
- Existing Survey Map and Photographic Information

- City of Livonia Geographical Information System Data
- Subwatershed Management Plan for Upper and Middle 3 subwatersheds
- Illicit Discharge Elimination Plan
- Public Education Plan
- Operation and Maintenance Procedures

The majority of this information was used to create the Current Stormwater Situation Report, which is attached as Appendix A to this report.

2.6 Stormwater Management Goals

The City of Livonia is a participant in both the Upper and the Middle 3 SWAGs. As a participant, they have contributed to and endorsed the defined goals of both subwatersheds. These goals are listed below:

2.6.1. Upper Subwatershed Goals

1. Protect public health
   - Meet water quality standards for recreation uses (wading, boating, fishing, swimming)
   - Restore impaired areas
   - Protect areas free of problems
2. Reduce excessive flows
   - Reduce frequency and severity of flood flows
   - Protect natural water storage areas (wetlands and floodplains)
   - Construct new and maintain existing retention facilities
3. Protect and restore river ecosystem
   - Meet water quality standards for fish and wildlife
   - Protect existing habitat
   - Enhance diversity and sustainability
4. Restore and maintain river aesthetics
   - Reduce liter, debris and waste in river
5. Reduce sedimentation
   - Control erosion at construction sites

2.6.2 Middle 3 Subwatershed Goals

1. Improve water quality consistent with the Vision Statement
2. Reduce Public Health Risk
   - Minimize impact of SSOs and CSOs
   - Eliminate Illicit discharges
   - Remove fish advisories
3. Educate public
4. Preserve greenways adjacent to the river
5. Enhance and preserve habitat
6. Implement general stormwater permit
7. Identify and obtain funding for watershed management

2.6.3. Specific Goals

In addition to the subwatershed goals, the City has additional stormwater management goals that are more specific for the community. The City's more specific goals for the stormwater management plan are listed below:

- Create drain map that correctly shows open drains and enclosed drains
- Identify appropriate agency responsible for drain maintenance
- Identify problem areas and prioritize for either immediate, short term or long term attention
- Recommend needed improvements
- Identify anticipated costs of needed improvements
- Recommend funding and financing for the needed improvements

3.0 EXISTING STORMWATER MANAGEMENT PROGRAM

A stormwater management program must include provisions for the design, construction and operation and maintenance of the stormwater conveyance system both open and enclosed drains such that runoff is safely conveyed during storm events. In addition, a stormwater management program must include a water quality component such as illicit discharge elimination and public education. Proper funding is necessary to ensure that these activities are successful in managing the City's stormwater runoff.

The City of Livonia has in place an existing stormwater management program. A detailed discussion of the existing program is included in the Current Situation Report included as Appendix A. The existing program includes the following components and is summarized below:

- Stormwater Design Standards
- Stormwater Ordinances
- Stormwater Operation and Maintenance Procedures
- Illicit Discharge Elimination Program
- Public Education Program
- Stormwater Funding

3.1 Stormwater Design Standards

The City of Livonia currently requires use of the Rational Method and Ten Year Design storm for stormwater drainage designs. Use of the Rational Method is common engineering practice throughout southeast Michigan. The Rational Method assumes that the maximum flow will occur at the time when the runoff flows from the contributing watersheds reach the outlet. It is commonly used for designing small drainage structures. The rational method assumes that the rainfall intensity is constant over the watershed and throughout the storm, and it assumes the runoff coefficient does not vary throughout the storm.

For large projects that do not outlet to an enclosed storm sewer, the City requires on-site detention in accordance with Wayne County's method of 0.15 cfs/acre of allowable outlet flow.

3.2 Stormwater Ordinances

Currently, the City of Livonia has identified two ordinances, which address stormwater related issues. These two ordinances were forwarded to the Joint Venture by the City Engineer and are listed as appears in the actual ordinance below.

3.2.1 Storm Sewers and Drainage Courses

Livonia City Ordinance 16.24.210 Storm sewers and drainage courses.

- The Proprietor shall provide for and construct, at his own and sole expense, a proper and adequate system for the disposal of all surface stormwater, to be designed in conformity with the department regulations, standards, requirements and particular requirements therefore; and to be constructed in strict conformity with the development plans, profiles, cross-sections and specifications therefore prepared by and for the proprietor and approved by the department. The proprietor shall also provide at his own and sole expense a storm sewer outlet for each lot within the proposed plat for purposes of outletting groundwater from building footing drains. In every case, storm sewers and drainage shall be designed to handle the ultimate stormwater runoff in accordance with the master storm-drainage plan of the city, in a manner that will be consistent with the best interest of the community and for the storm of that intensity which can be interpreted as the conventional ten-year storm for the area. The runoff from platted areas shall in no case be considered less than thirty-five percent, and in the case of large paved areas not less than seventy-five percent. Storm sewers shall be connected so as to align the 0.8 diameter points, and when the velocity exceeds twenty feet per second, the invert shall be paved with vitrified tile or other abrasion-resisting material.
- Storm sewers shall be made of such material as is determined to be in the best interests of the city by the department and approved by the city council, and of adequate load-carrying capacity as determined by the city engineer. Catch basins shall be so placed that the line of travel from the sidewalk can be made without crossing the excessive gutter flow.
- The type, extent, location and capacity of all drainage facilities shall be approved by the department through the city engineer.
- All properties shall be served by underground storm-sewer systems discharging into previously approved outlets and constructed in absolute conformity with all city requirements.
- Existing watercourses, where so required by the city council, shall be dedicated as drainage courses and thereafter maintained as such by the city. (Ord.1993 § 1 (part), 1989: prior code § 9-116(e))

3.2.2 Minimum Requirements for Rear Yard Storm Drainage Requirements

Livonia City Ordinance 16.24.220 Minimum requirements for rear-yard storm drainage requirements.

- The proprietor shall provide for the adequate and safe disposal of all rear-yard stormwater. Suitable inlets or catch basins shall be provided at the rear of the lots at intervals of no more than four hundred eighty feet and at the grade required by the department. Such construction shall be inspected and approved by the city engineer after construction if the same are adequate and sufficient. The rear grade level of each lot shall be in conformity to the grade level shown on the development plans, profiles, cross-sections and specifications therefore, prepared by or for the proprietor and approved by the department. (Prior code § 9-116 (f))

3.3 Stormwater Operation and Maintenance Procedures

The Streets and Signs Division with maintenance help from the Water & Sewer Division is in charge of the operation and maintenance of the open and enclosed drains. The Water & Sewer Division does the cleaning and inspecting of the enclosed drains. It is estimated that the DPW spends approximately 15% of their time on stormwater issues.

3.3.1 Open & Enclosed Drain Inspections

The routine inspection procedure for open drains consists of an inspection of the inlet grates only monthly to every other month. Otherwise, open drain inspections are conducted only on a complaint basis and there are approximately 6-10 complaint inspections performed each year. Logjams are most typical. For the enclosed drains, inspection is on an emergency basis only and approximately 100+ complaint inspections are performed each year.

3.3.2 Catch Basin Cleaning

The City of Livonia's DPW utilizes a vactor truck for catch basin cleaning. Catch basins are cleaned once every 2.5 years generally between April and November. The City does not clean catch basins located on private property.

The material gathered through the catch basin cleaning program is taken to the Glendale Landfill. The City is currently in the process of constructing a waste transfer facility for the catch basin material.

3.3.3 Street Sweeping

The City of Livonia's DPW performs street sweeping with both mechanical and regenerative air equipment. The street sweeping practices are summarized below:

- The City sweeps the residential areas at least 3 times each year and major roads approximately 7 to 8 times each year.
- The City does not sweep the County or State roads.
- The City does not sweep during wet and inclement weather.
- The City does not sweep private streets, parking lots, uncurbed streets or public parking lots.
- The City has a formal leaf collection program that generally occurs from the third week in October to the first week in December. Following bulk leaf pickup, a contractor sweeps the entire City to remove leaf residue.

The material gathered through the street sweeping program is taken to the Glendale Landfill. The City is currently in the process of constructing a waste transfer facility for this material.

3.4 Illicit Discharge Elimination Program

Along with other communities in the Rouge River watershed, the City of Livonia applied for and obtained a voluntary Stormwater General Permit. The City submitted its permit application to MDEQ in December 1998 and the MDEQ subsequently issued the certificate of coverage on August 27, 1999.

A key requirement of the general permit is the development and implementation of an Illicit Discharge Elimination Program (IDEP). The goal of the IDEP is to effectively identify and eliminate illicit discharges to the City's separate stormwater drainage system, thereby improving and protecting the Rouge River. The basic elements of an IDEP include:

- Identifying all storm sewer outfalls to the Rouge River;
- Inspecting storm sewer outfalls during dry weather conditions to determine if an illicit discharge may be present;
- Tracking sources of potential illicit discharges detected during dry weather inspections;
- Eliminating illicit discharges identified during inspections and tracking.
- Identifying failing septic systems that may cause seepage into the storm drainage system.

3.4.1. Dry Weather Inspection of Storm Sewer Outfalls – Efforts to Date

In 1999, the consulting firm Camp, Dresser & McKee, Inc. conducted field identification and dry weather screening of approximately 319 storm sewer outfalls, as part of its project to update the City's GIS. Based on the results of this field work - which included physical observations as well as limited water quality sampling – 65 outfalls were identified with a high likelihood of having an illicit discharge. City personnel subsequently conducted a second; follow up inspection at each of these outfalls in April and May 2001. These follow up inspections revealed illicit connections to 3 outfalls. City personnel are investigating the source(s).

The City also identified an additional 60 outfalls that were not inspected as part of the GIS project. City personnel conducted dry weather inspection at these outfalls in the summer and fall of 2001. Based on the results, the City may need to do additional investigation.

The City is using the Rouge Program Office's IDEP application software to track and document its IDEP activities.

3.4.2 Dry Weather Inspection of Storm Sewer Outfalls - Future Efforts

Upon completion of initial dry weather inspections at all of the City's storm sewer outfalls, the City should determine an appropriate frequency for continuing outfall inspections.

3.4.3 Identifying & Eliminating Failing On-Site Disposal Systems – Efforts to Date

In September 1999, Wayne County adopted a countywide on-site disposal system ordinance. The ordinance, which went into effect in February 2001, requires evaluation of on-site disposal systems at the time of property sale or transfer. If the OSDS is found to be failing, the property owner must either connect to the sanitary sewer (if available) or make corrections to the on-site system in accordance with county standards. The evaluation consists of visual and olfactory observations of the disposal system, pumping of septage, an inspection of the condition of the septic tank, absorption system, pumps, filters and other features of the disposal system.

As a supplement to the countywide ordinance, the City of Livonia began conducting yearly visual inspection of all properties with on-site disposal systems in 2001. City personnel notify Wayne County of any signs of on-site system malfunction or failure noted during these annual inspections. These inspections consist of visual observation of the property.

3.4.4 Identifying & Eliminating Failing On-Site Disposal Systems – Future Efforts

Areas served by On-Site Disposal Systems (OSDS) were identified and mapped as part of the GIS project completed by Camp, Dresser & McKee. The City plans to utilize this information to develop a master plan for providing sanitary sewer service to unsewered areas.

3.5 Public Education Program

Another requirement of the voluntary Stormwater General Permit is the development and implementation of a Public Education Program (PEP). The goal of the PEP is to educate the public regarding how its day-to-day activities can affect water quality and to encourage the public to reduce the discharge of pollutants in stormwater through river friendly actions.

The public education plan must address the following objectives, in accordance with the general stormwater permit.

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

The City addresses the permit's public education objectives through several mechanisms including quarterly newsletter articles, direct mailings to residences, cable programs and public service announcements, public building displays, the City's web site, and annual River Day activities. Table 3.5 summarizes the City's public education activities from the past 2 years.

Table 3.5: Public Education Activities

Public Education Activity	Description	Recent Activities
City Newsletter Series	The City publishes articles in its quarterly newsletter to inform residents of actions to protect the Rouge River.	The following articles have been published: Fall '99 – "Water…. Everyone's Responsibility" Spring '00 – "Where Does Your Stormwater Go?" Summer '00 – "Household Hazardous Waste" Winter '00-'01 – "Hey…What Are You Dumping Into My River?" Spring '01 – "Household Hazardous Waste Disposal – Protecting our Waterways" Summer '01 – "Maintaining Healthy Lawns and Gardens" Fall '01 – "The Rouge, A Shared Interest in Our Community" Fall '01 – "Keep Animal Waste Out of Our Lakes and Rivers"
Cable Programs and Public Service Announcements	The City provides educational facts about stormwater pollution and citizen actions via the local cable station.	The City advertised its annual Household Hazardous Waste Drop-of Day on several cable networks in 2000 and 2001. The video "Storm Drains are Not Garbage Cans" was broadcast during May through August 2001.
Public Building Displays	The City uses display boards at public buildings to provide information on river restoration.	A display containing the Rouge Program Office's "Our Actions" materials was set up at the library.

(Table 3.5 continued)

Public Education Activity	Description	Recent Activities
Web Site	The City provides watershed information to residents via the web site.	The web site (www.ci.livonia.mi.us) includes information on a variety of watershed topics including: • History of the Rouge River • Where Does Stormwater Go? • Stewardship • Household Hazardous Waste • Car Washing • Fertilizer Application • Illicit Discharges • Subwatershed Management Plans • River Day • Rouge River Links
River Day/Rouge Rescue	The City sponsors sites for the annual river clean up and education effort.	Sponsored Rouge Rescue at Botsford Park in June 2000 Assisted residents with clean up of Tarabusi Creek on May 5, 2001. Sponsored Rouge Rescue at Levan-Knoll on June 23, 2001. Sponsored 2nd clean up at Levan-Knoll on August 25, 2001.
Direct Mailings to Homes	The City uses direct mailings (to supplement the quarterly newsletter) to inform residents of watershed related activities and/or actions.	Yearly letters to residents regarding appropriate Household Hazardous Waste Disposal and City's annual drop-off day.
Host Workshops	The City hosts workshops on watershed topics in conjunction with Friends of the Rouge.	Hosted a workshop regarding streambank stabilization techniques on August 9, 2001.

3.6 Stormwater Funding - Current

The City of Livonia has few separate funding and accounting mechanisms in place exclusively for stormwater related work and activities. Currently, stormwater operations and maintenance, storm sewer upgrades, soil erosion and sedimentation control, and other related activities are funded from various City accounts. These accounts are found in the DPW and Engineering Budgets; Local and Major Road budgets for stormwater road related activities and current grant funds. The following current City of Livonia funding sources should be noted:

- Engineering Budget
- Livonia Drain Fund
- Stormwater Grants
- Water and Sewer Fund
- Special Assessments

3.6.1 Engineering Budget

The Engineering budget contains a line item that addresses some citizen complaints for stormwater related issues. Expenditures can be tracked within this fund by use of the City's work codes. Construction and repair related to citizen complaints, including, minor drainage problems are covered under a line item which is approximately $15,000/year. Engineering site plan reviews related to stormwater is covered under the Engineering Budget as well. Site plan reviews require that a 1-½% estimated cost of construction review fee be paid to the City's General fund. Sites with proposed stormwater facilities expend approximately 25% of the review fee on stormwater system review.

3.6.2 Livonia Drain Fund

In the past, the City utilized Chapter 20 of the Michigan Drain Code to provide for storm drain improvements. Under Chapter 20, the City has historically paid all principal and interest on bonds that will be issued by the County Drain Commissioner. As of December 31, 2001, the Livonia drain fund has a balance of $194,000 that could be used for small drain projects.

3.6.3 Grant Funding

The DPW has been proactive in researching and applying for stormwater related grant funding. The DPW has applied for and received four individual Rouge River National Wet Weather Demonstration Project Grants (RRNWWDP) from Wayne County. In addition, the City has received RRNWWDP grant funding through the Upper and Middle-3 Subwatershed Advisory Groups. The City has

also applied for Clean Michigan Initiative (CMI) program grants, administered by the Michigan Department of Environmental Quality (MDEQ).

The four individual RRNWWDP grants are being used for the Regional Stormwater Retention Facility at Idyl Wyld, the Storm Sewer Maintenance Plan, and the Regional Street Waste Transfer Facility. These grants include planning and design costs, as well as construction costs for the planned projects. Three of the grants are 90/10 grants which provide 90% of the total project cost in grant funds while requiring 10% local matching funds. The fourth grant is a 50/50 grant, which provides 50% of the project cost while requiring 50% local matching funds. The following summarizes each grant and the project cost breakdown:

Regional Stormwater Retention Facility at Idyl Wyld – Round I Grant
Total Project Cost = $200,000 Grant = $180,000

Regional Stormwater Retention Facility at Idyl Wyld – Round IIA Grant
Total Project Cost = $691,700 Grant = $345,850

Storm Sewer Maintenance Evaluation Study – Round I Grant
Total Project Cost = $124,000 Grant = $111,600

Regional Street Waste Transfer Facility – Round I Grant
Total Project Cost = $150,000 Grant = $135,000

General Permit Activities/ Round I Grant
Total Project Cost = $508,800 Grant = $205,400

The City has also received RRNWWDP grant funding through the Upper and Middle-3 subwatersheds. These grants were made available to the subwatershed advisory groups to assist the communities with watershed planning and implementing their MS4 general stormwater permit requirements, i.e., Illicit Discharge Elimination Programs and Public Education Programs.

The City has prepared and submitted five applications to the MDEQ for CMI funding. One of these applications was for the Rennolds' Ravine Bank Stabilization construction project and was submitted in July 1999. This project was not funded, and the City decided not to resubmit the application for CMI funding. Four CMI applications have been submitted for the Idyl Wyld Regional Stormwater Facility – in July 1999, November 2000, August 2001, and January 2002. The first three applications were not funded, however, MDEQ indicated that the project has significant merit. Subsequently, the City has partnered with MDEQ and stream restoration experts Don Roseboom and Chester Watson on design of the stream restoration portion of the Idyl Wyld project. This work – which will include the Roseboom/Watson design effort as well as educational workshops on stream restoration for area communities using Idyl Wyld as a case study - will be funded by MDEQ, separate from the fourth CMI application, which is for construction costs. MDEQ is currently

developing contract language for the Roseboom/Watson design effort. The fourth CMI grant application is pending.

3.6.4 Water and Sewer Fund

In the past the City has utilized appropriations from the Water and Sewer Fund when stormwater improvement projects were of direct benefit to the sanitary system. Project examples include the combined sewer separation program undertaken in the mid-1970s and again in the mid-1990s and also the rear yard program in combined sewer areas in the early 1990s.

Obviously the main objective of any of these projects is to reduce the volume of stormwater that overloads the sanitary system. This can easily translate into thousands of dollars of savings in sanitary pipe sizing, pumping and treatment costs and charges.

3.6.5 Special Assessment Districts (SADs)

The City has used SADs in the past, mainly for local road paving and sanitary sewer projects. A SAD for the stormwater improvements in the Fitzgerald Avenue/7 Mile Road area (only 2 parcels) has also been completed. This type of funding, which puts the burden of cost on those that benefit from the improvement, has been found to be unpopular within the City.

Funding storm drainage improvements via special assessment districts can be done, but it is largely viewed as very difficult and unpopular in urban areas. The difficulty has to do with deriving an equitable method of apportioning costs to benefits received as often the majority of costs would be assessed upstream or on properties that do not flood or experience problems. Likewise the assessment method is unpopular because costs are imposed on property owners throughout a drainage course; many of whom may not understand the need or validity of the assessment and contend they do not require a direct benefit.

The special assessment method can be successfully used where a clear majority of property owners request an improvement e.g. a rear yard drain, a drain cleanout, a relief sewer etc. To facilitate this process in a positive way the City could require a 50% plus majority initiatory petition if this method is to be considered.

3.6.6 Summary of Current Financing

The following is a summary of specific stormwater related tasks and the current method of funding:

New Construction (Private Sites)

- Engineering Design - Review Fees (1-½% of Estimated Construction Cost)
- Construction Inspection - Inspection Fee (3% of Estimated Construction Cost)

Road Construction (Public Road Drainage)

- Engineering Design — Act 51 monies
- Construction — Act 51 monies

  Note: Very little Act 51 money is used for stormwater upgrades

Maintenance

- Structure Cleaning — Local Road Fund and DPW Budget
- Storm Sewer Cleaning — DPW Budget
- Street Sweeping — Road Funds and DPW Budget
- Soil Erosion Control — DPW and Engineering Budgets
- Plan Review — Developer Paid Fees
- Site Inspection — Developer Paid Fees
- Enforcement — Developer Fees and General Fund Accounts

Drainage Complaints

- Complaint Investigation — DPW and Engineering Budget
- Construction/Repair — Engineering Budget

4.0 EXISTING STORMWATER MANAGEMENT CONDITION

4.1 Watershed and Subwatershed Area

A watershed is defined as an area of land that drains to a single river or outlet and is separated from other watersheds by a topographic divide. The overall watershed may be divided into smaller subwatersheds that also drain to single points within the watershed, which is often times useful for analysis. The City of Livonia is located within the overall Rouge River Watershed, which has been subdivided into seven (7) designated subwatersheds. Of the seven (7) subwatersheds, the city limits lie within three (3): the Upper Subwatershed, the Middle 1 Subwatershed, and the Middle 3 Subwatershed.

4.2 Stormwater Conveyance System

4.2.1 Open Drains and Water Courses

Open drains are defined by flow through a defined channel with a free water surface. There are approximately 43.8 miles of open drains within the City of Livonia. Natural rivers and streams are included in this category, as are man made open channels.

4.2.2 Enclosed Drains

Enclosed drains are defined by flow through pipes or other enclosed conduits. Flow may have a free water surface or may submerge the enclosed conduit through which it is flowing. There are approximately 324 miles of enclosed drain within the City of Livonia stormwater system.

4.3 Field Survey of Open Drains

As part of the Joint Venture Study, an inventory of the Rouge River tributaries and the open drains was conducted throughout the City of Livonia. An Open Drain Inventory Report was developed based on the findings of the survey of the system. This report is located in Appendix B of this Stormwater Management Plan. The field survey of the tributaries and drains involved eight (8) specific water courses. This section contains a summary of the seven (7) general conditions of the watershed as well as a brief description of each of the eight (8) water courses that were investigated. The Open Drain Inventory Report provides additional detailed information.

4.3.1 General Conditions

Erosion – In general, it was observed during the field survey that many streambanks in the watershed were highly eroded and unstable. Upper bank failure, toe failure, and scour were all observed throughout the open drains. Erosion was most severe in areas of sharp bends, near discharge outfalls, and at the transition from enclosed to open drain. Erosion was particularly severe in areas where the bank soil was found to be very sandy and where the stream cover is made up primarily of lawn or grass. In several locations, failed upper banks had collapsed over outfalls, completely blocking the discharges.

Deposition in the Drain Channel – Significant sedimentation was observed during the field survey, consisting mainly of silt, sand, or cobble. Areas of sediment were found mostly just downstream of areas of erosion, bends in the drain, and drain intersections. In many locations, deposition completely blocked the drain channel. Sediment was also found blocking culverts and filling outfalls.

Discharge Outfalls – Approximately 469 outfalls were documented during the open drain inventory. Information regarding the location of the outfalls was used to update the City's current GIS system. Oil and grease were found on the water surface in several locations adjacent to discharge outfalls. The City is following up on these outfalls under its IDEP. The extent of nonpoint source pollution is not known however, and would require further water quality testing and land use evaluations.

Instream Obstructions – Approximately 350 logjams were found that blocked at least 50% of the channel flow at the logjam location. In many locations, the flow behind these obstructions was completely stagnant and covered with a layer of scum. It was also common to find litter incorporated into or behind these logjams. It is important to note that not all logjams need to be removed since they provide habitat for animals and are a source of bank stabilization. Logjams that cause flooding can be removed or minimized on a case-by-case basis.

Channel Width and Flow Depth – Channel widths throughout the watershed varied from one (1) foot to thirty (30) feet. In many locations, the stream width had been dramatically increased from erosion of the natural channel. Depth of flow in the channels varied from no flow to about three (3) feet of depth.

Stream Cover – Throughout the watershed, stream cover mainly consisted of brush and trees, or grass.

Qualitative Water Quality Characteristics – In many areas, the water was highly turbid, especially downstream of logjams and outfalls. In one (1) area, the turbid water was blue-green in color. Algae growth was found behind many of

the logjams and in other areas where the water was stagnant. Oil was found on the water surfaces, especially downstream of discharge outfalls from parking lots and roadside drainage. Foaming was also observed at discharge outfalls and near logjams and other instream obstructions. Monitoring would be required to determine an accurate water quality baseline.

4.3.2 Bell Branch

The Bell Branch is an 8.2 mile open drainage channel that flows through Sections 13 through 18 and 7, across the entire length of the City of Livonia. The river (or watercourse) enters from Northville Township from under Haggerty Road, between Five Mile and Six Mile Roads. The drain flows east until it exits Livonia under Inkster Road, between Five and Six Mile Roads. Flows from the Denmar Drain, West Bell Creek, Patter Drain, Gates Drain, Barlow Drain, Tarabusi Creek, and North Bell Creek all intersect the Bell Branch.

Bank erosion appeared to be the most severe problem in the Bell Branch, found along the entire length of the channel. Many of the areas of erosion were severe and located close to residential homes. As is to be expected with the large amounts of bank erosion, sedimentation steadily increased along the length of the channel. In addition, logjams, woody debris, litter, and sediment were found blocking the drainage channel in all sections of the drain.

Both width and depth increase steadily as the Bell Branch flows to the east. At the upstream end, the width ranges from 3 to 5 feet, with a depth of 4 to 6 inches. At the downstream end, the channel reached a width of 30 feet, with a depth of over 3 feet. The stream cover is mostly trees, brush and grassy lawn. The drain passes primarily through residential yards and also through Idyl Wyld Golf Course and open areas near the I-275 freeway crossing.

The water quality of the Bell Branch was found to be poor. The flow was highly turbid and light brown in color. Stagnant water and algae were found behind the numerous logjams and instream obstructions. Distinct odors of decay were also noted in these areas. In addition, a very strong sanitary odor near the intersection of the Bell Branch and an open channel from a dog kennel on Greenland Avenue was noted.

4.3.3 West Bell Branch

West Bell Branch is a 4.8 mile open drainage channel that flows through Sections 4, 5, 6, 9, and 16, in the northwest corner of the City of Livonia. The river (or watercourse) enters the City from Farmington Hills under Eight Mile Road, just west of Newburgh Road. The flow travels south and east until it intersects with the Bell Branch, just east of Wayne Road.

Bank erosion is the most severe problem in the West Bell Branch. Erosion along the grass fairways in the Whispering Willows and Fox Creek Golf Courses is extensive, especially downstream of the pond at Whispering Willows. Erosion was also severe downstream of the Denmar Drain intersection, behind the homes on Riverside Drive. As is to be expected with the large amounts of erosion, sedimentation steadily increased along the length of the drain. Woody debris and smaller logjams were common throughout the West Bell Branch.

The width of the West Bell Branch varies from 3 feet to 20 feet, and the depth varies from a few inches to over 3 feet. The stream cover varies along the length of the drain. Through the golf courses, the cover is mostly grass, with some areas of brush and long grass. The remaining portion of drain flows mostly through woods and thick brush, with a few areas of swampy, marsh like areas.

Visual water quality in the West Bell Branch was fair. Oil was found on the water surface in two (2) locations upstream of the pond in Whispering Willows Golf Course. Layers of brown algae have grown on the stagnant water surfaces created by the logjams, woody debris, and litter. One (1) outfall was noted to be in need of repair.

4.3.4 North Bell Creek

North Bell Creek is located in Sections 2, 12 and 13 in the northeast portion of Livonia. Due to development and the installation of storm sewers, the drain is broken into two sections. The first 0.5 mile section enters Livonia from Farmington Hills under Eight Mile Road between Milburn Avenue and Purlingbrook Road, and flows southeast until it intersects with a 72 inch storm sewer north of Bretton Road. This storm sewer then outlets into the Tarabusi Creek. The 1.9 mile section of the Creek begins at a storm sewer outlet at the end of Dardanella Avenue, just east of Middlebelt Road and flows southeast until it intersects the Bell Branch south of Six Mile Road, just west of Inkster Road.

Erosion was found to be a problem at the Purlingbrook Road crossing, as well as behind the homes on Rougeway Drive between Six Mile and Inkster Roads. Despite areas of noted erosion, deposition and sedimentation was minor along the North Bell Creek.

The width of the creek is generally 3 to 4 feet, with the depth ranging from 1 to 6 inches. The channel is narrow and easily blocked by debris. Numerous and extensive logjams were noted within the drainage course. The stream cover is generally brush and trees, however it varies along the length of the drain, ranging from lawn and grass near Purlingbrook Road to a heavily wooded area upstream of the Bell Branch intersection.

Visual water quality in both sections of the North Bell Creek was poor. Oil was found on the water surface downstream of Dardanella Avenue, behind the Woodridge Apartments, and also downstream of the intersection of the creek with an open channel from the apartment complex. Layers of brown algae have grown on the stagnant water surfaces created by woody debris, blocked culverts and litter. In addition, one (1) outfall was noted to have a rusty, orange colored discharge. The City is following up on these areas as part of their IDEP.

4.3.5 Tarabusi Creek

The Tarabusi Creek is a 5.1 mile open drainage channel that flows through Sections 3, 4, 10, 11, 12 and 13. The channel enters the City from Farmington Hills under Eight Mile Road just east of Gill Road, and flows southeast until it intersects with the Bell Branch, east of Middlebelt Road.

Erosion is the most severe problem in the Tarabusi Creek, and was noted throughout the length of the drainage course. The most severe problem was noted near Eight Mile and Gill Roads, along Polyanna Drive. In this area, several failed retaining walls and attempts of bank stabilization were observed. As a result of the erosion, significant deposition was noted along the channel, consisting mostly of sand and cobble. In addition to the erosion, several instream obstructions were noted throughout the creek, and several discharge outfalls along the drain were in need of repair.

The width of the Tarabusi Creek ranges from 10 feet to 20 feet, and the depth varies from 3 inches to over 2 feet. The creek generally flows through wooded areas and approaches residential yards in the northern sections of the drain, south of Eight Mile Road. Visual water quality in the Tarabusi Creek was poor. The flow was turbid and stagnant in many areas due to instream obstructions. Algae was noted on the water surface in the vicinity of these blockages, and foam was noted at the discharge points of several outfalls.

4.3.6 Denmar Drain

The Denmar Drain is located in Sections 5 through 8 and 17 in the northwest portion of the City. The drain consists of 3 branches. The main branch is a concrete lined channel with an 18 inch underchannel. The drain begins at the outlet of a 60 inch storm sewer between Comstock Avenue and Levan Road, north of Jay Avenue, and continues south until it reaches Idyl Wyld Golf Course. The Denmar Drain also has two branches to the north and west. The north branch carries flow from Sections 5 and 6 from north on Victor Parkway, and from subdivisions east of Newburgh Road. The west branch carries flow from Northville Township through Sections 6 and 7.

Several areas of severe erosion and deposition were found along the west branch, while little or no erosion and deposition were noted along the main and

north branches. Instream obstructions were minor along the main and west branches of the Denmar Drain, however the open drain of the north branch was found to be completely blocked by erosion and sedimentation from construction activity east of Victor Parkway. Other blockages were noted north of Six Mile Road where construction debris was found in the channel.

The width of the concrete channel of the main branch ranges from 5 feet at the upstream end to 18 feet at the downstream end. The northern branch is comprised by an open drain, 30 inch storm sewer, and small, narrow, or undefined channel. The width of the western branch varies from 1 to 10 feet wide, with channel depths ranging from 4 inches to 4 feet. At Seven Mile and Newburgh Roads, and again at Victor Parkway and Seven Mile Road, the drain channels transition into ponds and marshy areas and then back into a channel further downstream.

The stream cover of the main branch is generally grass or lawn, while the north branch greatly varies from thick woods and brush to lawn and grass. The cover of the west branch is also variable, ranging from bare soil at a construction site to thick woods and brush near residential homes. No flow was noted in the main branch, and visual water quality in the north branch was good. The general water quality of the west branch however was poor. Several areas of stagnant water was note on which algae was found on the water surface.

4.3.7 Beitz Drain

The Beitz Drain is a 0.7 mile open drainage channel in Sections 4 and 5 of the City of Livonia. The drain enters the City from Farmington Hills under Eight Mile Road, west of Ellen Drive. The drain empties into a pond in the Glen Eden Cemetery, just south of Eight Mile Road, and then flows southeast towards Wayne Road. The open channel was abandoned as the drain enters the storm sewer in front of the homes on Wayne Road. Another portion of the open drain exists along the southern border of the cemetery, which flows east until it joins the above mentioned storm sewer network near the end of Bretton Drive. This storm sewer network eventually outlets into the Barlow Drain.

Erosion was noted in the area just upstream of the enclosure near the end of Bretton Drive. Deposition was moderate, with sediment of sand and cobble found downstream of where the drain enters the woods after crossing the cemetery. Several instream obstructions were noted along the drainage course, consisting of woody debris, leaves, and logjams. In addition, several discharge outfalls were noted to be in need of repair.

The width and depth of the drain varies greatly along its length from 6 to 8 feet wide and 6 to 8 inches deep at the cemetery to 10 to 15 feet wide and 1 to 4 feet of depth behind the homes of Pembroke Drive. The banks of the portion of the drain that flow through the cemetery are surrounded by grass and manicured

lawn. The remainder of the channel flows through areas of woods and thick brush. The abandoned portion of the drain downstream of the cemetery is overgrown and the channel is lined with leaves and fallen trees.

Flow through the Beitz Drain was found to be turbid with algae located on the water surface in the abandoned section of the drain. The odor of decay was strong near the downstream intersection of the abandoned drain and the drain behind the homes on Pembroke Drive. Foam was common near the numerous instream obstructions.

4.3.8 Upper Rouge River

The Upper Rouge River is a 1.9 mile drainage channel (or watercourse) located in Sections 1 and 12 in the northeast corner of the City. The drainage channel (or watercourse) enters Livonia from Farmington Hills under Eight Mile Road east of Middlebelt Road, and flows in a southeasterly direction. The drainage channel (or watercourse) enters Redford Township as it crosses Inkster Road, south of Seven Mile Road.

Erosion is generally minimal in the Upper Rouge with a few isolated exceptions along Angling Road between Pembroke and Vassar Avenues, and also between Fargo and Norfolk Avenues, near the intersection of Bridge Avenue and Antago Boulevard, and near the intersection of Margareta Street and Inkster Road. Sedimentation was generally minor along the drain, however a large area of deposition was noted downstream of the Eight Mile crossing. Several areas of significant instream obstructions were noted, consisting of logjams, woody debris, sediment, and litter. In addition, several discharge outfalls were damaged along the drainage course.

Channel width and flow depth vary along the Upper Rouge River, ranging from 15 feet wide and 18 inches of depth, to approximately 30 feet wide with 2 feet of flow depth. In general, the stream cover of this portion of the Rouge is long, thick grass with large trees and some brush. Visual water quality in the Upper Rouge was generally good. Turbidity increased gradually as the flow progressed downstream.

4.3.9 Middle Rouge River

The Middle Rouge River is a 3.6 mile drainage channel (or watercourse) that flows through Sections 31 through 33 in the southwest corner of the City of Livonia. The drainage channel (or watercourse) begins flowing through Livonia at the downstream overflow from Newburgh Lake, and flows southeast. Downstream of Stark Road, there is a parallel channel that also transports flow. The two channels meet at the upstream end of Nankin Lake.

Erosion is the most common problem along this portion of the Middle Rouge, with the most severe locations located between Ann Arbor Road and Grandon Avenue. Deposition did not appear to be severe, however sedimentation was noted downstream of the areas of erosion. Several discharge outfalls along the drain were found to be damaged and in need of repair.

The width of the Middle Rouge varies from 25 feet to almost 40 feet, and the depth varies from a dry riverbed to over 4 feet. The stream cover is generally trees and grass, with the channel flowing close to paved and dirt roadways in several locations within Hines Park.

The water in the river was highly turbid. In most locations, the bottom of the channel could not be seen, due to the high turbidity. No algae, foam, or discolored water was found, and no odors were detected along the length of the channel.

4.4 Open Drains – Investigated Areas

During the course of the field investigation, several problem areas were noted. This section lists and prioritizes areas in need of maintenance or repair in the five (5) categories in which observations were made as part of the open drain inventory. Nine problem areas were cited at the beginning of this project and are listed below and can be referenced in more detail in the Current Stormwater Situation Report found in Appendix A.

4.4.1 Nine Known Problem Areas

1. Bretton East of Newburgh Road (Section 5)
   Stormwater overflows the 30" storm drain inlet structure from the Whispering Willows Golf Course to the Willow Woods subdivision and floods the rear yards of the homes along Bretton Drive. In addition, the streets near the Bretton Drive and Sussex Ave. intersection also flood.

2. Fitzgerald Avenue north of 7 Mile Road (Section 5)
   There have been numerous homeowner complaints of flooding and erosion in the area. In the vicinity where the drain heads east between two residences (19263 Fitzgerald), severe flooding and erosion resulted with the City adding a 44" x 72" elliptical corrugated metal pipe (cmp) culvert in the fall of 1998. Flooding in the area was reported to be within a few feet of the homes on either side of the drain.

3. 7 Mile/Wayne Road Area near Bicentennial Park (Section 4/9)
   The creek overtops its banks both upstream and downstream of Seven Mile Road even in small storm events. Sheet flow was occurring across Seven Mile Road upstream of the culvert at Bicentennial Drive and flows down Bicentennial Drive onto Seven Mile Road. The stream was not overtopping Seven Mile Road at the culvert during these storms.

4. 5 Mile/Levan Road area (Rennolds' Ravine; Section 20)
   There are extensive bank failures along Rennolds' Ravine. Bank erosion is encroaching on the residents' back yards and it was observed that some property owners are attempting to stabilize their banks with vegetation, stakes and geotextile to preserve what remaining yards they have. As the drain winds west and south, field observations noted a fairly significant debris jam and severe right bank erosion at the 90 degree bend in the drain. At this point, the drain has very steep banks, nearly vertical, and there is severe upper bank failure and toe erosion.

5. 5 Mile/Gary Lane and Riverside (Section 16)
   Streambank erosion occurs along stream adjacent to Riverside (both sides of stream)

6. West of Gill Road (Section 4)
   The storm sewer is surcharging at Bretton and Fairfax. The inlet from the open watercourse to the enclosed drain at Pembroke near Ellen was improved a few years ago and based on field observations, the inlet has not deteriorated since construction.

7. Tarabusi Creek east of Merriman Road (Section 11)
   This portion of Tarabusi Creek has problems with bank erosion, log jams and excessive flow.

8. Woodside/Westbrooke near 6 Mile and Levan (Section 8)
   There have been numerous homeowner complaints of flooding in the area, including a lawsuit. A computer model using the XP-SWMM software package was developed to analyze the area. It is recommended that a new relief system be constructed to alleviate the flooding in the area.

9. Munger court west of Levan (Section 17)
   Two residences located on Munger Court have a previous history of flooded basements during wet weather events. Investigations have shown that the problem is actually a sanitary sewer issue. Stormwater entering the sanitary sewer system has caused the basement backups reported by the residents. The problem has been somewhat alleviated since the sanitary sewer rehabilitation and relief program was conducted several years ago.

4.4.2. Outfalls

While performing the open drain inventory, 469 outfalls were documented, considerably more than previously documented. About 150 or more of these outfalls were 12 inches in diameter or greater. It is recommended that these outfalls be documented and included in the current City of Livonia outfall inventory. The sources of these outfalls should also be identified and their areas should be included in the appropriate drainage districts.

In addition to the outfalls not previously identified, Table 4.4.2 shows the outfalls that were noted during the field investigation to be in need of repair.

Table 4.4.2: Outfalls in Need of Repair

Outfall Description	Outfall Size and Material	Comment
Bell Branch		
Outfall from Fairway Drive	12" Concrete	Collapsed outfall.
Natural channel from kennel on Greenland Ave	Natural Channel	Strong sanitary odor from steadily flowing channel during dry weather.
West Bell Creek		
Outfall from Pro Golf parking lot	12" Concrete	Wingwall is broken and is blocking flow.
North Bell Creek		
Outfall from yard lot of business along Eight Mile	4" Metal	Discharge is bright orange, rusty color.
Outfall from Woodridge Apartments	54" Concrete	Outfall is blocked with litter behind bar screen.
Tarabusi Creek		
Outfall from apartment complex on south side of Eight Mile Road	18" Concrete	Outfall is broken.
Road drainage from south along Farmington Road (west side)	12" Concrete	Broken outfall.
Outfall from St Mary's Cultural Center parking lot	Concrete	Broken outfall.
Outfall from Ravine Drive	12" Concrete	Broken outfall.
Outfall from south along Middlebelt (west side)	12" Concrete	Broken outfall.
Outfall from south along Middlebelt (west side)	18" Concrete	Broken outfall.
Outfall from east along Six Mile Road	12" Concrete	Broken outfall.
Denmar Drain		
Outfall from new construction north of Rio Bravo	36" Concrete	Broken outfall.
Upper Rouge River		
Outfall from medical building parking lot	CMP	Broken outfall.
Outfall behind homes on Angling Avenue at Fargo	48" Concrete	Outfall has collapsed.
Outfall from St. Francis Avenue and Bridge Avenue	30" Concrete	Outfall is completely submerged and is adjacent to large pieces of broken pipe.
Middle Rouge River		
Road drainage from north along Ann Arbor Road	12" Clay	Broken outfall.
Outfall west of Wayne Road	36" Concrete	Broken outfall.
Outfall from Stark Road	8" Plastic	Broken outfall.

4.4.3 Logjams

Many instream obstructions were found blocking the drainage channels throughout the City of Livonia. About 300 obstructions were found blocking more than 75% of the channel at the logjam location. Most of these obstructions were created by logjams and woody debris. The Open Drain Inventory Report located in Appendix B indicates the number of instream obstructions in each of the eight (8) studied drains, categorized according to level of severity. The following areas however are the most critical logjam locations (potential for property damage) observed during the field inventory of the City:

1. Bell Branch
   - Just south of drain intersection at Alpine and Riverside Drives
   - End of Greenland Court
   - East of Merriman Road
   - East of Middlebelt Road
   - South of Grove and west of Savoie
   - Terrence Avenue west of Tarabusi Creek
   - Terrence Avenue east of Tarabusi Creek

2. West Bell Creek
   No logjams causing significant damage to the drain channel or residential property were noted.

3. North Bell Creek
   - West of Inkster Road

4. Tarabusi Creek
   - End of Myron Drive
   - South of Seven Mile Road
   - Yorkshire Drive and Hillbrook Avenue
   - West of Merriman Road
   - Northeast corner of Middlebelt Road and Six Mile Road
   - South of Six Mile Road
   - Stanmoor Drive and Harrison

5. Denmar Creek
   No logjams causing significant damage to the drain channel or residential property were noted.

6. Beitz Creek
   No logjams causing significant damage to the drain channel or residential property were noted.

7. Upper Rouge River
   - Intersection of open drain behind Brentwood Avenue and the enclosed drain from Angling Road
   - Angling Road between Norfolk and Long Avenues
   - Angling Road just south of Norfolk Avenue
   - Angling Road and Pembroke Avenue
   - Angling Road south of Vassar Avenue
   - West of the intersection of St Francis and Bridge Avenue

8. Middle Rouge River
   - No logjams causing significant damage to the drain channel or residential property were noted.

4.4.4 Erosion – Critical Areas

Erosion was found to be a severe problem throughout the City of Livonia's open drainage system. The areas of erosion that require attention are too numerous to be entirely listed, however the following areas are the 11 most severe erosion locations observed during the field inventory. Additional detail may be found in the complete Open Drain Inventory Report, located in Appendix B.

1. Five Mile Road and Levan Road – Extensive bank failures along the Bell Branch through Rennolds' Ravine Subdivision.

2. Tarabusi Creek South of Eight Mile Road – Erosion severe between Eight Mile and Seven Mile Roads due to sandy, unstable banks. The channel is very close to residential homes in this area.

3. Victor Parkway – Severe erosion noted along Denmar Drain in the vicinity of recent construction along Victor Parkway, and downstream of I-275 crossing. All of the erosion problems along Victor Parkway between the Rio Bravo and 3M buildings have been corrected by the owner with the use of riprap, gabions, and erosion control mats.

4. Eight Mile Road and Newburgh Road, and Middle Rouge River – The channel of the West Bell Creek runs parallel to Eight Mile Road as it approaches Newburgh Road. At the time of inspection, erosion along this channel was very close to the edge if pavement, which could lead to future problems. This condition was also noted along the Middle Rouge River between Levan Road and Ann Arbor Road, where the erosion has brought flow within2 feet of the Hines Park bike path.

5. Myrna Avenue and Hubbard – Sheet erosion of the banks of the Bell Branch is very close to residential homes in this area. Many failed retaining walls and bank stabilization efforts were noted.

6. Idyl Wyld Golf Course – Both the Bell Branch and Denmar Drain exhibited severe upper bank failures. It appears that the grass-covered banks are not stable enough to withstand the high velocities seen during wet weather. Currently, the Idyl Wyld Regional Detention Facility study is being performed to address these issues.

7. I-275 and Hix Road – The area downstream of the Bell Branch crossing of I-275 exhibits severe upper bank failures, sheet erosion, and a high flow rate. It appears that the 36 inch outfall just upstream of the crossing is contributing flow resulting in the erosion problems. This outfall was not shown on the current GIS layer and therefore further investigation to identify contributing sources is recommended.

8. Tarabusi Creek and North Bell Branch Intersection – Sheet erosion is severe near the intersection of the Tarabusi Creek and the North Bell Branch, which is not easily seen by residents due to its location. Erosion was also noted along the Bell Branch downstream of the Tarabusi Creek intersection. Sheet erosion was found very close to residential property in this area.

9. Six Mile and Francavilla Drive – Erosion along the open drain in this area has exposed an abandoned landfill. Litter was found falling from the banks and into the open drain. This site is currently listed on the MDEQ's list of contaminated sites.

10. Gary Lane and Riverside Drive – Drain banks downstream of the intersection of the Denmar Drain, West Bell Creek and Bell Branch are severely eroded. This section of drain is very close to residential homes and yards.

11. Bell Creek Court – Drain banks along the north side of the Bell Creek are severely eroded in this vicinity. The drain banks are very steep (15+ feet) and nearly vertical. This section of the drain is very close to residential homes and yards and appears that additional undercutting of the drain may lead to property damage.

4.4.5 Water Quality

Color, odor, turbidity, and the presence of oil or foam were all observed to determine the qualitative water quality of the open drainage system of the City of Livonia. Table 4.4.5 shows the areas that require further investigation to determine if an illicit discharge is contributing to the problem.

Table 4.4.5: Areas Requiring Further Investigation

Drain	Location	Description
Tarabusi Creek	North of intersection of Stanford and Fonville Drive	Foam on the water surface
Tarabusi Creek	North of Seven Mile Road	Rusty orange flow
Tarabusi Creek	South of Six Mile Road	Brown foam from Fulton Pines Court outfall
West Bell Creek	Whispering Willows Golf Course	Oil on water surface
West Bell Creek	Whispering Willows Golf Course	Rusty orange flow
West Bell Creek	South of end of Curtis Road	Scum on water surface
North Bell Creek	South of Eight Mile Road	Rusty orange flow from outfall
North Bell Creek	South of Eight Mile Road and north of Purlingbrook	Scum on water surface
North Bell Creek	South of Dardanella Avenue	Oil on water surface
North Bell Creek	Woodridge Apartments	Oil on water surface
North Bell Creek	Downstream of Woodridge Apartments adjacent to cemetary	Oil on water surface
North Bell Creek	Lathers Drive north of Six Mile Road	Scum on water surface
North Bell Creek	Rougeway Drive west of Inskter Road	Scum on water surface
North Bell Creek	Just west of Inkster Road	Sanitary odor
Upper Rouge River	Angling Road between Long and Norfolk Avenues	Blue-green flow from an unidentified outfall
Upper Rouge River	West of the intersection of St. Francis and Bridge Avenue	Oil on water surface
Beitz Drain	Drain intersection west of Pembroke Avenue	Odor of decay
Denmar Drain	East of Victor Parkway and north of Seven Mile Road	Scum on water surface
Denmar Drain	East of Newburgh Road	Algae near outfall from Dardanella Avenue
Bell Branch	Parkhurst Avenue and Stonehouse Circle	Scum on water surface
Bell Branch	Myrna Avenue east of Hubbard Road	Oil on water surface
Bell Branch	Greenland Avenue west of Middlebelt Road	Sanitary odor

5.0 RECOMMENDED STORMWATER MANAGEMENT IMPROVEMENTS

Included in this section of the SMP, are the recommended stormwater management improvements for the City of Livonia. This past decade has seen the definition of stormwater management expand. Stormwater management includes a variety of components including construction activities for the safe conveyance and adequate treatment of stormwater, operation and maintenance of those facilities, planning and design, ordinances, removal of illicit connections and public education. Due to the varied nature of stormwater activities, the recommendations in this report are subdivided into two groups, physical improvements and policy amendments.

5.1 Physical Improvements

Physical improvements include those items that can be seen or touched. Elements of physical improvements include the planning, design, construction or repair of a stormwater conveyance or treatment facility. Physical improvements also include repair of broken outfalls and removal of "critical" logjams. Below is a summary of the physical improvements considered in this report:

- Regional Stormwater Storage Basins
- Stormwater Best Management Practices
- Nine Known Problem Areas
- Stream Bank Stabilization
- Storm Sewer System
- Outfalls
- Logjams

5.1.1 Regional Stormwater Storage Basins

The need for regional stormwater storage basins is very apparent. **The open drain inventory, described in Section 4 and detailed in Appendix B, showed erosion in approximately 50% of the drains with some of the erosion resulting in complete bank failure.** The basins provide stormwater storage, thereby, helping to reduce peak storm discharges and minimize erosion. Also, they can provide needed stormwater treatment, which has great positive impacts further downstream.

The City has received Rouge River National Wet Weather Demonstration grant funding to design and construct a regional stormwater facility along the Bell Branch at the City-owned Idyl Wyld golf course. The retention facility is being designed to attenuate peak flows, thereby reducing erosion and sedimentation downstream. The project will be used as a model for additional storage basins in the City.

Twenty-four locations were field investigated for determining the suitability of constructing regional stormwater storage basins. The areas considered include both City owned parcels and privately owned open areas. In general, the joint venture looked at the potential for off-line basins. However, in some locations in-stream detention was the most feasible.

For each basin location that is considered cost-effective, a preliminary estimate of potential storage and anticipated cost is provided. However, further field investigation and topographic information is required to obtain an accurate storage estimate as well as cost. In addition, to accurately assess the basin's benefits, a detailed study identifying the limits of the watershed and anticipated peak storm flows including those from adjacent communities would need to be conducted. A summary of the basin locations considered is provided below along with a brief description (see Map 5.1.1).

Many of the basin locations considered will address one or more of the nine known problem areas (described in Section 4.4.1.) The following summary of basin locations identifies which problem area(s) will be addressed. Section 5.1.3 also highlights the problem areas and identifies which basins address those areas.

Bell Branch

Basin Location 1: I-275 North of 5 Mile

Basin location 1 is proposed to be located east of I-275 and north of 5 Mile Road along the Bell Branch. The area considered was wooded and high in elevation. Similar to basin location 11, construction of a basin at this location would require removal of trees and significant excavation. Therefore, constructing a basin at this location is not recommended.

Basin Location 2: St. Mary's Hospital

Basin location 2 is proposed to be located east of Newburgh Road and south of 5 Mile at St. Mary's Hospital along the Bell Branch. There appears to be plenty of room along the drain for the construction of a stormwater storage basin. The basin could be designed as an amenity to the hospital while still allowing for hospital expansion or other development. Two locations were considered viable for the construction of the storage basins. The first location is an existing open space area east of Newburgh Road and west of the drain. The second location is south of 5 Mile and north of the drain. Below is the criteria used to perform a preliminary estimate of the potential storage that could be achieved at this location:

Basin A: East of Newburgh, west of Bell Branch

- Basin depth = 5 feet
- Basin surface area = 150,000 ft^2 (500 ft x 300 ft)
- Basin side slopes = 1 vertical to 6 horizontal

- Potential Basin Storage Volume = 475,000 ft^3

Basin B: South of 5 Mile, north of Bell Branch

- Basin depth = 5 feet
- Basin surface area = 150,000 ft^2 (750 ft x 200 ft)
- Basin side slopes = 1 vertical to 6 horizontal

- Potential Basin Storage Volume = 475,000 ft^3

Total Storage for Basin location 2 = 950,000 ft^3

Basin 2 would be located on the Bell Branch. **Since the field investigation showed severe erosion (including problem areas 4 & 5) downstream of this potential basin site, it appears that constructing a basin in this vicinity would have significant benefits.**

Basin Location 3: Parkview Cemetery

Basin location 3 is proposed to be located west of Farmington Road and south of 5 Mile Road at the Parkview Cemetery along a tributary to the Bell Branch. At this location there is an existing pond, but it doesn't appear to have any storage potential. Therefore, constructing a basin or enlarging this existing pond is not recommended.

Basin Location 4: Stevenson High School and Marshall Elementary School

Basin location 4 is proposed to be located west of Farmington Road and north of 6 Mile in the vicinity of Stevenson High School and Marshall Elementary School along a tributary to the Bell Branch. There appears to be area available for an off-line storage basin, however; the area is high and a significant amount of earthwork would be necessary. Below is the criteria used to perform a preliminary estimate of the potential storage that could be achieved at this location:

- Basin depth = 1 ft
- Basin surface area = 36,000 ft^2 (360 ft long x 100 ft wide)

- Potential Basin Storage Volume = 36,000 ft^3

Basin 4 would be located on a tributary of the Bell Branch. Since the field investigation showed erosion further downstream on the Bell Branch, it appears that constructing a basin in this vicinity would have benefits.

Basin Location 5: Merriman Road between 5 and 6 Mile Roads

Basin location 5 is proposed to be located west of Merriman Road between 5 and 6 Mile Roads along the Bell Branch. There appears to be potential for storage on both sides of Merriman Road. Below is the criteria used to perform a preliminary estimate of the potential storage that could be achieved at this location:

- Basin depth = 1.5 ft
- Basin surface area = 10,000 ft^2 (200 ft long x 50 ft wide)

- Potential Basin Storage Volume = 15,000 ft^3

Basin 5 would be located on the Bell Branch. Since the field investigation showed erosion throughout Bell Branch, it appears that constructing a basin in this vicinity would have benefits.

Denmar Drain

Basin Location 6: Victor Parkway Basin

The Victor Parkway Basin is an existing stormwater storage basin located in the commercial/office development north of Seven Mile Road and east of I-275 along the Denmar Drain. Victor Parkway is the main access road into this development. The storage provided by this basin could be increased by removing some accumulated sediment and raising the weir elevation. Below is a preliminary estimate of the additional storage that could be achieved at this location:

- Existing basin volume: 526,500 ft^3
- Additional volume by raising weir by 0.5ft & removing sediment: 75,000 ft^3

This basin is located in the upper portion of the Denmar Drain watershed. The main branch of the Denmar Drain is concrete lined which has significantly protected the drain's banks. However, extensive erosion begins at the Idyl Wyld Golf Course and continues downstream. **It appears that enlarging this basin may have some benefits in reducing peak flows, thereby minimizing erosion downstream.** Additional storage at this location may also allow for some of the concrete channel lining to be removed in the future.

Basin Location 7: East of Victor Parkway

The second location evaluated for the construction of a regional stormwater storage basin is a little further downstream from basin location 6. This potential basin site is north of Seven Mile and east of Victor Parkway along the Denmar Drain. There appears to be room on the north side of this parcel for the construction of a storage basin. Below is the criteria used to perform a preliminary estimate of the potential storage that could be achieved at this location:

- Basin depth = 6 ft
- Basin surface area = 180,000 ft^2

- Potential Basin Storage Volume = 1,080,000 ft^3

Similar to Basin 6, this basin is located in the upper portion of the Denmar Drain watershed. **It appears that constructing a basin in this vicinity may have some benefits in reducing peak flows, thereby minimizing erosion downstream.** Additional storage at this location may also allow for some of the concrete channel lining to be removed in the future.

Basin Location 8: Greenmead Historical Park

The fourth location evaluated for the construction of a regional storage basin is slightly upstream of Basin Location 9 at the Greenmead Historical Park (west of Newburgh Road and north of Pembroke Drive adjacent to the Post Office) in Problem Area 1 and along the Denmar Drain. Although there appeared to be room to construct a basin, the site is too far upstream to help the flooding problem at Bretton Road (Problem Area 1). The flooding seems to be caused from the runoff from Newburgh Road, therefore, construction of a basin west of Newburgh Road is not recommended.

Basin Location 9: Whispering Willows Golf Course near Bretton Avenue

The third location evaluated for the construction of a regional stormwater storage basin is east of Newburgh Road and north of Bretton Avenue in Problem Area 1 along the Denmar Drain in the Whispering Willows Golf Course. It appears that a sufficient amount of storage could be achieved in this location that would theoretically remove the current flooding that is occurring at Bretton Avenue (Problem Area 1) without interfering with the play of the golf course. It was estimated that 1.9 acre-feet of storage is needed to limit run-off from the tributary area and prevent the flooding problem at Bretton Avenue. Review of contour maps and golf course layout indicated that this volume of storage could be obtained at the golf course near Bretton without significantly impacting play.

- Basin depth = 1.9 ft
- Basin surface area = 43,560 ft^2

- Potential Basin Storage Volume = 80,000 ft^3

Additional storage in this vicinity may be possible if the layout of the golf course was altered slightly. However, additional study and discussions with the City would be required to calculate the additional storage.

Basin Location 9 is proposed to be located in the upper portion of the Denmar Drain watershed along the north branch of the Denmar Drain. **It appears that constructing a basin in this vicinity may have significant benefits in reducing peak flows and resolving the flooding in Problem Area 1 (Bretton Avenue).** Additional storage at this location may also allow for some of the concrete channel lining in the Denmar Drain to be removed in the future.

Basin Location 10: St. Martins Avenue

Basin Location 10 is an existing detention basin, located east of Newburgh Road and north of 7 Mile Road that was used during the construction of this site development. A standpipe outlet structure was originally used to temporarily control outlet flow so that the basin would act as a sedimentation basin during construction. This standpipe has since been removed. Currently, the basin has a 21" outlet and provides some detention. There may be some potential for further restricting the outlet thus providing for additional detention. However, detailed grades must be obtained to verify how high the water can be raised without causing property damage or exceeding the limits of the stormwater easement. This basin is located in Problem Area 2 along the Denmar Drain. Below is the storage volume available according to the site plan:

- 100-year storm storage volume = 197,500 ft^3
- 10-year storm storage volume = 100,900 ft^3

Similar to Basins 8 and 9, this basin is located in the upper portion of the Denmar Drain watershed along the north branch of the Denmar Drain. It appears that rehabilitating this existing basin may help in reducing peak flows, and thereby, minimizing erosion downstream. Storage at this location may also allow for some of the concrete channel lining the main portion of the Denmar Drain to be removed in the future.

Basin Location 11: West of Levan Road and North of Curtis Road

Basin Location 11 is proposed to be located west of Levan Road and north of Curtis Road along the Denmar Drain. This area is wooded and at a high elevation. Construction of a basin at this location would require removal of the trees and significant excavation. Therefore, constructing a basin at this location is not recommended.

Basin Location 12: Holmes Middle School/Fairway Farms

Basin Location 12 is proposed to be located north of 5 Mile between Newburgh and Levan Roads along the Denmar Drain. At this location, there are existing playing fields for the schools and there doesn't appear to be any room to construct a storage basin. Therefore, constructing a basin at this location is not recommended.

West Bell Branch

Basin Location 13: Whispering Willows along West Bell Branch

Basin Location 13 is proposed to be located east of Newburgh Road and south of 8 Mile at the Whispering Willows Golf Course along the West Bell Branch in Problem Area 3. This area appears to be ideal to create a storage facility that incorporates wetland plantings as an amenity to the golf course. Below is the criteria used to perform a preliminary estimate of the potential storage that could be achieved at this location:

- Basin depth = 1 ft
- Basin surface area = 150,000 ft^2

- Potential Basin Storage Volume = 150,000 ft^3

Basin 13 would be located on the upper portion of the West Bell Branch. **Since the field investigation showed severe erosion downstream of this potential basin site, it appears that constructing a basin in this vicinity would have significant benefits.**

Basin Location 14: Bicentennial Park – Soccer Fields

Basin Location 14 is proposed to be located east of Wayne Road and north of 7 Mile at the Bicentennial Park along the West Bell Branch in Problem Area 3. It is proposed to construct a "linear" pond around the four (4) soccer fields for a total length of 3,300 feet. Below is the criteria used to perform a preliminary estimate of the potential storage that could be achieved at this location:

- Basin side slopes = 1 vertical to 6 horizontal (minimum)
- Basin length = 3,300 ft
- Basin depth = 1 ft
- Basin bottom width = 2 ft
- Basin surface width = 18 ft

- Potential Basin Storage Volume = 30,000 ft^3

In addition, it may be possible to construct a basin incorporating wetland plantings around the fire station for additional stormwater storage. Additional investigation is required to fully evaluate this possibility.

Basin 14 would be located on the West Bell Branch. Since the field investigation showed erosion downstream of this potential basin site, it appears that constructing a basin in this vicinity would have benefits.

Basin Location 15: Curtis Road E. of Wayne

Basin location 15 is proposed to be located south of Curtis Road and east of Wayne Road along the West Bell Branch. At this location, there appears to be the possibility of slowing flow using existing logjams as well as construction of a storage basin. Below is the criteria used to perform a preliminary estimate of the potential storage that could be achieved at this location:

- Basin depth = 1 ft
- Basin surface area = 22,500 ft^2 (750 ft long x 30 ft wide)

- Potential Basin Storage Volume = 22,500 ft^3

Basin 15 would be located on the West Bell Branch. Since the field investigation showed erosion along the West Bell Branch and further downstream on the Bell Branch, it appears that constructing a basin in this vicinity would have benefits.

Basin Location 16: Intersection of West Bell Branch and Bell Branch

Various locations were investigated for Basin 16. The areas considered were along the West Bell Branch east of Munger Drive to the drain's intersection with the Bell Branch and then further downstream along Bell Branch near Burton Lane. This entire area consists of a deep ravine that appears to have storage potential. Below is the criteria used to perform a preliminary estimate of the potential storage that could be achieved at this location:

- Basin depth = 3 ft
- Basin surface area = 100,000 ft^2 (5,000 ft long x 20 ft wide)

- Potential Basin Storage Volume = 300,000 ft^3

Since the field investigation showed erosion throughout this area as well as further downstream on the Bell Branch, it appears that constructing detention capability in this vicinity would have significant benefits.

Beitz Drain

Basin Location 17: Glen Eden Cemetery

Basin Location 17 is an existing pond located on the Glen Eden Cemetery property, west of Wayne Road and south of 8 Mile along the Beitz Drain. This existing pond has potential to increase its current storage by raising the weir elevation at the pond discharge by 1 ft and also by adding a second in-line control structure 350 feet downstream of the pond. Below is a preliminary estimate of the additional storage that could be achieved at this location:

Additional volume by raising weir by 1 ft at the existing pond:	60,000 ft^3
2nd control structure 50 ft wide x 350 ft long x 1 ft depth:	17,500 ft^3
Potential Basin Storage Volume =	77,500 ft^3

Basin 17 would be located along the Beitz Drain in Problem Area 6. Since the field investigation only showed small areas of erosion along this drain and that the open portion is only 0.7 miles long, it appears that creating additional storage at this site may have limited benefits.

Basin Location 18: Pembroke Drive

Basin Location 18 is proposed to be located east of Wayne Road and south of Pembroke Drive along the Beitz Drain in Problem Area 6 near the trails and wildlife sanctuary at the north end of Bicentennial Park. This area is heavily wooded, and since the field investigation only showed small areas of erosion along this drain, it appears that creating storage at this site would have limited benefits. Therefore, constructing a basin at this site is not recommended.

Tarabusi Branch

Basin Location 19: Ardmore Site

Basin Location 19 is proposed to be located east of Farmington Road and north of 7 Mile along the Tarabusi Creek in Problem Area 7. This site has high potential for redevelopment in the future. It was previously recommended to the City that the basin for this development be constructed larger so it could function as a regional storage basin for the City as a whole in addition to only serving stormwater needs of the site. This basin could be constructed as either an in-line or an off-line basin with a triangular cross-section. Below is the criteria used to perform a preliminary estimate of the potential storage that could be achieved at this location:

- Basin side slopes = 1 vertical to 6 horizontal (minimum)
- Basin length = 1,000 ft
- Basin depth = 5 ft
- Basin width = 200 ft

- Potential Basin Storage Volume =500,000 ft^3

Basin 19 would be located on the Tarabusi Creek. **Since the field investigation showed significant erosion downstream of this potential basin site, it appears that constructing a basin in this vicinity would have major benefits.**

Basin Location 20: Nature Preserve Area near Rotary Park

Basin Location 20 is proposed to be located south of 7 Mile and west of Merriman Road in the nature preserve area near Rotary Park along the Tarabusi Creek in Problem Area 7. Although construction of a basin would have substantial benefits to the Tarabusi Creek, this area is heavily wooded making access and construction difficult. It is not cost effective to construct a basin at this location, therefore, constructing a basin at this site is not recommended.

Basin Location 21: Bryant Community School

Basin Location 21 is proposed to be located north of 6 Mile Road and east of Merriman Road at the Coolidge Elementary School along the Tarabusi Creek in Problem Area 7. Although construction of a basin would have substantial benefits to the Tarabusi Creek and the Bell Branch further downstream, it is not feasible to construct a basin at this location due to interference with playing fields. Therefore, constructing a basin at this site is not recommended.

Basin Location 22: Sunset Park

Basin Location 22 is proposed to be located west of Middlebelt Road and north of 6 Mile Road at Sunset Park along the Tarabusi Creek in Problem Area 7. There appears to be potential for construction of some small ponds to be located southwest of Coolidge Elementary, south of Beverly Park, and also on the school property. Below is the criteria used to perform a preliminary estimate of the potential storage that could be achieved at this location:

- Basin depth = 1 ft
- Basin surface area = 10,000 ft^2 (100 ft long x 100 ft wide)

- Potential Basin Storage Volume = 10,000 ft^3

Basin 22 would be located on the Tarabusi Creek. Since the field investigation showed erosion downstream of this potential basin site, it appears that constructing a basin in this vicinity would have benefits.

Basin Location 23: Mt. Hope Cemetery

Basin Location 23 is proposed to be located north of 6 Mile Road and east of Middlebelt Road at the Mt. Hope Cemetery along the Tarabusi Creek in Problem Area 7. Although construction of a basin would have substantial benefits to the Tarabusi Creek and the Bell Branch further downstream, it appears that this site may be reserved for future development as part of the cemetery. A discussion with the property owner and clarification of the parcel boundaries would be necessary prior to serious consideration of locating a basin on this parcel. Therefore, construction of a basin at this location may be possible, but additional follow-up with the landowner is necessary. Therefore, constructing a basin at this site is not recommended.

North Bell Branch

Basin Location 24: Bethel Memorial Cemetery

Basin Location 24 is proposed to be located north of 6 Mile and east of Middlebelt Road just north of the Bethel Memorial Cemetery along the North Bell Branch. When this site was investigated, the drain was dry, and it appears that this location is too far upstream along the drain to provide any significant storage potential. Also, it appears that any storage potential that currently exists is already being utilized with little additional storage possible. Therefore, constructing a basin at this site is not recommended.

Summary of Stormwater Storage Basin Site Evaluations

Table 5.1.1.a summarizes the 24 basin locations that were evaluated. For those areas where a stormwater storage basin is not recommended, the table indicates "no basin". Cost estimates were performed utilizing a "graphical analysis" based on actual costs or detailed design costs for other stormwater storage basins. The basins used in this cost analysis include the following:

- Elmgrove – City of Westland
- Maplehurst – City of Auburn Hills
- Flemings Roseland/Cass – City of Farmington Hills
- Reid and Branch – Orion Township
- Idyl Wyld – City of Livonia
- Vinewood – City of Auburn Hills

Table 5.1.1.a: Stormwater Storage Basin Anticipated Cost

Basin#	Name	Land Ownership	Volume (cft)	Volume (cyd)	Cost Estimate (range)
1	I-275 N. of 5 Mile	Public	no basin	no basin	no basin
2	St. Mary's Hospital	Private	950,000	35,200	$875,000 - $925,000
3	Parkview Cemetery	Private	no basin	no basin	no basin
4	Stevenson High & Marshall Elementary Schools	Public	36,000	1,300	$150,000 - $175,000
5	Merriman Road between 5 & 6 Mile Roads	Public	15,000	600	$125,000 - $150,000
6	Victor Parkway Basin	Private	75,000	2,800	$200,000 - $225,000
7	East of Victor Parkway	Private	1,080,000	40,000	$900,000 - $950,000
8	Greenmead Park	Public	no basin	no basin	no basin
9	Whispering Willows near Bretton	Public	80,000	3,000	$200,000 - $225,000
10	St. Martins Avenue	Private	100,900	3,700	$200,000 - $225,000
11	W. of Levan Road & N. of Curtis Road	Public	no basin	no basin	no basin
12	Holmes Middle School/Fairway Farms	Public	no basin	no basin	no basin
13	Whispering Willows along West Bell Branch	Public	150,000	5,600	$325,000 - $375,000
14	Bicentennial Park - Soccer Fields	Public	337,500	12,500	$650,000 - $700,000
15	Curtis Road E. of Wayne	Public	22,500	800	$125,000 - $150,000
16	Intersection of West Bell Branch & Bell Branch	Public	300,000	11,100	$625,000 - $675,000
17	Glen Eden Cemetery	Private	77,500	2,900	$200,000 - $225,000
18	Pembroke Drive	Public	no basin	no basin	no basin
19	Ardmore Site	Private	500,000	18,500	$700,000 - $750,000
20	Nature Preserve by Rotary Park	Public	no basin	no basin	no basin
21	Bryant Community School	Public	no basin	no basin	no basin
22	Sunset Park	Public	10,000	400	$75,000 - $100,000
23	Mt. Hope Cemetery	Private	no basin	no basin	no basin
24	Bethel Memorial Cemetery	Private	no basin	no basin	no basin
				Total =	$5,350,000 - $5,850,000

* The anticipated cost includes design, construction, contract administration and inspection. It does not include land acquisition, easements or financing.

Figure 5.1.1 shows the cost/volume graph that was used in predicting basin costs. Due to the preliminary nature of these cost estimates, a range has been provided for the anticipated cost.

Figure 5.1.1: Basin Cost Determination

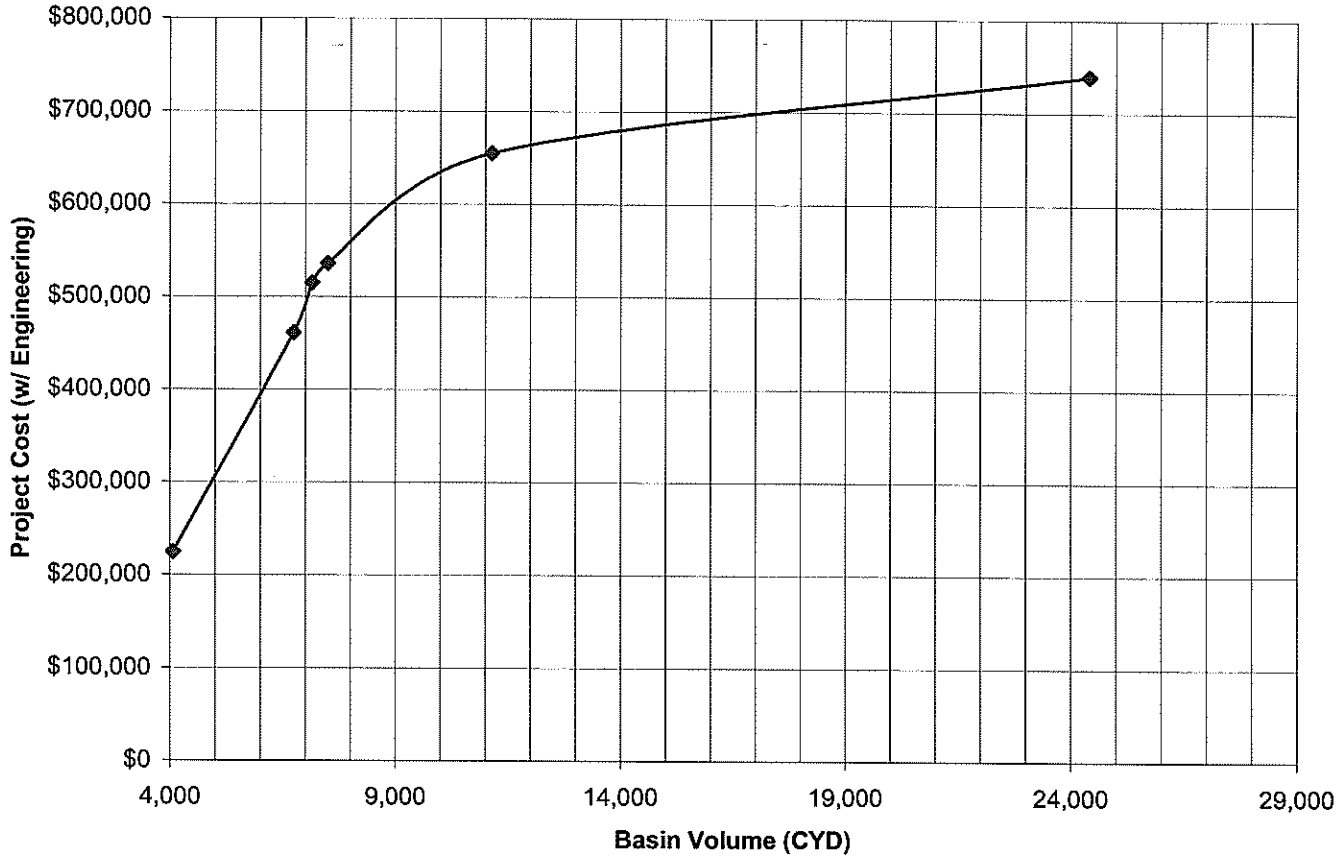


Table 5.1.1.b "scores" the basin locations that are recommended for further study and possible construction of a stormwater facility. Items such as project cost/cf of storage, potential for flow reduction, potential to minimize erosion downstream and site limitations were considered in the scoring. The scoring range is from 1 through 10 with a 1 rating as being excellent and a 10 rating being poor. The total score is the cumulative total from the 4 items considered. A low score indicates that the basin is cost-effective and should provide positive benefits.

Table 5.1.1.b: Recommended Basin Scoring Table

Basin #	Name	Volume (cf)	Project Cost/ cf of Storage	Potential for Flow Reduction	Potential to Minimize Erosion Downstream	*Site Limitations	Total Score
2	**St. Mary's Hospital**	**950,000**	**2**	**2**	**1**	**1**	**6**
4	Stevenson High & Marshall Elementary Schools	36,000	8	8	5	8	29
5	Merriman Road between 5 & 6 Mile Roads	15,000	10	10	6	2	28
6	Victor Parkway Basin	75,000	7	7	5	2	21
7	**East of Victor Parkway**	**1,080,000**	**1**	**1**	**5**	**2**	**9**
9	Whispering Willows near Bretton	80,000	7	5	5	2	19
10	St. Martins Avenue	100,900	6	4	5	3	18
13	**Whispering Willows along West Bell Branch**	**150,000**	**5**	**6**	**3**	**1**	**15**
14	Bicentennial Park-Soccer Fields	30,000	4	9	4	3	20
15	Curtis Road E. of Wayne	22,500	9	9	4	5	27
16	**Intersection of West Bell Branch & Bell Branch**	**300,000**	**4**	**4**	**2**	**4**	**14**
17	Glen Eden Cemetery	77,500	7	7	8	2	24
19	**Ardmore Site**	**500,000**	**3**	**3**	**1**	**1**	**8**
22	Sunset Park	10,000	10	10	3	2	25

Interpretation	Score
Poor	10
Fair	8
Average	5
Good	3
Excellent	1

* Site limitations include: excessive excavation, trees, proximity to buildings, difficulty in construction and/or access.

- **Bold indicates top 5 recommended basin location sites**

As indicated in Table 5.1.1.b, the 5 top recommended basin location sites area: St Mary's Hospital, Ardmore Site, East of Victor Parkway, Whispering Willows Golf Course and Intersection of West Bell Branch and Bell Branch. Table 5.1.1.c summarizes all the recommended basin location sites according to the basin score. Basin location sites are listed in order of recommended priority. For instance, St. Mary's Hospital with the lowest score is the number 1 recommended basin location site.

Table 5.1.1.c: Recommended Basin Location Sites Prioritized by Score

Score	Basin #	Basin Location Site	Estimated Cost
6	2	St. Mary's Hospital	$875,000 - $925,000
8	19	Ardmore Site	$700,000 - $750,000
9	7	East of Victor Parkway	$900,000 - $950,000
14	16	Intersection of West Bell Branch & Bell Branch	$625,000 - $675,000
15	13	Whispering Willows along West Bell Branch	$325,000 - $375,000
18	10	St. Martins Avenue	$200,000 - $225,000
19	9	Whispering Willows near Bretton	$200,000 - $225,000
20	14	Bicentennial Park-Soccer Fields	$650,000 - $700,000
21	6	Victor Parkway Basin	$200,000 - $225,000
24	17	Glen Eden Cemetery	$200,000 - $225,000
25	22	Sunset Park	$75,000 - $100,000
27	15	Curtis Road E. of Wayne	$125,000 - $150,000
28	5	Merriman Road between 5 & 6 Mile Roads	$125,000 - $150,000
29	4	Stevenson High & Marshall Elementary Schools	$150,000 - $175,000

5.1.2 Stormwater Best Management Practices

Stormwater best management practices (BMPs) consist of a practice or combination of practices that provide a means of preventing or reducing pollution generated from non-point sources. [1] (Ref. MDEQ Stormwater Management Guidebook Revised August 1999) BMPs can be divided into four categories: detention, retention, vegetated swales and strips, and other practices to reduce accumulated pollutants picked up by run-off, regulate the amount of impervious areas, and eliminate inappropriate discharges to drains and storm sewers.

Examples of various BMPs are as follows:

- Extended Detention Ponds
- Wet Ponds
- Stormwater Wetlands
- Multiple Pond Systems
- Infiltration Trenches
- Infiltration Basins
- Porous Pavement
- Sand Filters
- Grassed Swales
- Filter Strips
- Water Quality Inlets

(Ref. A Current Assessment of Urban Best Management Practices, March 1992)

The use of these BMPs is extremely dependent on soil type/infiltration rate of soil, the level of the water table at the particular location, amount of sediment at the site, thermal impacts, space constraints, drainage area, and cost. Therefore, a particular BMP should be selected based on the water quality needs as well as cost, drainage area, land use, soil and topography. Combinations of BMPs yield additional water quality benefits as opposed to simply constructing a regional detention basin. Possible examples are as follows:

- Directing runoff from downspouts or parking lots to vegetative swales or grass filter strips instead of discharging directly to a stream
- Instituting a policy of regular stormwater system maintenance
- Instituting and enforcing soil erosion policies
- Public education on the use and disposal of fertilizers, herbicides, and pesticides

(Ref. MDEQ Stormwater Management Guidebook Revised August 1999)
It is recommended that the City utilize BMPs whenever possible. Some of the structural BMPs can be incorporated with site development/redevelopment, or separate stormwater improvement projects. Policy BMPs such as stormwater system maintenance and public education can be incorporated into the City Stormwater Pollution Prevention Initiatives, required under the City's voluntary permit.

5.1.3 Nine Known Problem Areas

The recommendations in this section are specific to address the nine known problem areas that were summarized in Section 4.4.1. Table 5.1.3 summarizes the problem areas along with the proposed recommendations.

Table 5.1.3: Nine Known Problem Areas with Proposed Recommendations

	Problem Area	Proposed Recommendations
1	Bretton East of Newburgh Road	Construction of Basin 9 (Whispering Willows near Bretton Construction of Basin 10 (St. Martins Avenue)
2	Fitzgerald Avenue north of 7 Mile Road	Construction of Basin 10 (St. Martins Avenue)
3	7 Mile/Wayne Road Area near Bicentennial Park	Construction of Basin 13 (Whispering Willows along West Bell Branch) Construction of Basin 14 (Bicentennial Park – Soccer Fields)
4	5 Mile/Levan Road area	Construction of Basin 2 (St. Mary's Hospital) and Rennolds' Ravine Bank Stabilization Project
5	5 Mile/Gary Lane and Riverside	Construction of Basin 2 (St. Mary's Hospital) Construction of Basin 13 (Whispering Willows along West Bell Branch) Construction of Basin 14 (Bicentennial Park – Soccer Fields) Construction of Basin 15 (Curtis Road E. of Wayne) Construction of Basin 16 (Intersection of West Bell Branch & Bell Branch)
6	West of Gill Road	Construction of Basin 17 (Glen Eden Cemetery) Construction of Basin 18 (Pembroke Drive)
7	Tarabusi Creek east of Merriman Road	Construction of Basin 19 (Ardmore Site) Construction of Basin 22 (Sunset Park)
8	Woodside/Westbrooke near 6 Mile and Levan	Construction of Vargo Woodside Relief Storm Sewer
9	Munger court west of Levan	Sanitary Problem (no recommendation)

5.1.4 Stream Bank Stabilization

Activity 1.2 identified and documented erosion throughout the open drainage system in the City. The erosion areas were classified as critical, severe or moderate. Critical erosion areas are considered to need immediate repair due to the potential for property damage. Severe erosion areas are locations where total bank failure has occurred, but potential for property damage is not imminent. Moderate erosion areas are locations that need monitoring and unless flows are reduced will become severe over time.

As discussed in Section 4.4.4, 11 areas were considered to be critical and in need of immediate repair. The City has already corrected one of those areas, Victor Parkway. The remaining 10 critical erosion areas are listed in this section along with their anticipated repair cost.

The anticipated repair cost is based on detailed cost estimates for two previous City streambank stabilization projects: Rennolds' Ravine and Idyl Wyld. The Rennolds' Ravine project consists of constructing a gabion wall with associated excavation and fill for bank stabilization along one side of the drain. The anticipated cost, including design and construction, is $420 per linear foot or $840 per linear foot when both sides of the drain are stabilized. The Idyl Wyld project consists of constructing a combination of gabion wall reinforcement, polyethylene cellular reinforcement, bio-blanket reinforcement along with excavation, fill and vegetation. The anticipated cost including design and construction is $290 per linear foot.

The type of streambank stabilization proposed is unique for each situation. Therefore, the exact stabilization methods selected must be made on a case by case basis as part of a design project. However, preliminary estimates can be provided based on averaging the per foot cost of the two referenced projects, which results in an average cost of $565 per linear foot of drain stabilization (along both sides). This cost was rounded to $600 per linear foot for the preliminary cost estimates. Table 5.1.4.a summarizes the 10 critical erosion areas along with their anticipated repair cost. The critical erosion sites are all considered to need immediate repair and are not ranked in any particular order.

Table 5.1.4.a: Critical Erosion Areas and Preliminary Repair Costs

Area*	Description	Length (ft)	Total Project Cost**
1	5 Mile Rd & Levan Rd	250	$105,000
2	Tarabusi Creek S. of 8 Mile Rd	3,500	$2,100,000
3	8 Mile Rd & Newburgh Rd	250	$150,000
4	Myrna Avenue & Hubbard	1,300	$780,000
5	Idyl Wyld Golf Course	1,100	$320,000
6	1-275 & Hix Rd	1,100	$660,000
7	Tarabusi Creek & North Bell Branch Intersection	650	$390,000
8	6 Mile Rd & Francavilla Drive	100	$60,000
9	Gary Lane & Riverside Drive	1,000	$600,000
10	Bell Creek Court	250	$150,000
	Total	9,500	$5,650,000

* Area 1 is the Rennolds' Ravine cost estimate based on gabion stabilization along 1 side of the drain. Area 5 is the Idyl Wyld cost estimate based on a variety of stabilization techniques. The total project cost of the remaining areas was based on an average of $600 per linear foot (stabilization along both side of the drain).
** The Total Project Cost includes design, construction, contract administration and inspection.

The critical erosion sites listed in Table 5.1.4.a are in need of immediate repair. The cause of the erosion is excessive stormwater flows that are reaching these areas of the open drains. Although the proposed streambank stabilization will protect the banks, reducing the stormwater flows reaching these areas will greatly prolong the life of the stabilization project. Table 5.1.4.b shows the 10 critical erosion sites and the recommended basin that would help reduce the storm flows that are reaching these locations.

Table 5.1.4.b: Critical Erosion Areas and Recommended Basin Location Sites

Area	Description	Basin Number/Name
1	5 Mile Rd & Levan Rd	Basin Number 2 (St. Mary's Hospital)
2	Tarabusi Creek S. of 8 Mile Rd	None * (at City of Farmington Hills & City of Livonia border)
3	8 Mile Rd & Newburgh Rd	None * (at City of Farmington Hills & City of Livonia border)
4	Myrna Avenue & Hubbard	Basin Number 2 (St. Mary's Hospital) Basin Number 4 (Stevenson High & Marshall Elementary Schools) Basin Number 6 (Victor Parkway Basin) Basin Number 7 (East of Victor Parkway) Basin Number 9 (Whispering Willows near Bretton) Basin Number 10 (St. Martins Avenue) Basin Number 13 (Whispering Willows along West Bell Branch) Basin Number 14 (Bicentennial Park – Soccer Fields) Basin Number 15 (Curtis Road E. of Wayne) Basin Number 16 (Intersection of West Bell Branch & Bell Branch) Basin Number 17 (Glen Eden Cemetery)
5	Idyl Wyld Golf Course	Basin Number 6 (Victor Parkway Basin) Basin Number 7 (East of Victor Parkway) Basin Number 9 (Whispering Willows near Bretton) Basin Number 10 (St. Martins Avenue)
6	1-275 & Hix Rd	None * (at Northville Township & City of Livonia border)
7	Tarabusi Creek & North Bell Branch Intersection	Basin Number 19 (Ardmore Site) Basin Number 22 (Sunset Park)
8	6 Mile Rd & Francavilla Drive	Basin Number 4 (Stevenson High & Marshall Elementary Schools)
9	Gary Lane & Riverside Drive	Basin Number 2 (St. Mary's Hospital)
10	Bell Creek Court	Basin Number 2 (St. Mary's Hospital) Basin Number 4 (Stevenson High & Marshall Elementary Schools) Basin Number 6 (Victor Parkway Basin) Basin Number 7 (East of Victor Parkway) Basin Number 9 (Whispering Willows near Bretton) Basin Number 10 (St. Martins Avenue) Basin Number 13 (Whispering Willows along West Bell Branch) Basin Number 14 (Bicentennial Park – Soccer Fields) Basin Number 15 (Curtis Road E. of Wayne) Basin Number 16 (Intersection of West Bell Branch & Bell Branch) Basin Number 17 (Glen Eden Cemetery)

* These locations are located at the City border. Coordination with the neighboring community is needed to address excessive flow concerns and resolve erosion problems.

In addition to the critical erosion sites, the open drain inventory identified additional areas of severe erosion. Map 5.1.4 shows the locations of this severe erosion. The City should review those areas and prioritize repair for any areas noted as severe. In addition, the map indicates areas that were considered as moderate erosion. The City should continue to monitor those areas because over time the erosion will continue to worsen unless storm flows and erosive velocities are reduced. Table 5.1.4.c summarizes the remaining erosion and anticipated repair cost as documented during the open field inventory.

Table 5.1.4.c Additional Streambank Erosion and Anticipated Repair Cost

Erosion Type	Length	Total Project Cost*
Severe Erosion	40,500 feet	$24,300,000
Moderate Erosion	9,000 feet	$2,700,000

* Severe erosion was calculated at $600 per linear foot. Moderate erosion was calculated at $300 per linear foot. The Total Project Cost includes design, construction, contract administration and inspection.

5.1.5 Storm Sewer System

The City of Livonia was primarily developed during a time when it was desired to remove stormwater runoff from the City's streets in the most expedient manner possible. Therefore, much of the City is served by an expansive storm sewer system adequately sized to convey the 10 year – 1 hour storm. This storm sewer system is shown on Map 5.1.5 and is an integral part of the City's Geographic Information System.

Discussions with the City have indicated that the storm sewer system is adequately sized and there are no known areas subject to flooding caused by undersized storm sewers except in Problem Area 1 and Problem Area 8. The flooding that is occurring in Problem Area 1 is proposed to be resolved by constructing a stormwater storage basin – refer to Section 5.1.

At this time, the City has completed the design and is waiting for funding to construct the Vargo Woodside relief storm sewer. This relief sewer will help relieve flooding in Problem Area 8. Recommendations for operation and maintenance of the storm sewer system are discussed in Section 5.2.3.

5.1.6 Outfalls

It is recommended that the City GPS those outfalls that were not GPSed by Camp, Dresser & McKee as part of the City GIS update and tie them in to the existing storm sewer GIS layer as well as the current City of Livonia outfall inventory. A numbering system should be established so no outfalls are repeated. The sources of these outfalls should also be identified and their areas should be included in the appropriate drainage districts.

As part of the City's IDEP program, City personnel inspect all storm outfalls on a 5-year cycle. It is recommended that the City inspect the outfalls for any structural problems in addition to looking for illicit connections. Any new outfalls should also be noted at the time of the IDEP inspections.

The table shown in Section 4.4.2 lists 19 outfalls in need of repair due to structural problems. It is recommended that the City make these repairs as well as keep a current list of any other outfalls in need of repairs that are found during the IDEP inspections.

5.1.7 Logjams

Section 4.4.3 lists the "critical" logjams that were found during the Open Drain Inventory. These logjams are causing significant damage to the drain and/or residential property. It is recommended that the City continue to remove logjams when they pose imminent danger to a resident's property or safety. However, each logjam should be reviewed on a case by case basis to determine if it should be completely removed or minimized. Some logjams have been found to provide habitat for small animals and can be a source of bank stabilization. Therefore, all logjams should not be removed without assessing each one individually.

It is recommended that the City develop a Woody Debris Management Program. Research has shown that there is little direct evidence to support the argument that removing large woody debris from rivers reduces flooding or that it greatly improves the capacity of the river to carry flood flows. It has been found to be ecologically desirable to have a range of flow velocities and water depths within a channel. Therefore a balance needs to be found between the adverse changes in river level caused by the logjam and the ecological benefits of leaving the logjam in place in the river. As an example, one alternative to removing large woody debris is to re-orient the log along the bank to minimize its effect on the river levels.[1] A Woody Debris Management Program would outline these practices and describe the types of logjams, or large woody debris of which the City should be concerned:

[1] Issue Sheet 7 - Managing Snags in Rivers - Guidelines for the Management of Large Woody Debris (Snags) in Rivers, Centre for Environmental and Applied Hydrology at the University of Melbourne, Australia

Currently the MDEQ is preparing guidance to assist Rouge watershed communities with woody debris management. Logjam removal is currently unregulated by the MDEQ. Permits are required from the Land and Water Management Division for the following situations:

- Removing stumps from anchored logs
- Removing logs that are buried in the streambank or stream bed
- Leaving logs in the stream channel for bank stabilization
- Stream bank stabilization is regulated
- Log removal that requires heavy equipment

The MDEQ in conjunction with Friends of the Rouge are developing guidance that should be completed by May 2002 for the Rouge River Rescue Day in June 2002 to assist volunteers with criteria for removing woody debris. In addition, a task force will be created including MDEQ, Wayne County Department of Environment, Friends of the Rouge, and possibly others to develop recommendations for communities and other State agencies, etc. This task force, as well as the written MDEQ guidance, will assist the City of Livonia in developing a program that could be shared between communities to develop a regional approach to managing woody debris in the Rouge River and its branches. Appendix C includes some detailed information on Woody Debris Management Goals & Strategy.

5.2 Policy Amendments

The City's stormwater policies describe their methods, procedures and requirements in dealing with stormwater issues. These existing policies were reviewed during Activity 1.1 and are summarized in Section 3 of this SMP. This section includes the proposed recommendations for enhancing the existing policies. Below is a summary of the policies considered in this report:

- Stormwater Engineering Design Standards
- Stormwater Ordinances
- Stormwater Operation and Maintenance
- Illicit Discharge Elimination Program
- Public Education Plan
- Adjacent Community – Regional Flow Control

5.2.1 Stormwater Engineering Design Standards

The existing City's engineering standards are summarized in Section 3.1 of this report. The current standards only address a couple of areas in stormwater management including sizing of storm sewers and detention basins for large projects. It is recommended that the City expand their current standards to reflect the goals of the Upper and Middle 3 subwatersheds which are summarized below:

Upper Subwatershed Goals

1. Protect public health
   - Meet water quality standards for recreation uses (wading, boating, fishing, swimming)
   - Restore impaired areas
   - Protect areas free of problems
2. Reduce excessive flows
   - Reduce frequency and severity of flood flows
   - Protect natural water storage areas (wetlands and floodplains)
   - Construct new and maintain existing retention facilities
3. Protect and restore river ecosystem
   - Meet water quality standards for fish and wildlife
   - Protect existing habitat
   - Enhance diversity and sustainability
4. Restore and maintain river aesthetics
   - Reduce liter, debris and waste in river
5. Reduce sedimentation
   - Control erosion at construction sites

Middle 3 Subwatershed Goals

1. Improve water quality consistent with the Vision Statement
2. Reduce Public Health Risk
   - Minimize impact of SSOs and CSOs
   - Eliminate Illicit discharges
   - Remove fish advisories
3. Educate public
4. Preserve greenways adjacent to the river
5. Enhance and preserve habitat
6. Implement general stormwater permit
7. Identify and obtain funding for watershed management

An initial first step in achieving these goals is to continue to work with the subwatershed advisory groups and to implement the City's stormwater pollution prevention initiatives through new site developments and redevelopment wherever possible. A second step would be to adopt the Wayne County stormwater ordinance. This ordinance provides for both water quantity and water quality objectives and is in agreement with the subwatershed goals.

Currently, the Michigan Department of Environmental Quality has no stormwater design standards available for municipalities to consider. Much of the standards that exist are in a state of change as the public becomes educated on what is important to regulate. However, it has become apparent that regulation of stormwater quantity alone is insufficient in stormwater management. Improving stormwater quality is also very important in achieving

the subwatershed goals. Stormwater best management practices are design and policy elements that are specifically intended to improve stormwater quality.

It is also recommended that the City continue to work with the school district to educate them on the importance of watershed protection and stormwater management. It is understood that the City has little control over construction that occurs on school property. However, by becoming a stormwater partner with the school district, the stormwater goals for the City will be easier to achieve.

In summary, it is recommended that the City develop a set of engineering standards that address both stormwater quantity and stormwater quality. The standards should be comprehensive enough (such as the Wayne County stormwater ordinance) to ensure that the City's stormwater goals are achieved.

Stormwater Ordinances

It is recommended that the City develop and adopt a comprehensive stormwater ordinance. The ordinance should address both stormwater quantity and stormwater quality. The Wayne County ordinance should be reviewed as a basis for drafting this document. Also, it is recommended that the City contact other Wayne County municipalities that have already developed a comprehensive stormwater ordinance in order to gain ideas and discover their strengths and weaknesses.

Stormwater Operation and Maintenance

Proper maintenance of the stormwater management system is crucial for its success. Recommendation for the following components of the stormwater management system are addressed in this section:

- Open drainage courses
- Enclosed drains (storm sewers)
- Street sweeping and catch basin cleaning

Open Drainage Courses

It is recommended that all new inlet grates be located by GPS and then entered into the City's GIS system. It is understood that all existing inlet grates have already been located by GPS and are part of the GIS system. In addition, the City should inspect all inlet grates on a routine basis, and at an established frequency. An inspection form should be created and a maintenance record kept to record when inlets are inspected and the types of problems encountered. For inlets that continuously become blocked or have similar problems, an investigation as to the cause and corrective action should be taken.

It is also recommended that the condition of the open drain itself be routinely inspected. As part of the City's IDEP program, it is recommended that City staff "walk" the open drains while performing the IDEP program. During this drain evaluation, it is recommended that the City assess and prioritize streambank erosion, perform a woody debris management assessment on the logjams and prioritize the logjams that need to be removed. In addition, the City should note and record any additional outfalls that are found.

Enclosed Drains (Storm Sewers)

The majority of the City is served by enclosed storm sewers. For the stormwater management system to function effectively, this system must be maintained in proper working order. However, routine inspections would be cost prohibitive. Therefore, based on the findings of the study, three recommendations are proposed:

- Storm sewers should be televised for illicit connections if identified by the IDEP program.
- The City's GIS should be upgraded to include all new storm sewer and any replacement storm sewer.
- When a street gets repaved, the storm sewer should be evaluated at that time to determine its structural integrity.

Street Sweeping and Catch Basin Cleaning

The City of Livonia recently completed a Storm Sewer Maintenance Study to evaluate the effectiveness of catch basin cleaning and street sweeping in reducing pollutant loadings to the Rouge River. The study focused on four pilot areas, comprised of one commercial parking area, 2 residential streets areas, and one recreational parking area. Actual street dirt accumulations and their associated pollutant concentrations were monitored. Data from the monitoring was used to calibrate the Simplified Particulate Transport Model (SIMPTM) which was then used to simulate the pollutant loading reductions associated with various street sweeping and catch basin cleaning frequencies.

The following recommendations are based on the findings of the study. More details on the study and its recommendations can be found in the Executive Summary and Section 2 (i.e., Findings, Conclusions and Recommendations) of the Storm Sewer Maintenance Study, contained in Appendix D.

Street Sweeping

The City currently sweeps residential streets approximately 4 times per year, and major public roads approximately 7-8 times per year, using mechanical and regenerative air equipment. The City does not sweep private roads or public or private parking lots.

- It is recommended that the City increase its street sweeping frequency for residential and major streets. The study showed that the optimal cost-effective frequency of street sweeping is 17 times/year for residential streets. While an immediate increase in effort to this level may not be feasible, even an intermediate increase in sweeping efforts will provide substantial water quality benefits.

- It is recommended that the City explore mechanisms to encourage or require commercial and industrial property owners to sweep their parking lots. The study showed that commercial areas contribute significantly higher pollutant runoff than residential streets.

- The City should consider purchasing high-efficiency sweepers when replacing existing sweeping equipment and/or purchasing additional equipment.

Catch Basin Cleaning

The City currently cleans catch basins approximately every 2.5 years. The City should maintain its current level of catch basin cleaning. **The study did not justify increasing the catch basin cleaning frequency.**

Illicit Discharge Elimination Program

In December, 1998, the City submitted its application to the MDEQ for the voluntary Stormwater General Permit. One element of the permit application was an Illicit Discharge Elimination Plan (IDEP). The goal of the IDEP is to effectively identify and eliminate illicit discharges to the City's separate stormwater drainage system. The City is implementing its IDEP, in accordance with the general permit conditions.

Some of the IDEP work completed to date was conducted by Camp, Dresser & McKee (CDM) as part of a grant project to update the City's GIS storm sewer coverage. CDM conducted field identification and dry weather screening of approximately 319 storm outfalls. Because they noted discrepancies in the spatial coordinate locations of outfalls as compared to storm sewers during their review of the Rouge Program Office's 1996 outfall inventory, CDM also field located some of the outfalls with GPS. Subsequent to the CDM work, the City

identified 60 additional outfalls, for a total of 379. The City conducted dry weather screening at these outfalls in 2001.

In December 2001, the City submitted a Stormwater Pollution Prevention Initiative (SWPPI) to MDEQ in accordance with its voluntary Stormwater General Permit. The SWPPI identifies specific actions that the City will undertake to address the goals established in the Upper and Middle-3 subwatershed management plans, and specific activities related to illicit discharge elimination. In developing its SWPPI, the City reviewed and evaluated the IDEP, submitted to MDEQ with the permit application. Specific IDEP activities were reviewed and refined. A copy of the SWPPI is contained in Appendix E.

Livonia and its neighboring communities must update the Upper and Middle-3 subwatershed management plans, in accordance with the general permit. The updated subwatershed plans must be submitted to MDEQ in May of 2003. In addition, the communities must update their individual SWPPIs and submit them to MDEQ by December 2003.

- The City should continue to implement the Illicit Discharge Detection/Elimination Program activities identified in its SWPPI, dated November 28, 2001. The SWPPI commits to conducting dry weather outfall inspections at 20% of outfalls annually.

- The City should review and re-evaluate its Illicit Discharge Detection/Elimination Program activities as part of its SWPPI review and update. In particular, the City should assess the 20% annual dry weather outfall inspection frequency and determine if a different frequency is appropriate.

- The City should implement a program to GPS all its stormwater outfalls and to update the GIS to include the GPS locations. As noted previously, CDM conducted a GPS survey of some of the 469 outfalls. It is recommended that the City review the CDM work to identify the extent of GPS work needed.

- The City should establish a numbering system for its stormwater outfalls. The numbers should be physically marked on each outfall. Such numbering system will reduce duplication of effort when conducting outfall inspections as well as aid in identifying new or previously unidentified outfalls.

In addition, the City should continue its current program to eliminate pollution caused by On-Site Sewage Disposal Systems (OSDS). This includes the steps identified in Table 3 of the Stormwater Pollution Prevention Initiative (SWPPI). The four identified steps in the initiative are:

- Update map of areas within the City that are served by on-site disposal systems bi-annually.

- Continue to work with Wayne County and residents to enforce County OSDS ordinance. When Wayne County identifies a system failure, notify County and property owner whether public sewer is available. When Wayne County identifies a system failure and public sewer is not available, evaluate feasibility and cost effectiveness of extending sewer to serve property.

- Visually (only) inspect all known properties with OSDS for obvious signs of system failure annually.

- If visual inspection indicates a failure, refer to Wayne County Health Department.

Public Education Plan

In December, 1998, the City submitted its application to MDEQ for the voluntary Stormwater General Permit. One element of the permit application was a Public Education Plan (PEP). The goal of the PEP is to educate the public regarding how its day-to-day activities can affect water quality and to encourage the public to reduce the discharge of pollutants through river friendly actions. The PEP must address specific objectives listed in the general permit. These objectives are listed in Section 3.5.

The City has implemented its PEP, in accordance with the general permit conditions. Section 3.5 summarizes some of the public education activities that the City has conducted during the past several years.

In December 2001, the City submitted a Stormwater Pollution Prevention Initiative (SWPPI) to MDEQ in accordance with its voluntary Stormwater General Permit. The SWPPI identifies specific actions that the City will undertake to address the goals established in the Upper and Middle-3 subwatershed management plans, and includes many public education activities. In developing its SWPPI, the City reviewed and evaluated the public education activities listed in its PEP, submitted to MDEQ with the permit application. Those activities determined to be in-effective or inappropriate based on experience were eliminated from the plan.

Livonia and its neighboring communities must update the Upper and Middle-3 subwatershed management plans, in accordance with the general permit. The updated subwatershed plans must be submitted to MDEQ in May of 2003. In

addition, the communities must update their individual SWPPIs and submit them to MDEQ by December 2003.

- The City should continue to implement the public education activities identified in its SWPPI.

- The City should monitor the effectiveness of its public education activities, in conjunction with the Upper and Middle-3 Subwatershed Advisory Groups.

- The City should review and re-evaluate its public education activities as part of their SWPPI review and update.

Adjacent Community – Regional Flow Control

Stormwater enters the City of Livonia from three adjacent communities. These communities are the City of Farmington Hills at the City's northern boundary and the City of Novi and Northville Township at the City's western boundary. Flow that enters the City of Livonia from these adjacent communities can adversely impact the City's stormwater conveyance systems especially the open drains.

As discussed in Section 5.1, regional stormwater storage basins are recommended to help reduce peak stormwater flows along the open drains. These peak flows are directly responsible for the erosion that was documented throughout the City's open drains during Activity 1.2. It is recommended that the City work cooperatively with its neighboring communities in controlling these excessive storm flows on a regional watershed basis. Table 5.2.6 shows which communities contribute stormwater flow to the various proposed basin location sites.

Table 5.2.6: Basin Location Site & Contributing Community Stormwater Runoff

Basin Location Site Number	Basin Name	Drain	Communities Contributing to Stormwater Runoff
1	I-275 N. of 5 Mile	Bell Branch	Livonia, Northville Twp.
2	St. Mary's Hospital	Bell Branch	Livonia, Northville Twp.
3	Parkview Cemetery	Bell Branch	Livonia
4	Stevenson High & Marshall Elementary	Bell Branch	Livonia, Farmington Hills
5	Merriman Road between 5 & 6 Mile Roads	Bell Branch	Livonia, Farmington Hills, Northville
6	Victor Parkway Basin	Denmar Drain	Livonia
7	East of Victor Parkway	Denmar Drain	Livonia, Northville Twp
8	Greenmead Park	Denmar Drain	Livonia
9	Whispering Willows near Bretton	Denmar Drain	Livonia
10	St. Martins Avenue	Denmar Drain	Livonia
11	W. of Levan road & N. of Curtis Road	Denmar Drain	Livonia, Northville Twp., Novi
12	Holmes Middle School Fairway Farms	Denmar Drain	Livonia, Northville Twp., Novi
13	Whispering Willows along West Bell Branch	West Bell Branch	Livonia, Farmington Hills, Northville Twp., Novi
14	Bicentennial Park – Soccer Fields	West Bell Branch	Livonia, Farmington Hills, Northville Twp., Novi
15	Curtis Road E. of Wayne	West Bell Branch	Livonia, Farmington Hills, Northville Twp., Novi
16	Intersection of West Bell Branch & Bell Branch	West Bell Branch	Livonia, Farmington Hills, Northville Twp, Novi
17	Glen Eden Cemetery	Beitz Drain	Livonia, Farmington Hills
18	Pembroke Drive	Beitz Drain	Livonia, Farmington Hills
19	Ardmore Site	Tarabusi	Livonia, Farmington Hills,
20	Nature Preserve by Rotary Park	Tarabusi	Livonia, Farmington Hills,
21	Bryant Community School	Tarabusi	Livonia, Farmington Hills,
22	Sunset Park	Tarabusi	Livonia, Farmington Hills,
23	Mt. Hope Cemetery	Tarabusi	Livonia, Farmington Hills,
24	Bethel Memorial Cemetery	North Bell	Livonia

6.0 FUTURE FUNDING OPTIONS FOR RECOMMENDED IMPROVEMENTS

Given the content of this report and the identification of the City's future stormwater management and improvement needs and challenges, consideration must be given to future funding options and issues. Creating an acceptable plan of action for the future should consider short term and longer term needs, possibly phasing of capital improvements, financing for annual routine maintenance, using a combination of financing options and of course timing of stormwater initiatives with other city priorities.

Future funding options and issues have been evaluated within the following context:

1. It is assumed the City will be looking at finding new budgetary resources (money) or a reallocation of existing resources at the expense of another currently funded City activity.

2. It is recognized that the City's current tax levy is at the charter limit.

3. The City will always attempt to take advantage of all available state or federal grant programs.

6.1 Annual Maintenance

As the City continues to mature and in order to meet requirements of mandated stormwater compliance regulations, it is strongly suggested that more funding be made available in the City's public services annual budget. This can be accomplished through an increased line item allocation out of the City's budget. Increased maintenance funds could be used for increased drain, ditch, culvert and catch basin cleaning; increased street sweeping; coordinating an illicit discharge elimination program; for an outfall inspection program; increased inlet grate maintenance; establishment of a woody debris management program etc.

Currently funding for annual storm facilities maintenance is inadequate to meet the City's needs. An appropriation in the range of $100,000 to $250,000 would enable the City to begin to address several needs identified in this report.

6.2 Major Drain Improvements

The undertaking of major storm drain improvement projects will most likely require the commitment of funds sufficient to meet annual principal and interest debt requirements. Options that appear available to the City could include:

- Voter approved designated millage
- Voter approved bond issue
- Special Assessment Improvement Districts
- Use of Drain Code (Requires local funding)
- Use of Water and Sewer Fund for projects with benefit to the sanitary sewer system.
- Grants

6.2.1 Voter Approved Designated Millage

Under this option the City could place before the voters a request for an approved millage. This would allow for stormwater improvements on an annual basis and could be limited to a specific period of time. For example with a 2001 SEV of just over $4 billion dollars, a one-half mill levy would generate $2 million dollars annually. In ten years, $20 million dollars in major capital projects could be undertaken.

The advantage to a millage and "pay-as-you-go" approach is the avoidance of interest charges. The disadvantage can be the added cost of future inflation, especially construction related.

6.2.2 Voter Approved Bond Issue

Also known as a general obligation bond the electorate would be asked to approve a not-to-exceed dollar amount to cover debt service (principal and interest). Millage would be levied in an amount to cover annual debt service. The voted millage does not count against charter authorized tax limitations. This approach with an "unlimited tax" pledge is the most secure form of a bond issue and receives the best interest rate.

This approach would allow the City to take on major capital projects within a short time frame. For example, a $15 million dollar bond spread over 20 years at a 5% interest rate would require the City of Livonia to levy approximately three/tenths of a mill. While this approach is a hedge against the costs of inflation, it does require the payment of interest.

6.2.3 Special Assessment Improvements Districts

Where it can be determined that benefits to properties occur with improvements, special assessment districts (SADs) can be created. This usually requires the issuance of bonds with annual debt requirements payable from assessments collected with property taxes from benefiting property owners. Care must be given to assigning benefit and formulas must be equitable and fair.

While SADs are possible they have not been used extensively in urban areas except for clearly defined and more localized storm improvements, like in a specific City block or neighborhood. Generally because of the nature of flooding or other stormwater problems, property owners in the uplands aren't always willing to accept responsibility for problems in lower lying properties. Often quoted sentiments are "they shouldn't have built along the creek" or "why should I have to pay for the poor planning on the part of the developer".

If SADs are to be considered it would be strongly recommended that if possible the initiatory petitions come from property owners and that the City's legal bond counsel be brought in from the very beginning of the process.

6.2.4 Use of the Drain Code

It is possible to finance major drain projects under several differing approaches under the Michigan Drain Code. Before details are discussed the key factor to understand is that if county drain bonds are issued the municipality must still come up with funding to retire annual principal and interest payments. In essence the City of Livonia must find the dollars to pay off the City at large drain debt. If this requires a vote of the electorate it seems practical for the City to issue bonds on its own. Exceptions that would apply involve drain projects that involve a neighboring community or a desire to assess the County and/or State or assess some of the property owners; such as a shopping center, or a large industrial complex.

Drain bonds can be sold under Chapters 4, 6 or 8 of the Drain Code. Essentially the Drain Commissioner levies assessments against benefiting lands and public corporations in the drainage district. Chapter 20 of the Drain Code allows for assessments to be levied against public corporations (Cities, Villages, Townships) at large. Under Chapter 20 cities have the flexibility in managing indebtedness by using a variety of its budget resources e.g. taxes, fees, grants, other revenue etc. to pay off debt.

If the City were to consider use of the Drain Code the City's bond counsel should be brought in very early to review the best position for the City; given the City's project and which provision of the Drain Code would be best suited to achieving the City's goals.

6.2.5 Use of Water and Sewer Funds

As noted, the City has in the past, utilized reserves from the Water and Sewer Funds to finance capital projects that have reduced stormwater flows in the sanitary sewer system. Reductions in stormwater can result in clear savings in pumping and waste treatment charges. The City should carefully examine the potential use of water and sewer funds as a real possibility for undertaking several or at least portions of several of the improvements described in this report.

6.2.6 Grants

The City is already familiar with and has taken advantage of State and Federal grants through the Clean Michigan Initiative (CMI) and Rouge River National Wet Weather Demonstration Project. These programs will continue to be pursued. In addition low interest (generally 2.5%) loans are available under the

State Revolving Fund to assist "qualified" municipalities that have documented water quality needs. All of these programs are highly competitive and only fund a portion of applicants each year. However, as a pro-active program unfolds the City may better its position to obtain additional grants in the future.

6.2.7 County Contract Bonds – TIFA

Just a brief note that under Acts 185 and 342 county contract bonds are available, but do not seem applicable or to the advantage of the City at this point. If drain improvements are in a TIFA district e.g. DDA or LDFA certainly financing storm improvements should be looked into. It is not believed that either apply to the City's needs at this point.

6.3 Stormwater Utility

While not a viable option at present the concept of creating a stormwater utility is briefly discussed for information purposes.

In the late 1980's and early 1990's a few communities moved to create a stormwater utility. Included was the City of Lansing's attempt to impose a stormwater fee. This led to a lawsuit and subsequent ruling by the Michigan Supreme Court favoring Plaintiff Alexander Bolt over the City of Lansing. The so called Bolt Decision for now has so convoluted the issue of "when a fee is really a tax" that most municipal legal authorities do not believe that under current law cities can establish a stormwater utility fee. This opinion is held by the City of Livonia's bond counsel.

The Bolt decision has frustrated many communities with limited tax and funding options who are being forced to comply with Phase I or Phase II of federally mandated stormwater compliance programs. So there exists pent up interest in re-addressing the issue of Bolt, but at present no initiatives to make new permissive State law are underway.

If a stormwater utility was possible, it could be rather significant if indeed it was acceptable to citizens of the City of Livonia. For example, Ann Arbor created its stormwater system user fee in 1993. Basically single-family dwellings are charged $13.75 per quarter and other properties are charged $147.31 per acre per quarter multiplied by factors dealing with the pervious and impervious area of each site.

Factors range from .20 for pervious area, .30 for impervious area with retention, and .95 for impervious area without retention. Formulas are more complex than can be outlined here. In 2001 the Ann Arbor stormwater fee raised $2.7 million dollars.

Rouge Main 1-2 Subwatershed Detention Basin Inventory Study

November 2004







Prepared for the participating communities of:
Beverly Hills, Bingham Farms, Bloomfield Township, Rochester Hills, Southfield, Troy and West Bloomfield Township in conjunction with the Oakland County Drain Commissioner's Office

Rouge River
OURS TO PROTECT

HRC

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Section 1
Executive Summary

Overview

The Oakland County Drain Commissioner's Office (OCDC) – on behalf of the Main 1-2 Rouge River Subwatershed communities – received a grant to conduct an inventory and assessment of stormwater detention basins, as an initial step toward fulfilling the goals of the Main 1-2 Subwatershed Management Plan. Oakland County communities have for many years required on-site stormwater detention for new development, but it was suspected that many detention basins were not functioning at full design capacity due to incomplete construction and/or inadequate maintenance. Two additional reasons for the study were: 1) to update databases which currently have some incomplete or inadequate records of existing detention basins in the subwatershed and, 2) to consider recent improvements in detention pond design standards.

It was originally anticipated that 381 basins would be included in this study based on estimates provided by each participating community. The actual number of basins inventoried was 373. A summary of the communities and number of basins in each is provided in Section 2. The findings of the review of basin hydraulic/construction characteristics indicate that almost 60% of the basins were not, or could not be verified as, functioning at full design capacity. For most of these basins, the volume of the basin was smaller than designed, the outlet restrictor was not operational, and/or adequate plan/calculation information was not available. Nearly half of the 373 basins were in need of maintenance. The problems included debris and sediment in pipes, litter, nuisance levels of algae, overgrown conditions, end-section separations, erosion and sedimentation. Based on these findings alone, completion of the basin inventory was extremely valuable.

The purpose of the Main 1-2 Detention Basin Inventory Study was to identify, prioritize, and make recommendations for maintenance and possible design improvements for existing detention basins in the Main 1-2 Subwatershed. Several additional benefits of the project included:

- Awareness of the need for better record keeping, plan archives, maintenance agreements, and tracking of correspondence.
- Incorporation of detention basin data into the County-wide GIS stormwater utility database.
- Ability to use the data to support future hydrologic and hydraulic modeling.
- Information can be used in local Stormwater Master Planning efforts.

- Identification of pollutant 'hotspot' sites and potential illicit discharges and connections.
- Background information to support future grant opportunities.

Recommendations

General recommendations resulting from the study include:

A. Establish an adequate record keeping system for all existing and future detention basins;

B. Develop model ordinance(s) for the Main 1-2 Subwatershed that include(s) specific, quantitative design criteria;

C. Develop a design review checklist;

D. Develop and implement an inspection program to document that construction has been completed in accordance with approved design;

E. Establish detention basin maintenance requirements;

F. Develop a model maintenance agreement and/or ordinance or other regulatory mechanism that may be adopted by local communities requiring adequate basin maintenance;

G. Develop and implement a regular detention basin inspection program to ensure that basins are being adequately maintained;

H. Review the detention basin rankings and data presented in Sections 5 and 8 and develop community specific plans for addressing high priority maintenance needs and implementing basin modifications;

I. Develop and implement a program to educate developers, commercial property owners, homeowner associations, and other basin owners on the benefits of detention basins and the need for adequate maintenance;

J. Consider developing an incentive program to encourage owners of existing detention basins to undertake maintenance or retrofit of their basins.

In addition to these general recommendations, specific maintenance, modification, and retrofitting recommendations are presented along with anticipated costs.

Lessons Learned

Aside from the findings and recommendations that were the purpose of the study, a number of valuable lessons were learned that will help in planning and implementing future work.

- The effort required to complete the detention basin plan review and field assessments greatly exceeded the time estimated in the original grant application.

- The accessibility and thoroughness of plan and design information varies from site to site and community to community, so more time should be scheduled for the communities to compile available plan information before the inventory begins.

- There were challenges with the logistics of tracking photos and multiple ID numbers. The photos can be better tracked by downloading and numbering them as soon as possible after they are taken. The five different ID codes (for basins, inflows, outflows, overflows, and photos) can be easily tracked by letting the database automate the selection of ID number sequentially. This can be done if all of the plan review (Task I) is completed before the field assessment (Task II) begins.

- Conducting several field investigation 'trial runs' before beginning extensive field work helped to train all field staff and ensure efficiency and consistency.

- Experience with the use and limitations of new digital technology, especially GPS/PC tablet units. New 'rugged' versions of digital cameras and Trimble (GPS/PC) units were used that performed well under heavy use and adverse weather conditions.

Opportunities for Further Efforts

The results of this inventory should be integrated into a multi-jurisdictional stormwater management effort. As part of implementing a long-term management plan, further efforts should be considered:

- Several different types of retrofitting pilot projects should be implemented along with monitoring programs to evaluate their effectiveness and make recommendations for future basin retrofits.

- Due to the detention basin inventory's usefulness in stormwater planning and because so many existing basins were not functioning at full design capacity or were in need of maintenance, the effort should be expanded to other areas of the County.

- The results of the Main 1-2 subwatershed basin inventory may be incorporated into Stormwater Master Planning efforts at the watershed level. A watershed management approach to stormwater management would allow cost-effective flood protection and implementation of the goals of the subwatershed management plan.

- Retrofitting of many existing detention basins in the Main 1-2 would result in substantial subwatershed-wide water quality improvements. Before implementing extensive and costly improvements, a planning tool such as the Source Loading and Management Model (SLAMM) could quantify the anticipated pollutant loading reductions of basin retrofits and many other stormwater best management practices.

- To implement the Subwatershed Management Plan goal of improving river ecosystems, further study should be considered to develop a model ordinance that provides quantitative criteria to new developments for the control of water quality and streambank erosion.
    - For example, a statistical analysis of ten years of hourly rainfall data at Oakland University in Rochester Hills indicates that sizing water quality BMPs for 1.0" of rainfall will treat almost 90% of the total annual rainfall in an average year. Further statistical analysis of rainfall data, water quality data, and simple models could be used to calculate runoff volumes and on-site pollutant loads.
    - Extended detention offers the potential to reduce the increased volume and frequency of moderate-sized runoff events that watershed development can cause. However, further research of extended detention criteria is necessary to demonstrate adequate channel protection.

Section 2
Introduction

Background

Excessive peak flows resulting from urbanization and the resulting increase in impervious areas is a wide-spread problem throughout much of the Rouge River Watershed. The Rouge River Remedial Action Plan (RAP), completed by MDEQ in 1989 and updated in 1994, identifies surge flows and streambank erosion as significant contributors to impaired uses in the Rouge Watershed, including loss of habitat and degradation of fish populations, benthos and aesthetics.

Communities in the Main 1-2 Rouge River Subwatershed joined together in 1998 and created a Subwatershed Advisory Group, or SWAG, to develop a subwatershed management plan to identify impairments in the subwatershed, establish goals and determine actions necessary to restore and protect the Main 1-2 Subwatershed. The following long-term goals, from the Main 1-2 Subwatershed Management Plan completed in May 2001, clearly recognize the negative impacts of excessive peak flows and erosion on the watershed:

- Restore/Maintain Aesthetically Appealing Conditions
- Improve and Maintain River Ecosystem for Fish and Wildlife
- Minimize the Amount of Soil Erosion and Sedimentation
- Minimize Flow Variability and Associated Negative Impacts

As an initial step toward fulfilling these watershed goals, the Oakland County Drain Commissioner's Office (OCDC) – on behalf of the Main 1-2 Subwatershed communities – developed a grant proposal to conduct an inventory and assessment of stormwater detention basins. Although Oakland County communities have for many years required on-site stormwater detention for new development, many detention basins are not functioning as designed. This may be due to incomplete construction and/or poor maintenance. Furthermore, many communities have incomplete or inadequate records of existing detention basins in their jurisdiction, and modern detention pond design standards have improved. The purpose of the project, as stated in the grant application submitted in October 2000, is to identify and make recommendations for detention pond improvements to existing detention facilities in the Main 1-2 Subwatershed.

At the same time, OCDC also submitted a separate grant proposal to conduct an inventory of streambank erosion in the Main 1-2 Subwatershed. That grant proposal was also approved for grant funding.

In April 2003, OCDC solicited Statements of Qualifications from consulting firms interested in performing both the detention basin and streambank erosion inventories. After reviewing the Statements of Qualification, OCDC selected a "short list" of consultants and requested that they submit Proposals for Engineering Services (June 2003). OCDC ultimately selected the team of Limno-Tech Inc. and Hubbell, Roth & Clark, Inc. to conduct the inventory studies, with HRC conducting the detention basin inventory part of the project.

Project Purpose and Scope

Simply stated, the purpose of the Main 1-2 Detention Basin Inventory Study is to identify, prioritize, and make recommendations for maintenance and possible design improvements for existing detention basins in the Main 1-2 Subwatershed. This is the initial step toward realizing the broader, longer-term goal of minimizing flow variability and increasing detention basin pollutant removal efficiencies.

In order to achieve the stated purpose and goals and to meet the objectives of the grant, HRC conducted the following scope of activities:

1. Inventory of existing detention basins based on existing data, maps and drawings provided by the communities;
2. Field assessment of each detention basin to document physical and hydraulic characteristics, determine if the basin was built and is functioning as designed, verify land use and document existing condition;
3. Evaluation of data collected in inventory and field assessment resulting in prioritization of basins and recommendations for maintenance and/or retrofit;
4. Report summarizing findings.

Each of these tasks is described in more detail in subsequent report chapters.

The grant application and scope of work developed by OCDC anticipated that 381 basins would be included in the study. This number was based on estimates provided by each participating community. The actual number of basins inventoried was 373. The following table summarizes the communities and number of basins in each as well as indicating if plan review information was available.

Summary of Detention Basins by Participating Community

Community	Originally Estimated No. of Basins	No. of Basins with Plan Information Available	No. of Basins Assessed in Field
Beverly Hills	2	2	2
Bingham Farms	7	3	7
Bloomfield Twp.	55	42	55
Rochester Hills	60	52	53
Southfield	150	147	149
Troy	18	18	18
West Bloomfield Twp.	89	72	89
Total	**381**	**336**	**373**

GIS Database

All data collected during the detention basin inventory and field assessment was incorporated into a GIS database (compatible with the existing Oakland County GIS) and provided to each participating community on a compact disk (CD).

HRC utilized several sources of information to populate the database. Basic basin information – including site name, general location, and ownership - was obtained from the communities themselves, from the existing Oakland County GIS, and from plans and file records. More specific information on the size, volume, design, tributary land use, and other characteristics of each detention basin was gleaned from plans and records provided by each community. Information gleaned from the plans was then verified during the field assessment. Additional parameters were also collected during the field investigations, such as Geographic Positioning System (GPS) coordinates for each detention basin outlet, photographs, and visual observations. All photos collected in the field have been incorporated into the GIS.

Tables 7.1A, B, C and D (Section 7) identify and describe the data fields or attributes collected for each detention basin. These tables also identify the source of each attribute, i.e., community, plans, field, etc.

Tables 7.3A, B, C, and D show all of the data collected during the inventory and field assessment. All of this data may also be viewed via the GIS.

Participating Communities

The following communities in the Main 1-2 Rouge River Subwatershed participated in the detention basin inventory. For communities that lie in multiple subwatersheds, only the detention basins in the Main 1-2 subwatershed were part of this project.

Village of Beverly Hills
Village of Bingham Farms
Bloomfield Township
City of Rochester Hills
City of Southfield
City of Troy
West Bloomfield Township

The Cities of Farmington and Farmington Hills chose not to participate in the grant study, and opted to conduct an inventory of its detention basins on its own. The Cities of Birmingham and Bloomfield Hills, and the Village of Franklin did not participate in the grant study, because they have no detention basins.

A number of retention basins under the jurisdiction of the Oakland County Drain Commissioner were also included in the study.

Section 3
Inventory of Known/Existing Detention Basins

Inventory Methodology

The first task of the project was to develop an inventory of the existing detention basins based on existing data, maps and drawings provided by the communities. The goal of this task was to find out what information is available and record it.

Community Meetings to Solicit Available Information

HRC's initial step in developing the detention basin inventory was to obtain and compile existing records regarding each detention basin. To facilitate this effort - as well as to provide the communities with information on the anticipated activities, schedule and outcomes for both the streambank erosion and detention basin inventory studies – LTI and HRC conducted a series of project kick-off meetings with the communities.

At the meetings, each community described the extent and quality of the existing information and records they would be able to provide. Subsequently, each community provided copies of their available information. Table 3.1 summarizes the meeting dates, attendees and key items discussed.

As might be expected, the extent and quality of information varied dramatically - from communities that did not have many files, as-built drawings or other records of their detention basins to communities that maintained complete files including design calculations, drawings, inspection records and maintenance agreements.

Perhaps the most challenging aspect of this task was obtaining detention basin plans from the communities in a timely manner. Regularly updating the database system will be critical in managing records of future basins.

OCDC and the participating communities had various methods of managing detention basins. Some of these include:

- Several communities had their as-built drawings scanned and preserved electronically. Records of older basins were often no longer available, misfiled, or illegible.

- The City of Rochester Hills had an inspection form that they use for periodic basin inspections and prioritization of problems.
- West Bloomfield Township managed several residential basins by having them designated as part of an OCDC Chapter 18 drain.
- The City of Troy has taken over the maintenance of residential subdivision basins where the neighborhood association had disbanded.
- Some communities have developed design requirements in addition to Oakland County's standards such as extended detention, although they may not yet be formally adopted.

These forms, policies, and procedures could assist the Main 1-2 group in future basin planning, regulation, and management. Sharing and building on these methods will enable better management of detention facilities in the future.

Plan Review

HRC conducted a thorough review of the community-provided information for each detention basin and compiled the information in a GIS database. Loosely referred to as "plan review", HRC reviewed all information provided, including design calculations, design drawings, as-builts and other file information (if provided).

Prior to reviewing the plan information, HRC sent the list of data parameters to each of the participating communities for review and comment.

Of the total 373 detention basins that were part of this study, 336 basins had plans and/or other files, records or information that was reviewed in this task. The database indicates if plan information was available/provided or not.

Summary of Inventory Results

The inventory results are shown in Tables 7.3A, B, C, and D along with the results of the field assessment.

This information is also in the GIS database provided to each community.

Table 3.1: Summary of Community Meetings

Date	Community	Attendees	Detention Basin Issues
January 20, 2004	City of Southfield	Steve Marshall, Southfield Karen Mondora, Southfield Karen Tauriainen, OCDC Scott Bell, LTI Margie Kuhn, HRC Rob Myllyoja, HRC	City has compiled list of basins and locations; based on staff observations, City feels many basins are not working because the basin was not completed, restrictors were not installed and/or the basin is silted in;
January 22, 2004	West Bloomfield Township	Gary Mekjian, West Bloomfield Township Anne Vaara, West Bloomfield Township Jim Wineka, OCDC Scott Bell, LTI Margie Kuhn, HRC Rob Myllyoja, HRC	Design information for older basins was discarded by previous personnel; Township interested in condition of basins including sediment accumulation, debri, broken structures;
January 30, 2004	Bloomfield Township	Wayne Domine, Bloomfield Township George Roos, Bloomfield Township Karen Tauriainen, OCDC Scott Bell, LTI Margie Kuhn, HRC Rob Myllyoja, HRC	Township's map of detention basins not up-to-date; all detention basins have Township easements;
January 30, 2004	City of Farmington Hills	Tom Biasell, Farmington Hills Skip Otwell, Farmington Hills Gary Zorza, Farmington Hills Karen Tauriainen, OCDC Scott Bell, LTI Margie Kuhn, HRC Rob Myllyoja, HRC	Farmington Hills is not participating in detention basin inventory;
February 4, 2004	City of Troy	Dana Calhoun, Troy Jennifer Lawson, Troy Neall Schroeder, Troy Karen Tauriainen, OCDC Scott Bell, LTI Margie Kuhn, HRC Rob Myllyoja, HRC	City took over operation/maintenance of detention basins in residential areas;

Date	Community	Attendees	Detention Basin Issues
February 4, 2004	Village of Beverly Hills	Renzo Spallasso, Beverly Hills Scott Bell, LTI Margie Kuhn, HRC Rob Myllyoja, HRC	As-builts not available
February 4, 2004	City of Rochester Hills	Andrew Bahleda Roger Moore, Rochester Hills Tim Pollizzi, Rochester Hills Jim Wineka, OCDC Scott Bell, LTI Margie Kuhn, HRC Rob Myllyoja, HRC	City has database of detention basin information and will provide to HRC;
February 9, 2004	Village of Bingham Farms	Kathryn Hagaman, Bingham Farms Scott Bell, LTI Margie Kuhn, HRC	Village does not have any plans and referred HRC to consultant; no known basin problems; All basins are commercial;
February 9, 2004	City of Bloomfield Hills	Christine Bremer, Bloomfield Hills Scott Bell, LTI Margie Kuhn, HRC	No detention basins in City;

Section 4
Field Assessment

Field Protocol/Methodology

The primary goal of the field assessment was to determine, for each detention basin, if the basin was constructed according to its original design and whether it is now functioning as designed. Associated objectives for the field assessment include:

- Verify existence and location of each basin;
- Verify (through field measurements) whether actual dimensions (length, width, depth, volume, etc.) meet original basin design;
- Verify if inlet and outlet structures are present and operational;
- Document maintenance needs;
- Document safety concerns;
- Determine if there is potential for basin expansion and/or retrofit;
- Document other comments and/or observations;
- Collect GPS coordinates.

Due to grant project budget constraints, the field assessment was designed to be brief and focused. To facilitate the field assessment, minimize the amount of time needed in the field, and ensure quality data, the project team took the following steps:

Prior to initiating the fieldwork on a full scale, HRC conducted "dry run" assessments at a handful of test basins with all personnel that would be involved. These dry runs were conducted to work out the bugs, find the quickest means to collect the necessary data, and ensure consistency in data collection from person to person and team to team.

Prior to heading out to the field, each crew was provided with copies of the detention basin plans (if available) as well as the list of attributes gleaned from the plan review (See Section 3) for each basin to be field assessed by that crew that day. This allowed the crews to orient themselves quickly and focus on confirming already identified attributes.

Field crews documented the field measurements on a Data Collection Form (shown in Figure 4.1) using hand held computers. The data entered onto the hand held computers could then be downloaded to a database for QA/QC review and subsequent uploading to the GIS.

To the extent possible, the field crews assessed basins in proximity to minimize travel times between basins.

Where possible, field crews took digital photos of each basin and its key structural components. No photo was taken at basin 142 due to overgrown conditions and the fact that no structures were found.

In order to identify the basin Inflow, Outflow, and Overflow structures in the photographs, field crews placed a chalkboard showing the unique structure ID number and an arrow indicating the direction of flow near the structure. Upon processing the photos, it was noted that the directional arrow shown is incorrect in a handful of cases. Therefore, in the majority of cases the directional arrow indicated in the photograph is correct, but the text should be referenced to ensure accuracy.

Summary of Field Assessment Results

The data attributes collected during the field assessment are listed in Table 7.1A, B, C, and D along with the attributes collected during the plan review (described in Section 3). Table 7.2 lists commonly used abbreviations in the database.

The results of the field assessment are presented in Tables 7.3A, B, C, and D, along with data compiled during the plan review. Table 7.3A presents basic basin data; 7.3B presents basin inlet data; 7.3C presents basin outflow data; and 7.3D presents basin overflow structure data. Data for all 373 basins is presented in these tables, in order of Basin ID number.

Many parameters/attributes were collected during the plan review and subsequently verified in the field. The database and Tables 7.3A, B, C, and D present both the value gleaned during the plan review as well as the value measured in the field, in side-by-side columns allowing comparison. Data collected in the field is highlighted in green.

Figure 4.1: Sample Field Data Entry Form

BasinID _____ Date _____ LandUse _____ PhotoID _____

SiteName _____ Location _____

Storage Depth _____ StorageVol Provd _____

Freeboard _____ Area _____

PoolVolume _____ PoolDepth _____

SideSlopes _____ Basin Type _____

Sediment _____

Soils Desc _____

VegClass _____

VegIndicators _____ ExpansionCap (%) _____

InflowID _____ InflowID _____ InflowID _____ InflowID _____

Location _____ Location _____ Location _____ Location _____

Dia/Mat'l _____ Dia/Mat'l _____ Dia/Mat'l _____ Dia/Mat'l _____

Condition _____ Condition _____ Condition _____ Condition _____

OutflowID _____ OutflowID _____ OutflowID _____

Location _____ Location _____ Location _____

Dia/Mat'l _____ Dia/Mat'l _____ Dia/Mat'l _____

Condition _____ Condition _____ Condition _____

OverflowID _____ OverflowID _____

Location _____ Location _____

Description _____ Description _____

Comments _____

_____

Recommendations _____

_____

Scoring Methodology

HRC's first step in evaluating and ranking the 373 detention basins in the study was to develop an objective scoring methodology that could be applied to each basin. In order to be useful and effective, the methodology needed to be straightforward, relatively simple to apply, and understandable.

Scoring Categories

Based on the goals and objectives identified in the grant application as well as input from the Oakland County Drain Commissioner's Office and the communities, HRC determined the following six categories of concern to be considered in evaluating each detention basin:

1. Basin Hydraulics/Construction
2. Maintenance
3. Water Quality
4. Basin Retrofit Potential
5. Safety
6. Aesthetics

Individual Category Criteria

To apply the methodology, each basin would be ranked on a scale of one to ten in each of the six categories, with 1 being "good" or "low priority" and 10 being "very poor" or "high priority". One person completed all of the scoring to ensure consistency. This individual also supervised the plan review and field operations and was most familiar with the data and field conditions.

Table 5.1 identifies the criteria considered in determining the category rankings.

Category Weighting

Weighting factors were assigned to each of the six categories. While each of the categories is relevant in evaluating the overall condition of a given detention basin, it was decided that the first two categories – hydraulics and maintenance - were the most highly significant. It was then decided that the next two categories – water quality and retrofit potential – were slightly less significant, followed by safety and

aesthetics with less significance (but certainly still relevant). Higher weighting factors were assigned to the first two categories, with lesser weighting factors assigned to the other categories.

Table 5.1 shows the weighting factors assigned to each category.

Community Input

Prior to applying the scoring methodology, HRC sent it to each of the participating communities and the county for review and comment. While six (6) of the seven (7) communities and the county responded that they had received and reviewed the draft methodology, only two communities had comments or suggestions and these were minor. HRC modified and finalized the draft methodology based on these comments. Table 5.1 lays out and describes the final scoring methodology.

Scoring Results

After receiving consensus from the participating communities, HRC applied the methodology to each of the 373 basins. Utilizing the data collected during the plan review and field assessment portions of the study, HRC scored each detention basin in each of the six categories, applied the weighting factors calculated an overall basin score between 1 and 10.

HRC documented the scoring for each individual detention basin on the scoring sheet shown in Table 5.2.

Table 5.3 shows the results of the overall detention basin scoring. The table shows all of the detention basins sorted by overall score, with the highest scoring (i.e., highest priority) basins listed first. The 'Total Weighted Score' provides a way to summarize the overall results. Some basins with a low to moderate overall rating may have significant problems in an individual ranking category. A summary of findings and observations is provided for each of the individual ranking categories on the following pages. In the overall scoring and prioritization, the 'highest priority' basins were considered to be those that scored 6 and higher. However, as noted in the following discussion, the "highest priority" in some of the individual categories was based on ratings of 7 or higher.

The overall detention basin prioritization can be summarized as follows:

Priority	Total Weighted Score	Number of Basins	Percentage of Basins
Highest Priority	6.0 and higher	94	25
Moderate Priority	4.0 to 5.9	196	53
Lesser Priority	less than 4.0	83	22
	Total	373	100

Findings and Observations

Types of Detention Basins Found in the Main 1-2 Subwatershed

The sizes, shapes, styles, hydraulic structures, and in some cases design criteria, of the basins in the Main 1-2 Subwatershed varied greatly. The majority of the detention basins were dry basins designed for flood protection. However, for evaluation and planning purposes, it was useful to classify the rest of the basins into specific types. Design criteria and basin modifications have evolved over the years so that there are many types of basins being constructed in different regions of the country. Many of the detention basins in the Main 1-2 were unique. Table 5.4 describes the characteristics of each basin type used for the purposes of the inventory. There were ten different types of basins and three that provided a combination of two types of detention for a total of thirteen basin types. The basin type for each of the 373 detention basins is indicated in the database and Table 7.3A. Further discussion and description regarding these and other types of basins is provided in Section 6.

Basin Hydraulics/Construction

The purpose of evaluating the basin hydraulic characteristics was to determine if the basin was functioning as designed. Hydraulic characteristics considered include:

- was enough storage volume provided?
- was the basin discharging at the rate allowable by county standards (restrictor size)?
- was there an emergency spillway?
- were plans/design calculations available?
- was the basin generally constructed as designed?

The following findings and observations relate to basin hydraulics and as-built characteristics:

- Based on the Basin Hydraulics/Construction ranking category alone, approximately 59% of the basins would be considered high priority, with an individual category ranking of 7 to 10.

- Complete plans and calculations were not available for over 40% of the basins.

- For nearly 50% of the basins, it was not possible to compare the measured basin storage volume to the required storage volume. For over 40% of the basins, the required storage volume was not provided on the plans or calculations. For almost 10% of the basins, the storage volume could not be measured in the field because an Outflow could not be found or because of overgrown conditions. Of the basins where the measured storage volume could be compared to the required volume, approximately 12% provided less than half of the required storage volume and 25% provided less than 75% of the required storage volume.

- In many cases the size of the restrictor could not be verified in the field because the Outflow structure was not found, it was buried in sediment, or there were inadequate design calculations. The restrictor size was either not verifiable or was not adequate in over 33% of the basins. The presence of an Outflow was recorded in the field for almost 82% of the basins.

- Approximately 43% of the basins did not have an Overflow structure or emergency spillway identified in the field.

- There was no measurable freeboard at over two-thirds of the basins. This was usually because the basin did not have an overflow, but in some cases this was because the overflow was either not properly graded or located. Seventy-eight percent (78%) of the basins provided no freeboard or less than 1 foot of freeboard.

Freeboard (ft)	No. of Basins	% of Basins
0	256	68.6
0.1 to 0.9	35	9.4
1.0 to 1.4	41	11.0
1.5 to 1.9	8	2.1
2.0 and more	33	8.8
Total	373	100

It is important to note that a high ranking in the Basin Hydraulics/Construction ranking category does not necessarily mean that the basin was improperly constructed. As noted previously, in some cases, design calculations were not available. In other cases the restrictor may have been buried or located in a downstream manhole and could not be verified. These basins would require further investigation.

Basin Maintenance

Several indicators were considered during the maintenance ranking including erosion, sedimentation, structure blockages, condition of pipes and structures, and accumulation of litter and debris. The following findings and observations relate to basin maintenance:

- Based on the Maintenance ranking category alone, approximately 46% of the basins would be considered highest priority, with an individual category ranking of 7 to 10.

- Most small pipes, i.e. those 6 inches or less in diameter and not thought to be storm sewers based on plans or field observation, were not assigned an "Inflow ID". These pipes, when observed, were noted in the 'Comments' section of the field assessment. Most were 4" footing or roof drains or 2" irrigation lines. They were rarely shown on plans and were difficult to find in the field.

- Sediment bars, algae, litter, and organic debris were observed deposited in front of many of the Inflow pipes. Almost one third of the Inflow pipes had some blockage and over 7% of the Inflow pipes were more than half blocked. Approximately 9% of the Inflow pipes, other than those listed in the table below, were underwater and the amount of blockage could not be estimated.

Estimated Blockage (% of pipe diameter)	No. of Inflows (out of 513)	% of Inflows
3 to 25	74	14.4
26 to 50	40	7.8
51 to 75	8	1.6
76 to 100	30	5.8
Yes - Qty. Not Estimated	17	3.3
Total	169	32.9

- Algae in the Inflow pipe was noted approximately 3% of the time.

- Almost 5% of the Inflow pipes need some form of structural repair. The Inflow pipe was either deteriorated or broken, or the end-section was separated.

- Strong odors such as sewage, oil, mustiness, or decayed organic matter was noted in five (1%) of the Inflows. Suspected illicit discharges were reported to the community.

- Over 30% of the Outflow pipes were blocked with sediment, riprap, vegetation, and/or debris. The condition of some Outflow pipes could not be verified because they were not found or they were submerged. Blockage of the Outflow from the basin has a significant impact on the basins hydraulic characteristics, its ability to drain, and represents a possible threat to flooding. Over 12% of the Outflow pipes were more than half blocked. Other than those pipes listed in the table below, over 12% of the Outflow pipes were more than half blocked, over 5% of the Outflows were underwater, and over 18% of Outflows were not found.

Estimated Blockage (% of pipe diameter)	No. of Outflows (out of 313)	% of Outflows
3 to 25	12	3.8
26 to 50	17	5.4
51 to 75	4	1.3
76 to 100	65	11.2
Yes - Qty. Not Estimated	27	8.6
Total	125	30.4

- Almost 5% of the Outflow pipes were in need of some form of structural repair. Either the Outflow pipe was deteriorated, or broken, or the end-section was separated.

- When constructed properly, the overflow structures were generally in good condition. This is probably because the flows do not often reach the overflow elevation. Over 75% of the observed Overflows were in good condition. Over 56% of basins did not have an Overflow structure or emergency spillway. Some problems with Overflows noted include:
    - Storm sewer manholes that looked like they were overflow structures had solid covers;
    - Some riprap secondary Overflow spillways were not properly graded into the berm so that they created a mound of riprap instead of a spillway;
    - Some Overflows were blocked with sediment or debris;

- Some were overgrown with vegetation;
- Some had minor erosion; and
- Some (about 8%) had sediment deposited within the sump of the structure.

- Sedimentation of the detention basins was not prevalent. Where the sediment depth could be estimated, only 7.8% of the basins had more than 1 ft of sediment. Basin sedimentation of detention facilities was estimated using visual observation, depth probes, eye level equipment, and measurement of pool depth (to the nearest ft.). The purpose of recording this parameter was not to complete a detailed survey to quantify the sediment quantity and exact loss of potential storage, but to provide a preliminary assessment of the extent of the problem (if one exists) and to prioritize the need for further investigation.

  Quantifying sedimentation of detention basin facilities was very difficult or not possible in many basins due to several factors including:
  - Sediment deposition was not uniform. Sediment bars and depositional areas were often visible near the Inflow pipes. Sediment and debris was sometimes dumped in isolated areas over the bank.
  - Many basins were overgrown with cattails, phragmites, or other invasive wetland species making the site inaccessible and/or sediment measurement impossible. (Once the site is constructed and stabilized, dry detention basins (over 50% of the total) typically accumulate sediment at only a rate of about 0.5 to 1 in. of sediment per year (Pitt, R., 2003).) Therefore, in basins with dense forms of vegetation such as turf grass or invasive wetland species, there may be no visual indicators of historic sediment accumulation.
  - In wet basins, the amount of sediment was estimated by measuring the pool depth and subtracting this value from the as-built or design pool depth. In most cases (63.3% of the time), the pool depth of the basin was not available.

Wet Basin Pool Depth	No. of Wet Basins	% of Wet Basins
Not Available	62	63.3
less than 3 ft	16	16.3
3.0 to 5.9	10	10.2
6.0 and deeper	10	10.2
Total	98	100

A summary of the quantity of basin sedimentation is listed in the table below.

Description of Basin Sedimentation	No. of Basins	% of Basins
Not Available	82	22.0
Some – Quantity Not Available	57	15.3
Minimal	153	41.0
0.2 to 1 ft	52	13.9
1.1 to 2 ft	18	4.8
2.1 to 3 ft	7	1.9
> 3 ft or full	4	1.1
Total	373	100

- In situations where the detention basins had been used as sediment basins during construction, the basin was often over-excavated to provide a few feet of 'sacrificial storage' below the elevation of the outflow structure. Although a foot or two of sediment may be present in the basin below the elevation of the restrictor, it would not affect the storage volume provided. This was accounted for during the field assessment.

- Erosion of side slopes, pipes, and structures was common due to a lack of adequate permanent erosion control measures. Although a review of the Soil Erosion and Sediment Control Plan was not within the scope of work of this project, adequate permanent erosion control practices were not usually specified on the plans.

- Detention basins serving tributary areas that were still under development and construction had turbid water, high levels of sediment deposition, and excessive sedimentation at the Inflow structures. These (and other observations) indicate that adequate erosion control practices are not being implemented in the tributary area to prevent excessive sedimentation of detention basins. Although many detention basins are used as sediment basins during construction, Best Management Practices dictate that a treatment train approach (erosion control plus several lines of sediment control before reaching the basin) should be used to adequately contain sediment on the site. With some recently constructed basins that were used for sediment control during construction, there is some evidence that sediment was not adequately removed following construction.

- Although sedimentation of the basins was not prevalent, sediment accumulation in sumps, pipes and structures was very common. Some important conclusions can be drawn from these observations.
    - The depth of many dry basins was over-excavated during construction to provide sediment storage during construction or to reduce the maintenance period. The soils at most of the basins are poorly drained. Therefore, as the sediment, silt, and organic matter accumulates to the lower elevation of the design storage, the basin usually has the following characteristics:
        - The bottom of the basin fills with organic matter, sand and silt and associated nutrients and pollutants.
        - This loose sediment is easily flushed out of the basin during the next storm event, particularly when the outlet is a straight restricted (or unrestricted) pipe.
        - Invasive plants such as purple loosestrife, phragmites, cattail, and buckthorn become established in the disturbed soils. Other plant species may not be able to become established because of the nutrient levels and, in some cases, other pollutants.
        - Algae and organic matters decays and can cause problems with odor and aesthetics.

Water Quality

During the plan review, no quantitative design criteria were noted for detention basins to provide water quality treatment benefits. Because there were no established water quality control design criteria or requirements, there could be no determination of whether the basins were achieving adequate water quality control. It was not within the inventory study scope to conduct any water quality analysis during the field assessment. Visual observations (such as oil sheen, odors, litter, sediment, or excessive algae) were used to rank the basins in terms of water quality problems, i.e. was the basin acting as an obvious source of pollution.

- Based on the Water Quality ranking category alone, 17% of the basins would be considered poor or high priority (rated 6 or higher), 19% would be considered moderate (rated 4 to 5), and 64% would be considered good or low priority (rated 3 or less).

It is important to note that the lowest rated basins in this ranking category did not necessarily provide good water quality effluent. Although urban development may increase nutrient runoff by 200-300%

(University of Wisconsin – Madison, 2004), dry detention basins typically only provide about 10% TSS removal and no nutrient removal (Schueler, 1995). However, for this project most dry basins were rated at about 3 for water quality because there were no visual indicators that the basin was acting as a significant source of pollutants.

Basin Retrofit Potential

The retrofit potential of the basin (i.e. the ability to re-construct the basin into a new type of facility to provide additional benefits) depends on many site characteristics such as: the location of utilities, ownership, topography, availability of land, soils analysis, receiving water conditions and many other factors. These factors were not fully assessed as part of this inventory, however, preliminary information was compiled to provide guidance on retrofitting opportunities. The following findings and observations relate to basin retrofit potential:

- Based upon Retrofit Potential ranking category alone, approximately 19% o the basins would be considered 'highest priority', with an individual ranking of 7 to 10. Table 5.5 shows the highest ranked basins listed in order of retrofit potential. The table below summarizes the highest ranked basins in the Retrofit Potential category.

Retrofit Potential Ranking Category Rating	No. of Basins with High Retrofit Potential	% of Basins with High Retrofit Potential
10	0	0
9	10	2.7
8	25	6.7
7	36	9.6
Total	71	19.0

- In the field, the available possible expansion area was estimated (to the nearest 25%) because modifying the basin type to provide increased benefit typically requires adding additional storage volume. The following table summarizes the expansion capacity of the highest ranked basins in the retrofit potential category. Table 5.5 shows the expansion capacity of each of the highest ranked basins. Many of the basins were ranked highly as possible retrofits because they had room for expansion. Other basins in which a retrofit would provide benefit were not rated as high because of a lack of space. Although some of the higher ranked basins have little room for expansion, many of them were ranked higher because the basin is providing more storage than originally required, land

use, the depth of stage may be increased, or the basin was highly in need of extensive maintenance such as excavation and Outflow modification. The following table summarizes the expansion capacity of basins with high retrofit potential.

Potential Expansion Capacity (%)	No. of Basins with High Retrofit Potential	% of Basins with High Retrofit Potential	% of All Basins
100	21	29.6	5.6
75	2	2.8	0.5
50	6	8.5	1.6
25	6	8.5	1.6
0	36	50.7	9.7
total	71	100	19

- When considering cost-effectiveness of a particular basin retrofit, it is beneficial to look at the size of the basin and the contributing acreage that is being treated. The following tables classify the storage volume and contributing acreage of the basins with highest retrofit potential.

Storage Volume	No. of Basins with High Retrofit Potential	% of Basins with High Retrofit Potential	% of All Basins
N/A	12	16.9	3.2
<100,000	38	53.5	10.2
100,000 to 200,000	14	19.7	3.8
200,000 to 500,000	4	5.6	1.1
500,000 to 1,000,000	2	2.8	0.5
>1,000,000	1	1.4	0.3
Total	71	100	19

Contributing Acreage	No. of Basins with High Retrofit Potential	% of Basins with High Retrofit Potential	% of All Basins
N/A	31	43.7	8.3
<10	13	18.3	3.5
10 to 20	12	16.9	3.2
21 to 30	9	12.7	2.4
31 to 50	2	2.82	0.5
>50	4	5.63	1.1
Total	71	100	19

- The table below classifies the land use of the basins with highest retrofit potential. Most of the highest ranked basins are located within residential and commercial land uses.

Land Use	No. of Basins with High Retrofit Potential	% of Basins with High Retrofit Potential	% of All Basins
Res.	37	52.1	9.9
Commercial	26	36.6	7.0
Industrial	3	4.2	0.8
Institutional	3	4.2	0.8
Commercial/ Industrial	1	1.4	0.3
Residential/ Commercial	1	1.4	0.3
Total	71	100.0	19

Safety

One of the concerns regarding detention basins is safety. Although this was not a primary purpose of the project and the results are in no way to be considered a thorough investigation of all aspects of basin safety, some general observations regarding safety factors were recorded.

The following findings and observations related to basin safety:

- Based on the Safety ranking category alone, 4% of the basins were rated poor or high priority (6 or higher), 14% were rated moderate (4 to 5), and 82% were rated good (3 or less). This may be due to the high number of dry, turf grass basins in the subwatershed. The basins had to have obvious safety issues to be given a very high rating.

- Some safety issues observed include broken or dislocated bar grates, deep muck bottoms, illicit connections and discharges, steep side slopes, broken concrete, accessible wet basins with deep pools, and broken structures and end-sections.

- There were also some basins that presented safety issues for pets or wildlife.



Turtle trapped in Outflow structure.



Snake trapped in Outflow structure.



Signage is sometimes required for wildlife protection.

Aesthetics

Evaluating and ranking basin aesthetics is somewhat subjective. Most basins were assigned a rating of good or moderate unless there were obvious problems with factors such as pollution, odors, or litter. The following findings and observations relate to aesthetics:

- Based on the Aesthetics ranking category alone, approximately 22% of the basins were rated poor (6 or higher), 56% were rated moderate (4 to 5), and 22% were rated good (3 or less).

- Observed aesthetic issues include the following:
    - Side slope erosion in the form of minor slumping and excessive rill erosion was common. It was usually caused by basins not being properly stabilized when constructed. In some cases it appeared that the basins became inundated for a long period, possibly due to a blocked outflow and saturated the banks or killed upland vegetation.
    - Excessive sedimentation and associated problems with sediment bars, odors, and blocked structures.
    - Overgrown conditions and invasive plant species were common. In many dry basins, the side slopes were overgrown with buckthorn and the basin bottom and pipe end-sections were overgrown with cattails, or phragmites. This often occurred when a dry basin was fenced which limited access for maintenance. Where shallow ponding of water occurred in dry basins, algae and an overgrowth of invasive wetland plants on the basin bottom were common. Nuisance levels of algae and aquatic vegetation were the most likely to receive complaints due to their impacts on aesthetics and odors.

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Invasive Plant Species	% of Basins
Aquatics	2.1
Phragmites	12.1
Buckthorn	12.3
Purple Loosestrife	15.3
Algae	18.5
Cattails	31.1
None	23.6

    - Broken concrete, limestone riprap, separated end-sections, and broken pipes were observed periodically.

- Droppings from ducks, pets, and particularly from geese were a common problem. Many ponds had fencing, monofilament lines, and plastic owls installed along the shoreline to deter geese. One pond had several mutilated geese around its shore. Goose droppings not only affects water quality, but also is a factor in pond eutrophication and excessive algae growth.
- Litter was noted in 11 basins: 6 commercial, 4 residential, and 1 industrial land use. However, the most extensive littering was found in the basins with commercial land use.
- Of the 98 basins with wet pools, 39 had fountains and one of those had several aerators.
- Nuisance algae and invasive aquatic plants (pondweeds) were noted in approximately 8% of the basins with wet pools.

Table 5.1: Prioritization: Scoring Methodology

DETENTION BASIN SCORING

Based on the information collected during both the plan review and the field investigations, each detention basin will be evaluated and scored in six (6) individual categories as shown in the table below. Scoring in each category will range from 1 to 10, with 1 being "very good" (or, lower priority) and 10 being "very poor" (or, higher priority). The criteria considered in the scoring for each category are listed in the second column.

A weighting factor will be applied to each category score in order to obtain an overall basin score of 1 to 10.

DETENTION BASIN SCORING		
Category	**Criteria for Individual Category Scoring (1-10)**	**Weighting Factor**
Basin Hydraulics/ Construction	▪ Actual basin volume provided compared to design volume required ▪ Whether outlet restrictor is sized according to design, is larger than design, or is not installed at all ▪ Presence or absence of overflow structure ▪ Presence or absence of bar grates on large pipes ▪ Availability of design information	**.25**
Maintenance	▪ Presence and severity of structure blockages ▪ Presence and severity of erosion around structures ▪ Presence and severity of slope erosion and/or bottom erosion ▪ Condition of inlet pipe end-sections ▪ Condition of structures ▪ Accumulation of sediment ▪ Accumulation of vegetation and/or leaves	**.25**
Water Quality	▪ Existence and/or extent of buffer around wet basins ▪ Presence and severity of algal growth ▪ Presence and severity of odors, discoloration, oil sheens ▪ Evidence of illicit discharges/connections ▪ Presence and severity of yard waste, waterfowl droppings, and/or litter ▪ % and type of vegetative cover	**.15**
Retrofit Potential	▪ Availability of space for expansion ▪ Contributing drainage area compared to basin volume	**.15**
Safety	▪ Side slopes (steeper than 4:1) ▪ Presence or lack of fence or safety shelf ▪ Broken bar grate(s) ▪ Broken end section(s) on inlet pipe(s)	**.10**
Aesthetics	▪ Presence and/or extent of invasive plants ▪ Presence and/or extent of nuisance algae or aquatic vegetation ▪ Presence and severity of yard waste, waterfowl droppings, litter ▪ Erosion	**.10**
Total		**1.0**

Table 5.2: Prioritization: Score Sheet for Individual Basins

Basin Name/ID _____

Reviewer Name/Date: _____

Basin Hydraulics		
Actual volume vs. design volume	Basin volume > required Basin volume < required (_____ %)	
Restrictor presence/ size vs. design		
Overflow structure		
Bar grates		
Availability of design info		
Maintenance		
Blockages	Clear _____% blocked	
Erosion - around structures - side slopes - bottom	Mild Moderate Severe	
Condition of pipe sections		
Sediment		
Accumulation of vegetation &/or leaves		
Water Quality		
Buffer		
Algae		
Odors, discoloration, oil sheen		
Illicit discharge/connection		
Yard waste, droppings, litter		
% and type of vegetative cover		
Retrofit Potential		
Availability of space		
Drainage area/storage volume		
Land use, accessibility,		
Safety		
Side slopes	> 4:1?	
Fence and/or safety shelf		
Broken bar grate(s)		
Broken end section(s)		
Aesthetics		
Invasive plants		
Nuisance algae or aquatic vegetation		
Yard waste, droppings, litter		
sediment		

Table 5.3: Detention Basin Prioritization – Final Scoring

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Southfield	154	Hampton Hotel	9	8	10	8	8	7	**8.5**
West Bloomfield Twp	503	Woodcliff on the Lake	10	10	6	7	7	8	**8.5**
West Bloomfield Twp	461	Potomac Towne 1 - basin 2	9	10	6	9	6	7	**8.3**
Southfield	110	Chelsea Crossing twnhse Condos	10	10	8	7	2	8	**8.3**
Southfield	524	Weatherstone N. Townhouses - S basin	10	10	6	9	3	6	**8.2**
Rochester Hills	318	Lueders Drain Regional - Midvale basin	10	10	4	8	6	6	**8.0**
Southfield	288	Sam's Club	10	4	10	6	10	10	**7.9**
West Bloomfield Twp	454	Westwood Office Center	10	10	3	6	6	7	**7.7**
Rochester Hills	329	Adams Oaks	8	10	8	4	5	8	**7.6**
Southfield	226	Willowtree Apartments	9	9	4	9	5	6	**7.6**
West Bloomfield Twp	395	CVS Pharmacy	9	7	8	8	3	8	**7.5**
Rochester Hills	309	Northfield Industrial	10	10	4	8	2	4	**7.4**
West Bloomfield Twp	399	Jack Cauley Chevrolet - basin A	6	6	10	8	8	9	**7.4**
Southfield	215	Trowbridge Apts.	8	10	7	8	3	3	**7.4**
West Bloomfield Twp	447	West Bloomfield Nursing Home - N basin	9	10	7	3	3	7	**7.3**
Southfield	526	GE Plastics - S basin	10	10	6	3	3	6	**7.3**
Southfield	111	Marathon Gas Station	8	10	10	2	2	7	**7.2**
Southfield	153	Victor Center Office - Retention Area 1	8	9	8	6	3	5	**7.2**
Rochester Hills	320	Crooks Road Medical Center	9	10	4	6	3	6	**7.2**
Southfield	914	Burger King	9	10	4	8	3	3	**7.2**
Southfield	112	Fish Bones Restaurant	8	10	4	6	2	9	**7.1**
Southfield	235	Residence Inn	10	10	4	4	3	6	**7.1**
West Bloomfield Twp	396	West Bloomfield Medical Bldg - W basin	9	8	4	9	3	6	**7.1**
Southfield	527	Woodvale Condos - NE basin	10	10	6	4	3	3	**7.1**
Southfield	297	RRRSOC	9	8	6	6	3	7	**7.1**
West Bloomfield Twp	451	The Sports Club of W. Bloomfield - North	9	8	6	6	3	7	**7.1**
West Bloomfield Twp	514	Perrytown Estates	9	10	3	6	2	7	**7.0**
Bloomfield Twp	638	Shaker Heights	9	9	3	9	3	4	**7.0**
Southfield	205	Franklin Terrace Apts.	9	9	4	6	3	6	**6.9**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Southfield	224	Heatherwood Condos	9	10	3	6	4	4	**6.9**
Rochester Hills	348	Sanctuary in the Hills - basin A	8	10	6	4	5	4	**6.9**
West Bloomfield Twp	449	Weisman Cleaners	7	9	8	6	2	6	**6.9**
Rochester Hills	547	Chope Union	9	10	3	8	2	3	**6.9**
West Bloomfield Twp	691	Compuware	4	8	9	7	6	9	**6.9**
Rochester Hills	468	Sanctuary in the Hills - basin D	8	9	6	4	4	7	**6.9**
Southfield	116	Pavilion Twnhse Condos	4	10	8	8	3	6	**6.8**
West Bloomfield Twp	446	West Bloomfield Twp. Police HQ	9	9	6	4	2	6	**6.8**
Bloomfield Twp	471	Costco	9	8	8	3	3	6	**6.8**
Bloomfield Twp	686	MDOT Regional	8	8	6	6	4	6	**6.8**
West Bloomfield Twp	523	Autumn Ridge Estates	9	8	3	7	3	7	**6.8**
West Bloomfield Twp	405	Jewish Community Center - basin A	9	9	4	6	2	5	**6.7**
West Bloomfield Twp	438	Stonebridge Sub.	4	10	8	6	4	7	**6.7**
Bloomfield Twp	482	Dordan Sub.	9	9	4	8	2	2	**6.7**
Rochester Hills	331	Robert Evans Drain Regional - Outlot B	4	8	7	9	4	8	**6.6**
West Bloomfield Twp	415	Maple Creek Condos 3	8	9	3	8	3	4	**6.6**
West Bloomfield Twp	459	Lark Country Inn Restaurant	4	10	6	6	5	8	**6.6**
Southfield	131	Franklin Hills Apts.	9	9	2	7	3	4	**6.6**
Rochester Hills	344	Pine Trace Regional - SE basin	10	8	3	6	3	4	**6.6**
West Bloomfield Twp	394	Amberleigh Sub.	8	8	6	4	4	6	**6.5**
West Bloomfield Twp	521	Village Square	6	8	3	7	6	9	**6.5**
Southfield	160	Panian Chevrolet	7	9	5	6	3	5	**6.5**
Southfield	190	Pebble Stone Estates	9	7	6	3	4	7	**6.5**
Southfield	212	Denso International - W basin	9	8	3	7	3	4	**6.5**
Southfield	269	Autumn Ridge Condos	10	9	3	3	4	4	**6.5**
Rochester Hills	305	M.O.L. Investment	9	10	4	4	2	3	**6.5**
West Bloomfield Twp	408	J&S Office Center	10	10	3	4	2	2	**6.5**
West Bloomfield Twp	457	Dunhams	9	8	3	7	3	4	**6.5**
West Bloomfield Twp	450	Westfield Office Center	10	10	3	3	2	3	**6.4**
Bloomfield Twp	550	Knollwood Office Plaza	8	9	3	6	2	6	**6.4**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Southfield	109	Weatherstone N. twnhses - pond 1	8	10	2	5	4	4	**6.4**
Southfield	222	Omni Office	9	9	3	6	2	3	**6.4**
Rochester Hills	321	Michigan Humane Society	9	9	4	3	4	4	**6.4**
Rochester Hills	328	Rochester Hills Exec - A	8	8	4	7	3	4	**6.4**
West Bloomfield Twp	453	Barwick Park	8	8	6	3	4	6	**6.4**
West Bloomfield Twp	487	Chimney Hills Apt.	8	9	4	6	2	4	**6.4**
Southfield	535	Word of Faith - basin D	7	9	3	8	3	4	**6.4**
Southfield	113	Franklin Racquet Club	8	10	3	3	2	7	**6.3**
Southfield	142	Beacon Hill	8	10	3	3	3	6	**6.3**
Southfield	201	Oxford Estates	8	10	3	3	3	6	**6.3**
Southfield	250	MDOT Regional	9	8	2	9	2	2	**6.3**
Southfield	261	Southfield Townhomes	9	9	4	4	3	3	**6.3**
Rochester Hills	323	Combustion Research	9	8	3	8	2	2	**6.3**
Southfield	278	Fire Station 2	9	10	2	4	2	4	**6.3**
Rochester Hills	335	Pinetrace Sub. - park B	8	10	3	4	3	4	**6.3**
Bloomfield Twp	546	Bloomfield Crossing Sub.	8	6	6	7	2	6	**6.3**
Bloomfield Twp	551	Clarendon Crest	9	8	2	8	3	2	**6.3**
West Bloomfield Twp	413	Michigan Cosmetic Center	8	6	6	4	4	8	**6.2**
Southfield	534	Word of Faith - basin C	9	7	3	7	3	4	**6.2**
Southfield	127	Armenian Church	7	8	2	6	6	6	**6.2**
Southfield	159	Franklin River Apts - S basin	9	9	3	4	3	3	**6.2**
Southfield	187	Pebblecreek Park	9	8	3	3	6	4	**6.2**
Southfield	281	EZ Link Storage	8	10	3	4	2	4	**6.2**
Rochester Hills	340	Kingston Pointe South	3	9	7	6	4	8	**6.2**
West Bloomfield Twp	664	Lone Pine Estates	9	10	3	3	3	2	**6.2**
Southfield	145	Birmingham Cometic Center	9	9	5	3	2	2	**6.1**
Southfield	217	Village House Condos	9	6	4	7	3	4	**6.1**
Rochester Hills	345	Walnut Brook Estates	9	9	3	3	3	4	**6.1**
Bloomfield Hills	480	Whispering Pines	7	8	4	7	3	4	**6.1**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Southfield	151	Detroit Medical Center	10	8	3	4	2	3	**6.1**
West Bloomfield Twp	452	The Sports Club of W. Bloomfield - South	9	8	3	3	3	6	**6.1**
Bloomfield Twp	474	Bloomfield Knoll	9	9	3	4	2	3	**6.1**
West Bloomfield Twp	428	Shenandoah in the Woods	8	7	6	3	3	6	**6.0**
Bingham Farms	907	Danka - South	6	7	6	7	2	6	**6.0**
Southfield	130	Pine Air Apts.	8	10	3	4	1	3	**6.0**
Southfield	171	Ameritech	8	8	3	5	3	4	**5.9**
Southfield	260	Meadowbrook Villas	9	6	4	7	2	3	**5.9**
Bloomfield Twp	378	Meadowlake Sub.	8	8	6	2	3	4	**5.9**
West Bloomfield Twp	463	Potomac Village 3	4	10	3	9	2	4	**5.9**
West Bloomfield Twp	697	Orchard Crest Sub.	9	8	3	3	3	4	**5.9**
Southfield	144	Belle Tire	7	8	4	5	3	4	**5.8**
Rochester Hills	352	Meadowcreek Condos	2	9	5	8	3	8	**5.8**
West Bloomfield Twp	456	Dunhams - Parking	10	10	3	1	1	1	**5.8**
Pontiac	476	Lowe's	7	6	7	4	3	6	**5.8**
Bloomfield Twp	630	Hammond Lake Estates	8	8	4	4	2	4	**5.8**
Rochester Hills	313	NY Coney	9	4	3	7	7	3	**5.8**
Rochester Hills	322	Rochester Hills Corp. Ctr. Sub.	9	10	2	2	3	1	**5.8**
Troy	375	Forest Creek 2	9	8	2	4	3	3	**5.8**
West Bloomfield Twp	409	Maple Creek Condos 4	10	4	6	3	3	6	**5.8**
Bloomfield Twp	486	Bloomfield Club Sub.	7	9	3	6	2	2	**5.8**
Southfield	162	Galleria - NE basin	8	6	3	7	4	3	**5.7**
Southfield	186	Villas of Pebble Creek	9	8	2	3	4	3	**5.7**
Bloomfield Twp	606	Gilbert Lake Estates	9	8	3	4	2	2	**5.7**
Bloomfield Twp	684	Bloomfield Place Apt.	8	4	6	4	4	8	**5.7**
Southfield	158	Franklin River Apts - N basin	7	8	3	5	3	4	**5.7**
Southfield	182	Tyler Estates 4	8	8	6	1	2	4	**5.7**
Southfield	185	Villas of Pebble Creek East	10	4	3	8	2	3	**5.7**
Southfield	247	Single Family Homes	7	9	3	4	3	3	**5.7**
West Bloomfield Twp	500	Chimney Hills Apt.	8	6	3	6	2	6	**5.7**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Bloomfield Twp	549	Franklin Ravines Sub.	8	8	3	4	4	2	**5.7**
Southfield	553	Gordon Food Service	8	9	3	3	2	3	**5.7**
West Bloomfield Twp	668	Franklin Oaks 1	8	9	3	3	3	2	**5.7**
Southfield	107	The Pines Apts.	9	4	3	6	4	6	**5.6**
Southfield	115	D.I.L. Assoc.	8	10	2	2	3	2	**5.6**
Rochester Hills	315	Red Roof Inn	8	10	3	1	2	3	**5.6**
Southfield	529	Woodvale Condos - E basin	4	10	6	4	3	3	**5.6**
West Bloomfield Twp.	670	Franklin Colony Club	8	9	3	2	3	3	**5.6**
Southfield	163	Silver Triangle Office	8	6	3	6	3	4	**5.6**
Southfield	183	Tyler Estates 3	9	6	3	3	3	6	**5.6**
Southfield	228	Irvine Rehab Center	9	4	2	8	3	5	**5.6**
Southfield	229	Northwest Detroit Dialysis	9	8	3	3	2	2	**5.6**
Troy	373	Longview Acres	7	3	6	9	4	4	**5.6**
West Bloomfield Twp	432	Simsbury Condos	4	8	3	8	3	6	**5.6**
Southfield	106	Claymoor Apts.	3	10	4	5	2	7	**5.5**
Southfield	178	Courtyard Offfice Park	8	9	3	2	2	3	**5.5**
Southfield	210	Riverside Office Bldg.	9	7	3	3	4	2	**5.5**
Bloomfield Twp	382	Willisons Bloomfield Farms Sub. - pond 1	8	8	3	3	3	3	**5.5**
Southfield	528	Woodvale Condos - S basin	4	10	4	6	2	3	**5.5**
Southfield	122	Pilots Cove	8	8	4	3	2	2	**5.5**
Bloomfield Twp	608	Sandlewood Condos	7	9	3	4	2	2	**5.5**
Southfield	200	Cumberland Office Center	4	8	4	6	4	5	**5.4**
Southfield	285	Page Toyota	2	10	4	6	3	6	**5.4**
Rochester Hills	312	Lueders Drain Regional - Phase II	8	6	5	3	4	3	**5.4**
Bloomfield Twp	498	Chimney Hills Apt.	8	8	3	3	2	3	**5.4**
West Bloomfield Twp	695	Middlebelt Estates - NW basin	4	9	2	7	4	4	**5.4**
Southfield	180	Maple Tree Apts.	3	9	3	8	3	4	**5.4**
West Bloomfield Twp	437	Stonebridge Sub.	4	8	6	3	3	7	**5.4**
Southfield	192	American Commerce Center - basin 1	3	7	6	6	4	6	**5.3**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Southfield	294	Plum Hollow Woods	9	7	3	3	2	2	**5.3**
Bloomfield Twp	543	Square Lake Country Club Sub.	9	7	2	4	2	2	**5.3**
Southfield	552	Blue Cross Blue Shield	7	8	3	6	1	1	**5.3**
Bloomfield Twp	633	Willoway Place	8	8	3	3	2	2	**5.3**
Southfield	128	Pine Air Apts.	7	6	3	5	3	5	**5.3**
Southfield	139	Chanticleer Condos	6	7	3	7	2	3	**5.3**
Southfield	202	UPN 50	2	9	3	5	7	6	**5.3**
Bingham Farms	360	Woodlynne	6	4	6	7	4	4	**5.3**
Bloomfield Twp	380	Palmer Woods	8	6	4	3	4	3	**5.3**
West Bloomfield Twp	431	Simsbury Condos II	4	7	6	4	3	7	**5.3**
West Bloomfield Twp	440	Tam-O-Shanter - basin A	4	9	5	3	3	5	**5.3**
Southfield	132	The Lakes Apts.	7	6	2	7	3	3	**5.2**
Troy	363	Charnwood Hills Sub. 6	9	4	3	6	3	3	**5.2**
Southfield	136	Woodvale Condos	6	9	2	4	2	3	**5.2**
Southfield	258	Word of Faith - basin A	7	4	4	8	2	4	**5.2**
Southfield	272	Gordon Food Service	9	6	3	3	2	3	**5.2**
West Bloomfield Twp	426	Orchard Pine Office Center	4	8	6	3	3	5	**5.2**
West Bloomfield Twp	442	Tam-O-Shanter - basin D	4	8	6	3	3	5	**5.2**
Bloomfield Twp	545	Hidden Pines Sub.	9	3	3	8	2	3	**5.2**
Bloomfield Twp	602	Quarton Ridge	9	6	3	3	2	3	**5.2**
Bloomfield Twp	910	Maple Village	9	3	6	3	4	4	**5.2**
Southfield	173	Southfield Crossing Center	9	2	7	6	2	2	**5.1**
West Bloomfield Twp	403	Gateway Center - basin B	4	8	3	7	3	3	**5.1**
Southfield	179	Spring Hill Suites	9	6	3	3	2	2	**5.1**
Southfield	208	Lakeland Nursing Center - N basin	4	7	6	2	4	7	**5.1**
Southfield	234	City Center Office Center	9	6	3	3	2	2	**5.1**
Rochester Hills	330	State Farm Insurance	9	8	3	1	1	1	**5.1**
Troy	366	Strawberry Hill Sub.	6	5	4	6	5	3	**5.1**
Troy	369	Elm Court Sub.	7	5	4	5	3	4	**5.1**
Bloomfield Twp	548	Knollwood Pointe	8	6	3	4	2	3	**5.1**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Bloomfield Twp	631	Golling Chrysler	9	6	3	3	2	2	**5.1**
Bloomfield Twp	632	Oakhills Condos	9	6	3	3	2	2	**5.1**
Southfield	168	Essex Office Center	8	6	3	3	3	3	**5.0**
Southfield	221	First Center	9	3	4	6	2	3	**5.0**
Rochester Hills	356	Meadowbrook Elementary	5	7	3	7	2	3	**5.0**
Bloomfield Twp	377	Meadowlands of Bloomfield	4	6	6	4	4	6	**5.0**
West Bloomfield Twp	455	HCR Manor Care	4	9	4	3	3	4	**5.0**
Rochester Hills	467	Sanctuary in the Hills - basin C	3	8	6	3	3	6	**5.0**
West Bloomfield Twp	902	Brynmawr Condo	9	4	4	3	3	4	**5.0**
Bloomfield Twp	376	Eastway Farms Sub.	4	7	6	4	4	3	**5.0**
Bloomfield Twp	388	Pinetree Estates - N. basin	8	7	3	3	1	2	**5.0**
Bingham Farms	905	Bingham Office Park	9	4	2	6	4	1	**5.0**
Southfield	108	Weatherstone S. twnhses	3	10	2	5	2	4	**4.9**
Rochester Hills	339	Kingston Pointe North	3	9	4	4	3	4	**4.9**
Bingham Farms	358	Jamestown South	9	3	5	3	3	4	**4.9**
West Bloomfield Twp	407	Maplecreek Condo 2	8	6	3	3	3	2	**4.9**
Bloomfield Twp	544	Mitchell Ct. Condos	7	4	4	7	2	3	**4.9**
Southfield	134	Wellington Place Manor - SE basin	8	6	2	3	3	3	**4.9**
Rochester Hills	308	Guardian Angel	10	2	3	6	2	3	**4.9**
Southfield	236	Residence Inn	8	6	3	3	2	2	**4.8**
West Bloomfield Twp	460	Potomac Towne 1 - basin 1	4	4	6	6	3	7	**4.8**
West Bloomfield Twp	464	Potomac Village 1	10	6	3	1	1	1	**4.8**
Southfield	169	Wyatt Office Plaza	7	6	3	3	3	3	**4.8**
Southfield	188	Walnut Grove Condos	9	3	3	6	2	2	**4.8**
Southfield	287	New Hope Church	3	9	4	3	3	4	**4.8**
Bloomfield Twp	499	Stonehollow	9	3	3	6	2	2	**4.8**
Bloomfield Twp	600	Crofton Sub.	8	4	2	7	2	2	**4.8**
Bloomfield Twp	604	Indianwood Sub.	8	2	4	7	3	3	**4.8**
Beverly Hills	101	Westwood Common	6	6	4	4	2	3	**4.7**
West Bloomfield Twp	400	Jack Cauley Chevrolet - basin C	5	3	7	7	2	4	**4.7**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Southfield	105	CDI Systems	9	6	2	2	1	2	**4.7**
West Bloomfield Twp	401	Jack Cauley Chevrolet - basin B	4	6	4	7	2	3	**4.7**
West Bloomfield Twp	418	Townhomes at Maple Creek - W basin	4	8	4	3	2	4	**4.7**
West Bloomfield Twp	424	Oakbrooke Sub. - north	9	3	3	4	3	3	**4.7**
West Bloomfield Twp	441	Tam-O-Shanter - basin C	8	3	5	3	3	4	**4.7**
West Bloomfield Twp	694	Middlebelt Estates - E basin	4	9	3	3	3	2	**4.7**
Bingham Farms	908	Danka - North	9	3	2	3	2	7	**4.7**
Southfield	133	Wellington Place Manor - SW basin	6	7	2	3	3	3	**4.6**
Southfield	161	Galleria Office Park	3	6	3	8	3	4	**4.6**
Southfield	230	Oakland Commons - E basin	7	3	3	7	3	3	**4.6**
Southfield	231	Oakland Commons - W basin	7	3	3	7	3	3	**4.6**
West Bloomfield Twp	402	Gateway Center - basin A	2	7	6	3	4	6	**4.6**
West Bloomfield Twp.	448	West Bloomfield Nursing Home - S basin	9	4	3	2	3	3	**4.6**
Southfield	295	Plum Hollow Woods	9	4	3	3	2	2	**4.6**
Rochester Hills	342	Kingston Pointe South	2	8	4	3	4	6	**4.6**
West Bloomfield Twp	397	West Bloomfield Medical Bldg - E basin	4	3	8	2	6	7	**4.6**
Bloomfield Twp	472	Kent Ridge Sub.	4	9	3	3	2	2	**4.6**
West Bloomfield Twp	502	Chimney Hills Apt.	3	8	3	3	3	6	**4.6**
Southfield	166	Homestead Village	2	7	6	3	3	6	**4.5**
Southfield	191	Blue Cross Blue Shield - NE basin	9	2	3	6	2	2	**4.5**
Southfield	218	Woodcreek Apts. - pond 1	9	2	3	6	2	2	**4.5**
Southfield	219	Woodcreek Apts. - pond 2	9	2	3	6	2	2	**4.5**
Rochester Hills	303	True Green Chemlawn	9	2	3	6	2	2	**4.5**
West Bloomfield Twp	406	Jewish Community Center - basin B	9	3	3	3	3	3	**4.5**
West Bloomfield Twp	443	West Bloomfield Twp. Offices - SE basin	9	4	3	2	2	3	**4.5**
West Bloomfield Twp	444	West Bloomfield Twp. Offices - SW basin	9	4	3	2	2	3	**4.5**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Bloomfield Twp	475	Detroit Skating Club	7	4	3	6	2	2	**4.5**
Southfield	114	La Fontaine Office Bldg.	10	3	2	4	1	2	**4.5**
Southfield	225	Monticello Apts.	6	4	3	6	3	3	**4.5**
Rochester Hills	349	Deerfield Elementary	2	8	3	6	2	4	**4.5**
Southfield	237	Park Place Town Center	7	4	4	3	3	3	**4.4**
Southfield	296	National Storage	9	2	3	4	3	3	**4.4**
Bloomfield Twp	634	Adams Ct.	9	3	3	3	3	2	**4.4**
West Bloomfield Twp	701	Exclusive Fitness	4	8	3	3	2	3	**4.4**
Rochester Hills	341	Rockhaven Estates Condos	3	8	3	3	4	3	**4.4**
Troy	364	Windridge Sub. 2	8	3	2	6	2	2	**4.4**
Troy	370	Crescent Ridge Sub. 3	6	4	3	4	5	3	**4.4**
West Bloomfield Twp	417	Townhomes at Maple Creek - E basin	4	4	6	3	3	7	**4.4**
Southfield	146	Jewish Vocational Center	10	2	2	4	2	2	**4.3**
Southfield	207	Lakeland Nursing Center - S basin	8	4	3	3	2	2	**4.3**
Southfield	232	Oakland Town Square	7	4	3	4	2	3	**4.3**
Southfield	274	Kristy Woods Condos - W basin	9	3	3	3	2	2	**4.3**
Southfield	293	Plum Hollow Woods	9	3	3	3	2	2	**4.3**
Troy	371	Manchester Woods	8	4	3	3	2	2	**4.3**
Bloomfield Twp	389	Pinebrooke Manor Condos	9	3	2	4	2	2	**4.3**
Bloomfield Twp	682	Westview Basin	5	3	3	7	2	6	**4.3**
Southfield	213	Tim Hortons	9	2	3	3	3	3	**4.3**
Southfield	239	Hawthorne Suites	2	8	4	3	2	5	**4.3**
Southfield	279	Reid Glass	9	3	3	2	2	3	**4.3**
Rochester Hills	311	Devondale Warehouse	3	7	3	6	2	2	**4.3**
Rochester Hills	333	United Methodist Church	8	2	3	6	2	2	**4.3**
Rochester Hills	355	Avondale Middle School	3	6	3	7	2	3	**4.3**
West Bloomfield Twp	404	Gateway Center - basin C	3	10	2	2	3	1	**4.3**
West Bloomfield Twp	414	Maple Creek Condos 4	8	6	2	1	2	1	**4.3**
Troy	663	Sussex Place	6	5	3	3	3	3	**4.3**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Southfield	174	American Commerce Center, basin 2	3	3	6	6	4	5	**4.2**
Southfield	181	Tyler Estates 2	6	5	3	4	2	2	**4.2**
Rochester Hills	357	Kensington Sub.	9	2	3	4	2	2	**4.2**
West Bloomfield Twp	427	Potomac Towne 3 - basin 3	8	2	3	3	4	4	**4.2**
Rochester Hills	334	Assisted Living Complex	4	6	4	3	3	3	**4.2**
Rochester Hills	336	Pinetrace Sub. - park A	4	7	3	3	3	2	**4.2**
Rochester Hills	354	Northbrook Sub. - basin 1	3	7	3	4	2	4	**4.2**
Bingham Farms	359	Jacobson Bldg.	7	2	3	7	2	2	**4.2**
Bloomfield Twp	383	Willisons Bloomfield Farms Sub. - pond 2	4	6	4	3	3	3	**4.2**
West Bloomfield Twp	419	Maple Place - W basin	3	6	3	3	4	6	**4.2**
Bloomfield Twp	421	Bloomfield Chase	9	3	2	3	2	2	**4.2**
West Bloomfield Twp	703	Pizza Hut	9	2	3	3	2	3	**4.2**
Rochester Hills	307	Hi-Tech	8	2	3	5	2	2	**4.1**
West Bloomfield Twp	666	Bloomfield on the Lake Park	4	6	3	3	3	4	**4.1**
Southfield	170	Embassy Suites	9	2	3	3	2	2	**4.1**
Troy	372	Orchard Hills	7	3	3	4	3	2	**4.1**
Bloomfield Twp	385	Quarton Orchards	2	8	3	4	2	3	**4.1**
West Bloomfield Twp	412	Maple Farms	4	7	3	3	2	2	**4.1**
Bloomfield Twp	473	Provencal	4	6	4	3	2	3	**4.1**
Bloomfield Twp	635	Covington School	9	2	3	3	2	2	**4.1**
Bloomfield Twp	636	Meadowlake Farms	9	2	3	3	2	2	**4.1**
Troy	662	Amhurst on the River	9	2	3	3	2	2	**4.1**
Southfield	121	Carson Center - W basin	3	4	7	2	3	6	**4.0**
Southfield	184	Tyler Estates 1	9	3	2	2	2	2	**4.0**
Rochester Hills	343	American House	2	8	3	3	2	4	**4.0**
West Bloomfield Twp	693	Brookfield Academy	4	3	3	8	2	4	**4.0**
West Bloomfield Twp	901	Ridgewood Pt.	8	3	3	2	3	2	**4.0**
Bloomfield Twp	387	Pinetree Estates - basin B	9	2	3	3	1	2	**4.0**
Southfield	211	Nippendenso	3	6	3	4	2	4	**3.9**
Southfield	216	Oakwood at Southfield Apts.	4	3	5	4	4	4	**3.9**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Southfield	262	Detroit Federal Credit Union	2	7	3	4	2	4	**3.9**
West Bloomfield Twp	420	West Bloomfield Corp. Ctr.	4	6	3	3	2	3	**3.9**
West Bloomfield Twp	430	Simsbury Condos I	4	4	4	3	2	6	**3.9**
West Bloomfield Twp	696	Middlebelt Estates - S basin	4	5	3	3	3	4	**3.9**
Southfield	273	Standard Federal Bank	7	3	3	3	2	2	**3.8**
West Bloomfield Twp	501	Chimney Hills Apt.	8	2	3	3	2	2	**3.8**
Southfield	536	Reid Glass - Parking Storage	2	10	3	1	1	1	**3.8**
West Bloomfield Twp	903	Maple Place - E basin	4	3	5	2	4	6	**3.8**
Bloomfield Twp	390	Carrillon Hills	3	5	2	7	2	2	**3.8**
Southfield	141	Cranbrook Place Apts.	3	3	3	5	3	7	**3.7**
Southfield	242	Meadowcrest Apts.	4	2	3	9	2	2	**3.7**
Southfield	259	Word of Faith - basin B	2	4	3	7	3	4	**3.7**
Troy	365	River Meadow	2	6	5	3	2	3	**3.7**
Bloomfield Twp	481	Kirkway Ravines	6	3	3	4	2	2	**3.7**
Southfield	214	GE Plastics - N basin	8	2	3	2	2	2	**3.7**
West Bloomfield Twp	462	Potomac Towne 2	4	3	3	3	4	6	**3.7**
Bloomfield Twp	637	Pinehurst Sub.	8	2	3	2	2	2	**3.7**
Bloomfield Twp	912	Maple Village	6	3	3	3	2	3	**3.7**
Rochester Hills	353	Northbrook Sub. - basin 2	2	4	3	7	2	4	**3.6**
Rochester Hills	327	Allen Brothers	2	7	3	3	2	2	**3.6**
Troy	367	Adams Pointe	2	4	6	3	3	4	**3.6**
Troy	660	Cresent Ridge Sub.	4	2	3	8	2	2	**3.6**
Southfield	257	WRIF/WXYZ Studios	2	3	3	8	2	4	**3.5**
Southfield	286	Ingersoll	2	4	4	4	3	5	**3.5**
Rochester Hills	314	Colonial Mini Storage	8	2	3	1	2	2	**3.5**
West Bloomfield Twp	465	Temple Israel	4	4	3	3	4	2	**3.5**
Southfield	530	Parkwest Galleries	8	2	2	2	3	1	**3.5**
Southfield	175	Country Village Plaza	8	2	3	2	1	1	**3.5**
West Bloomfield Twp	393	aldingbrooke - basin2	2	6	3	2	4	3	**3.5**
West Bloomfield Twp	416	Maple Creek Condos 2	4	3	3	3	3	5	**3.5**
West Bloomfield Twp	692	Hidden Creek	4	3	4	2	2	6	**3.5**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Southfield	135	Wellington Place Manor - N basin	2	4	6	3	2	3	**3.4**
Rochester Hills	338	Pine Trace Golf Club	3	4	3	3	3	4	**3.4**
Bloomfield Twp	379	Bloomfield North Estates	4	2	3	6	2	3	**3.4**
Bloomfield Twp	384	Spruce Hills	3	4	2	6	2	2	**3.4**
Southfield	275	Kristy Woods Condos - E basin	2	6	3	3	2	2	**3.3**
Rochester Hills	350	Crooks Crossing East	9	1	3	1	1	1	**3.3**
Rochester Hills	351	Crooks Crossing East	9	1	3	1	1	1	**3.3**
West Bloomfield Twp	433	Simsbury Condos	4	3	3	4	2	3	**3.3**
Southfield	531	Victor Center Office - Retention Area 2	3	7	3	1	1	1	**3.3**
Southfield	233	Oakland Commons	3	3	3	4	4	3	**3.3**
Southfield	238	Park Place Town Center	4	3	3	3	2	4	**3.3**
Rochester Hills	332	American House	3	3	3	6	2	2	**3.3**
Bloomfield Twp	391	Applegrove	3	4	3	3	4	2	**3.3**
Troy	661	Estates of Cambridge	2	4	4	3	3	4	**3.3**
West Bloomfield Twp	909	Tam-O-Shanter - basin B	4	2	4	3	3	4	**3.3**
Southfield	246	Blue Water Productions	3	3	3	3	3	4	**3.1**
Troy	374	Forest Creek 1	3	3	3	3	4	3	**3.1**
West Bloomfield Twp	425	Oakbrooke Sub. - south	4	3	3	2	3	3	**3.1**
Rochester Hills	466	Sanctuary in the Hills - basin B	2	4	3	3	3	4	**3.1**
West Bloomfield Twp	698	West Bloomfield Twp. Public Library	4	2	3	3	3	4	**3.1**
Bloomfield Twp	439	Echowood Sub.	5	2	2	4	2	2	**3.1**
Southfield	104	Walgreen Drug	3	3	4	3	1	3	**3.0**
Southfield	220	Park Place Apts.	4	2	3	4	2	2	**3.0**
Southfield	525	Evergreen Nursing Home	3	2	2	6	2	3	**3.0**
Rochester Hills	326	Meadowbrook Ice Cream	2	3	4	3	3	3	**2.9**
West Bloomfield Twp	429	Ridgewood Pt.	3	2	5	2	3	3	**2.9**
Rochester Hills	705	Dana Automotive	2	4	3	3	2	3	**2.9**
Southfield	469	Carson Center	3	2	4	2	4	3	**2.9**
Troy	362	Charnwood Hills 4 - S basin	3	3	3	3	2	2	**2.8**

Table 5.3: Detention Basin Prioritization – Final Scoring (continued)

			Scoring from 1 to 10 (10 being very poor or highest priority)						
CVT	Basin ID	SiteName	Basin Hydraulics	Maintenance	Water Quality	Retrofit Potential	Safety	Aesthetics	Weighted Total
Bingham Farms	904	Arden Courts	4	2	3	3	2	2	**2.8**
Southfield	164	Meade Lexus East	3	2	3	3	4	2	**2.8**
Southfield	266	Sure Guard Storage	2	3	3	3	3	3	**2.8**
Rochester Hills	347	South Blvd. Municipal - S basin	4	3	2	2	2	2	**2.8**
Southfield	103	Walgreen Drug	3	2	5	2	1	3	**2.7**
Southfield	240	Lawrence Tech	2	3	3	3	2	3	**2.7**
Rochester Hills	319	Auburn Place	2	2	3	3	2	4	**2.5**
Southfield	270	Riverwood	3	2	4	2	1	2	**2.5**
Troy	361	Charnwood Hills 4 - N basin	2	2	3	4	2	2	**2.5**
West Bloomfield Twp	422	Maplewoods Sub.	4	2	3	2	1	1	**2.5**
Southfield	209	Irene's Myomassology	2	2	3	3	2	3	**2.4**
Southfield	125	Fountain Park Office Complex	1	2	5	2	2	3	**2.3**
West Bloomfield Twp	458	Sephardic Church	2	2	3	3	2	2	**2.3**
Rochester Hills	325	Meadowbrook Ice Cream	2	2	3	4	1	1	**2.3**
Rochester Hills	346	South Blvd. Municipal - N basin	3	2	2	2	2	2	**2.3**
Southfield	140	Evergreen Nursing Home	2	2	2	3	2	2	**2.2**
Southfield	532	Victor Center Office - Retention Area 3	3	2	3	1	1	1	**2.1**
Beverly Hills	102	Woods of Thurnberry	3	1	2	2	2	2	**2.0**
Southfield	538	Country Village Plaza	2	2	3	2	1	1	**2.0**
Southfield	699	Franklin Racquet Club - undergrnd	2	2	3	1	1	1	**1.8**
Southfield	126	Fountain View Office	1	2	2	1	2	2	**1.6**

Table 5.4: Detention Basin Categories

Basin Type	Description	Number in Main 1-2 (out of 373)	% of Total in Main 1-2	Comments
Dry	Dry basin with restricted orifice outlet.	187	50.1	Mainly for flood protection.
Wet	Wet constructed or natural pond with a minimum 3 ft. pool depth and restricted outlet.	87	23.3	Typically a natural pond, lake, or landscaped water feature.
Dry Extended Detention	Dry basin with a perforated riser pipe to a restricted orifice outlet.	27	7.2	Provides some water quality and erosion protection. Typically has an overflow.
Dry Catchbasin	Dry basin with a beehive CB. Water typically flows into the CB via pipes and out through a restricted orifice. Water backs up into the basin to provide storage.	26	7.0	Water backs up into the basin to provide storage. Typically has no overflow. Not recommended.
Wetland	Natural wetland area used for detention storage.	16	4.3	Provide good water quality, aesthetics, and habitat. Not recommended by MDEQ if it is not a constructed storm water wetland.
Parking	Surface parking lot and underground pipe storage with a restricted orifice outlet. Typically has no overflow.	8	2.1	Typically has no overflow. No water quality control.
Retention	Basin with no outlet. Water leaves through infiltration or evaporation. Designed for 2 x 100 yr capacity.	7	1.9	2 x 100 yr capacity. Emergency overflow.
Pumped Detention	Detention basin (typically dry) with pumped outflow. Typically has no overflow.	4	1.1	Typically has no overflow.
Wet Extended Detention	Wet pond (as above) with a perforated riser pipe to a restricted orifice outlet.	3	0.8	Provides some water quality and erosion protection. Typically has an overflow.
Inline Detention	Open drain with a weir structure providing some detention within the channel.	2	0.5	Not recommended by MDEQ.
Wet and Wetland	Wet pond (as above) with an attached wetland area or wetland shelf.	2	0.5	Provide good water quality, aesthetics. and habitat. Not recommended by MDEQ if it is not a constructed storm water wetland.
Dry and Parking	Dry basin with some parking lot and pipe storage. The restrictor is downstream in the storm sewer line. Typically has no overflow.	1	0.3	Flood protection.
Dry Catchbasin and Parking	Dry catchbasin type with some parking lot and pipe storage.	1	0.3	Typically a natural pond, lake, or landscaped water feature.
Total		**373**	**100**	

Table 5.5: Highest Ranked Retrofit Potential Sites

CVT	Basin ID	SiteName	Retrofit Potential	Expansion Capacity
West Bloomfield Twp	461	Potomac Towne 1 - basin 2	9	100
Southfield	524	Weatherstone N. Townhouses - S basin	9	100
Southfield	226	Willowtree Apartments	9	0
West Bloomfield Twp	396	West Bloomfield Medical Bldg - W basin	9	0
Bloomfield Twp	638	Shaker Heights	9	50
Rochester Hills	331	Robert Evans Drain Regional - Outlot B	9	25
Southfield	250	MDOT Regional	9	100
West Bloomfield Twp	463	Potomac Village 3	9	100
Troy	373	Longview Acres	9	50
Southfield	242	Meadowcrest Apts.	9	0
Southfield	154	Hampton Hotel	8	0
Rochester Hills	318	Lueders Drain Regional - Midvale basin	8	0
West Bloomfield Twp	395	CVS Pharmacy	8	100
Rochester Hills	309	Northfield Industrial	8	0
West Bloomfield Twp	399	Jack Cauley Chevrolet - basin A	8	75
Southfield	215	Trowbridge Apts.	8	100
Southfield	914	Burger King	8	0
Rochester Hills	547	Chope Union	8	100
Southfield	116	Pavilion Twnhse Condos	8	100
Bloomfield Twp	482	Dordan Sub.	8	0
West Bloomfield Twp	415	Maple Creek Condos 3	8	100
Southfield	535	Word of Faith - basin D	8	100
Rochester Hills	323	Combustion Research	8	75
Bloomfield Twp	551	Clarendon Crest	8	100
Rochester Hills	352	Meadowcreek Condos	8	0
Southfield	185	Villas of Pebble Creek East	8	50

CVT	Basin ID	SiteName	Retrofit Potential	Expansion Capacity
Southfield	228	Irvine Rehab Center	8	50
West Bloomfield Twp	432	Simsbury Condos	8	25
Southfield	180	Maple Tree Apts.	8	100
Southfield	258	Word of Faith - basin A	8	0
Bloomfield Twp	545	Hidden Pines Sub.	8	0
Southfield	161	Galleria Office Park	8	50
West Bloomfield Twp	693	Brookfield Academy	8	0
Troy	660	Cresent Ridge Sub.	8	100
Southfield	257	WRIF/WXYZ Studios	8	0
West Bloomfield Twp	503	Woodcliff on the Lake	7	0
Southfield	110	Chelsea Crossing twnhse Condos	7	0
West Bloomfield Twp	691	Compuware	7	0
West Bloomfield Twp	523	Autumn Ridge Estates	7	25
Southfield	131	Franklin Hills Apts.	7	0
West Bloomfield Twp	521	Village Square	7	0
Southfield	212	Denso International - W basin	7	0
West Bloomfield Twp	457	Dunhams	7	100
Rochester Hills	328	Rochester Hills Exec - A	7	100
Bloomfield Twp	546	Bloomfield Crossing Sub.	7	100
Southfield	534	Word of Faith - basin C	7	0
Southfield	217	Village House Condos	7	100
Bloomfield Hills	480	Whispering Pines	7	0
Bingham Farms	907	Danka - South	7	0
Southfield	260	Meadowbrook Villas	7	25
Rochester Hills	313	NY Coney	7	0
Southfield	162	Galleria - NE basin	7	0
West Bloomfield Twp	695	Middlebelt Estates - NW basin	7	50

CVT	Basin ID	SiteName	Retrofit Potential	Expansion Capacity
Southfield	139	Chanticleer Condos	7	25
Bingham Farms	360	Woodlynne	7	100
Southfield	132	The Lakes Apts.	7	100
West Bloomfield Twp	403	Gateway Center - basin B	7	0
Rochester Hills	356	Meadowbrook Elementary	7	0
Bloomfield Twp	544	Mitchell Ct. Condos	7	0
Bloomfield Twp	600	Crofton Sub.	7	0
Bloomfield Twp	604	Indianwood Sub.	7	0
West Bloomfield Twp	400	Jack Cauley Chevrolet - basin C	7	0
West Bloomfield Twp	401	Jack Cauley Chevrolet - basin B	7	100
Southfield	230	Oakland Commons - E basin	7	25
Southfield	231	Oakland Commons - W basin	7	0
Bloomfield Twp	682	Westview Basin	7	0
Rochester Hills	355	Avondale Middle School	7	0
Bingham Farms	359	Jacobson Bldg.	7	0
Bloomfield Twp	390	Carrillon Hills	7	0
Southfield	259	Word of Faith - basin B	7	0
Rochester Hills	353	Northbrook Sub. - basin 2	7	100

Section 6
Recommendations

The following section summarizes recommendations for detention basins relative to the findings discussed in Section 5. General recommendations related to the overall regulation and management of stormwater detention facilities are presented first, followed by more specific recommendations regarding design and review of future detention basins, additional investigations of existing detention basins, future inspection and maintenance programs, maintenance needs and costs for existing detention basins, potential modifications and costs for existing detention basins, and potential retrofits and costs for existing detention basins.

General Recommendations

A. Establish an adequate record keeping system for all existing and future detention basins, including:
    - Final design calculations and drawing(s);
    - As-Built drawing(s);
    - Property owner contact information;
    - Maintenance agreements;
    - Documentation of proper basin construction;
    - Documentation of correspondence;
    - Documentation of basin maintenance and inspection.

B. Develop model ordinance(s) for the Main 1-2 Subwatershed that include(s) specific, quantitative design criteria for detention basins to provide treatment for water quality as well as extended detention to protect from streambank erosion.

   Recommendations and considerations for developing this ordinance and design criteria are presented in subsequent text, starting on page 6-3.

C. Develop a design review checklist to insure that basins are designed correctly based on the desired function(s).

D. Develop and implement an inspection program to document that construction has been completed in accordance with approved design, including use of a field inspection form(s) for final inspections.

E. Establish detention basin maintenance requirements. Appropriate basin maintenance programs should specify the person(s) or organization responsible for the maintenance and how the maintenance operations will be financed. (University of Wisconsin – Madison, 2004.)

Recommendations and suggestions for detention basin maintenance and inspection are presented in the subsequent text, starting on page 6-8.

F. Develop a model maintenance agreement and/or ordinance or other regulatory mechanism that may be adopted by local communities requiring adequate basin maintenance. Communities may want to consider establishing a policy which allows them to hire a qualified contractor to conduct detention basin maintenance if the owner does not adequately perform maintenance as required.

G. Develop and implement a detention basin inspection program to ensure that basins are being adequately maintained. Insure that adequate regulatory mechanisms are in place to require construction approvals, notification procedures, inspection fees, and compliance.

Recommendations and suggestions for detention basin maintenance and inspection are presented in the subsequent text, starting on page 6-8.

H. Review the detention basin rankings and data presented in Sections 5 and 8 and develop community specific plans for addressing high priority maintenance needs and implementing basin modifications and/or retrofits.

Recommendations and costs for basin maintenance, modifications and potential retrofits are presented in the subsequent text, starting on page 6-9.

I. Develop and implement a program to educate developers, homeowner associations, and other basin owners on the benefits of detention basins and the need for adequate maintenance. One example of this type of education is the workshops recently conducted in Auburn Hills and Bloomfield Township.

J. Consider developing an incentive program to encourage owners of existing detention basins to undertake maintenance or retrofit of their basins.

Design and Plan Review of Future Detention Basins

In developing the detention basin design criteria and plan review checklist –recommended in General Recommendations B and C in the previous subsection – the OCDC and communities should consider the following items. This list is based, in part, on field observations and the finding discussed in Section 5. It is not intended to be an all-inclusive list of design criteria.

- Runoff Coefficient: In some cases, the runoff coefficient (C factor) noted in the design calculations seemed low. A low runoff coefficient can significantly reduce the amount of storage volume required. Although it was not within the scope of this project to evaluate all of the design parameters used in the initial design calculations, this is worth noting. (The information is available within the inventory database so that communities can compare the runoff coefficient (where it is available) to the land use to screen for this problem.) Communities should review their design criteria to insure that adequate guidance is available for designers as well as staff conducting plan review.

- Site Drainage: On some sites inventoried, not all of the stormwater runoff from the site was detained even though there appeared to be adequate storage volume for the whole site. In some cases, basins did not receive any direct storm sewer inflow. In other cases, not all of the site drainage was directed through the basin and was, therefore, not detained. This was sometimes noted in the comments section of the database. Site drainage should be thoroughly reviewed during plan review to ensure that all site drainage is adequately detained.

- Soil Conditions: Local soil conditions affect the infiltration rate, side slope stability, bottom erosivity, ability to grow vegetation, and chemical and biological processes in wet ponds. Many of the basins inventoried had poorly drained clayey soils or minor ponding. However, approximately 30 basins had sandy or well drained soils.
    - Although soil observations were not completed for all 373 basins the results suggest that retention or infiltration basins may be a viable option in about 10% of the Main 1-2 subwatershed.
    - Extra precautions should be used to stabilize silty and unconsolidated soils. Seed mixes and maintenance practices should be modified in areas with clay soils.
    - Where wet basins are planned, pond water loss can be a problem. Areas with high percentages of coarse grained soils may need clay blankets, liners, or soil compaction to maintain water levels.

- Basin Shape: Irregularly-shaped basins are generally more aesthetic than rectangular, triangular, or circular basins. The basin should be designed to fit in to the surrounding natural topography (University of Wisconsin – Madison, 2004).

- Storm Sewers: Require criteria, such as recommended by ASCE (ASCE, 1970), for the design of storm sewers so that they are self-cleansing such as:

  Velocity = 3.0 ft/sec (0.9 m/sec) or

  Minimum Shear Stress = 0.027 to 0.26 lb/ft^2 (1.3-12.6 N/m^2)

- Inflow: In some cases, storm sewer discharges into the basin were causing erosion. All stormwater runoff should be directed to the basin at a non-erosive velocity. This may require vegetation and the installation of energy dissipaters or level spreaders.

- Outflow: Recommendations for Outflow design include:
  - Discourage the use of Parking lot and Dry Catchbasin type basins where the Outflow is a beehive catchbasin located at the bottom of a depression which drains through a restricted pipe away from the site. These are prone to blockage and typically provide no Overflow structure.
  - Wet ponds may use a surface weir, pipe, or wide channel to minimize erosion (University of Wisconsin-Madison, 2004) and usually have less problems with blockage except with floating debris.
  - Encourage the use of a riser pipe to provide extended detention or locate the restrictor within the pipe leaving a drop structure. The drop structure should have a sump which can be cleaned out and which minimizes blockage. A 4" Outflow pipe at the bottom of a dry basin is prone to blockage and is difficult to clean

- Overflow Structures: An overflow structure or spillway is necessary to direct flows away from buildings in case the Outflow becomes blocked or the runoff exceeds the capacity of the basin. Over 56% of basins inventoried did not have a formal overflow structure or emergency spillway. The topography of the site may have allowed some of these basins to overflow to a street catchbasin or to a ditch, but for safety purposes and flood protection this is a problem. Some basins had one or more overflow structures as well as an overflow spillway, but some basins, particularly older ones, did not have a way to safely overflow.

- Freeboard: Both FEMA and BOCA require one foot of freeboard above the storage volume to allow the basin to safely overflow through the overflow swale or structure when the basin exceeds its storage capacity. Approximately 78% of the basins inventoried provided no freeboard or less than 1 ft. of freeboard. (The amount of freeboard could not be measured at many basins.) Minimum depth of freeboard should be an established design criterion and should be reviewed during the plan review process for future basins.

- Litter and Debris: Although the occurrence of litter debris cannot be entirely eliminated, the use of fencing, trash racks, and sumps may minimize the impact of debris.

- Access: Provide a right-of-way and stable access road for trucks and appropriate excavators and other anticipated maintenance equipment.

- Fencing: Strategic placement of fencing, such as along a roadway, can help to keep litter from a basin. However, fencing can also reduce access for maintenance and can be costly to install and maintain. Appropriate slope grading, safety features, and landscaping may be used instead where site conditions allow.

- Velocities: Spillways, Inflow pipes and Outflow structures should be adequately stabilized and designed to discharge at non-erosive velocities.

- Temporary Sedimentation Basins: An area should not be used as a temporary sediment basin if an infiltration basin is to be constructed. If a dry basin is used as a temporary sediment basin during construction and the bottom is not excavated and stabilized, then there will be problems with invasive vegetation, ponding, algae, and aesthetics.

- Safety/Accessibility: Although it is difficult to totally exclude people from basins, accessibility is one of the main issues affecting safety. Based on the observations in the field and adaptations of published recommendations (University of Wisconsin – Madison, 2004), the following factors are important safety considerations:
  - Location – reducing the visibility of the basin reduces accessibility. Locating basins on private property with adequate 'no trespassing' signage allows less access.
  - Isolation - Fencing of steep sided and deeper, wet basins promotes exclusion, but often causes aesthetic concerns. Fenced basins are often not maintained adequately and may impede

emergency access, if necessary. Fencing may be required around steep side slopes, retaining walls or some Outflow structures. Plant screening provides another solution with the combined benefits of reducing visibility, uptake of nutrients, soil stabilization, and some filtration of overland runoff. Emergent vegetation such as cattails along the shoreline can prevent basin access. Likewise, maintaining mowed turf grass to the water's edge encourages access, thereby increasing safety problems.

- Other planned uses of the basin – Detention basins should generally be used for storm water control and treatment only. Maintaining a stocked fishery for other recreational purposes presents several problems: it encourages access, it may require aeration in cold climates which can create dangerous ice conditions, and fish from a storm water basin could represent a health risk if eaten. However, minnows and other small fish can reduce populations of mosquitoes and other biting insects. Since basins are not tested and potentially represent a health risk due to high bacteria and other pollutants, swimming should not be encouraged in storm water basins.
- Appropriate signage – depending on site-specific potential problems and concerns, warning signs may address thin ice, no littering, no trespassing, pick up animal wastes, no feeding wildlife (particularly waterfowl), steep slopes, or other concerns.

- Side Slopes: A minimum 10 ft. wide bench with a 10:1 (H:V) slope should be constructed around the edge of wet basins. Upper side slopes should be 3:1 (H:V) or less. Side slopes should be stabilized with vegetation and mulch or appropriate rolled erosion control products.

- Water Depth and Level Stability: Designing for appropriate water depths and minimizing wide fluctuations in water levels should be considered. Steep drop-offs at the pond edge should be avoided.

- Bar grates: Bar grates should be installed over overflow structures and on end-sections of pipes 18 inches in diameter or larger. Openings should be smaller than 6 inches yet large enough to reduce the potential for debris blockage and trapping animals. Particularly where velocities exceed three feet per second, anti-vortex baffles should be considered as part of a bar grate on Outflow structures.

- Pathways: Pathways should not be too steep, turn abruptly near the water, or be located directly adjacent to the water edge.

- Stabilize Dry Basins: Dry basins should be cleaned out and stabilized following the completion of all construction. Stabilizing the bottom of the basin at the elevation of the outlet will reduce the aesthetic problems with invasive plant growth, ponding, and algae. Detention basin plans should clearly indicate how stabilization will be implemented and when.

- Stabilize Basin Side Slopes: Side slopes should be adequately stabilized and erosion prevention should be utilized while the site is under construction. Plans should clearly indicate how stabilization will be implemented.
  - Permanent stabilization of the side slopes of the basin should be completed within 5 days of final grading.
  - Slopes steeper than 3:1 (H:V) should be stabilized with appropriate erosion control blankets of turf reinforcement mats. Otherwise side slopes can be seeded and stabilized with crimped straw or hydraulically applied mulch.
  - The storm sewer outfalls (Inflows to the basin) and basin Outflow structures should be adequately stabilized and have appropriate energy dissipators, where necessary.
  - The use of deeper-rooting non-invasive, native plant species should be used to provide better soil stabilization and infiltration resulting in lower maintenance, reduced runoff volumes, and improved aesthetics.

- Landscaping and vegetative buffers: There are several considerations in selecting appropriate landscaping and vegetation. Frequent mowing is necessary to maintain lawns in dry basins. Depending on the landscaping, the side slopes of wet basins may need periodic mowing or pruning of trees and shrubs. Some mixes of native sedges and forbs require less maintenance once they become established. Upland vegetation should complement the aquatic vegetation expected such as a buffer of shrubs, trees, sedges and forbs blending into emergent vegetation along a shallow shelf area. Detention basin plans should clearly indicate the landscaping and/or vegetation to be implemented as well as anticipated maintenance.

Additional Investigations of Existing Detention Basins

As noted in the Findings and Observations (Section 5) field investigations were not always successful in verifying all basin parameters. The following items may warrant further investigation. The OCDC and communities should review the overall subwatershed rankings as well as their individual community-specific rankings and determine which investigations are appropriate.

- Verify Actual/Provided Detention Basin Volumes: During the study, it was not possible to accurately determine the ratio of required storage volume to volume provided for nearly 50% of the basins. After the more overgrown basins are maintained and/or the Outflow structures are cleaned out, a more detailed evaluation of the storage volume provided and the need for providing additional storage should be completed.

- Verify Storage Volume Deficiencies: The volume of detention basin storage provided should be at least the volume required by County or local standards. Where the inventory database indicates that the volume estimated in the field is less than 75% of the volume required (per the design calculations) the county and/or communities should initiate further investigation. If further investigation reveals that the actual basin capacity significantly under-sized, the community (or County) should determine if it is appropriate and/or feasible to provide additional volume. If additional storage is appropriate, then the community should work with the owner to determine a way(s) to provide additional storage onsite, offsite, or during site re-development or expansion.

- Verify Existence of Restrictors: Over one third of the basins did not have an adequate restrictor installed or the restrictor size could not be verified. Sometimes the basin Outflow was underwater, buried, or not found at all. In some cases the restrictor may be installed somewhere in the storm sewer system downstream of the basin outlet. Therefore, further investigation of these basins may be necessary to determine if the basin discharge is being restricted to the allowable discharge rate (per County or local standards) or not.

- Investigate Sediment Accumulations: More detailed investigations of sediment accumulation in wet basins should be completed to determine the need for dredging, particularly in ponds where nuisance algae, excessive aquatic vegetation, and high turbidity are a problem. Some wet ponds had excessive sedimentation and obviously needed dredging. In other ponds, the depth of sediment was unknown because the as-built pool depth was not provided and sediment probing was not possible. Excessive levels of sediment in a pond can lead to loss of storage, increased turbidity, anaerobic bottom conditions, and the storage of high nutrient levels.

Future Inspection and Maintenance Programs

In developing the detention basin inspection and maintenance programs - recommended in General Recommendations D, E, and F presented in the previous subsection – the OCDC and communities should

consider the following items. This is not intended to be an all-inclusive list of inspection and maintenance concerns.

- Periodically Inspect Structures: Inspect catchbasin sumps, overflow structures, pipes, and other structures yearly (in late spring or late fall).

- Periodically Clean Structures: To some degree, almost 33% of the Inflow pipes were blocked and over 30% of the Outflows were blocked. Structures must be periodically cleared of litter, sediment, and debris in order to function properly. Cleaning structures on a routine basis can reduce and/or eliminate the need to clean out the basin itself. The type of Outflow structure and the location of the restrictor can significantly affect the amount and frequency of Outflow blockage. An appropriate cleaning frequency for structures can be determined through periodic inspections.

- Periodically Clean Basin: Litter, trash, woody debris, decayed vegetation, and other debris needs to be cleaned from basins on a regular basis. This is particularly important near Outflow pipes and other structures. The appropriate cleaning frequency for the basins can be determined through periodic inspections.

- Maintain Vegetation: Some wet ponds have problems with excessive aquatic vegetation or algae to the extent that they may require periodic maintenance. Other basins have problems with invasive upland plants.

- Inspect for Illicit Discharges: Several pollutant 'hotspots' and potential illicit discharges and connections were identified during the field assessment. Basin inspection procedures should include checking for signs of illicit discharges.

Maintenance Needs and Costs for Existing Detention Basins

As indicated in General Recommendation H, the county and communities should review the detention basin data and rankings in Sections 5 and 8 and develop community specific plans for addressing high priority maintenance needs and implementing basin modifications.

- Sediment Removal from Basins: Some wet ponds had excessive sedimentation and obviously needed dredging. Excessive levels of sediment in a pond can lead to loss of storage, increased turbidity,

anaerobic bottom conditions, and the storage of high nutrient levels. Dredging can be costly but may be the only way to restore a wet basin.

Costs for removal and disposal of sediment are dependent on whether the sediment is contaminated or not. Sediment contamination is not usually a problem in residential land use areas but should be one of the first things determined when evaluating costs.

If the effort and expense are taken to dredge a basin, an accessible sediment trap should be installed at the major Inflows and appropriate source controls should be considered.

Typical costs for sediment removal from basins are presented in Table 6.1.

- Structural Repairs and/or Replacement: During the inventory approximately 5% of Inflow pipes and 5% of Outflow pipes were identified as needing structural repair. The condition of other structures could not be verified because they were not found or were buried. In addition erosion around pipes and structures was common. The condition of the structures should be verified through review of the photos in the database or through further field investigation, and prioritized for repair or replacement.

  Typical costs associated with pipe replacements are presented in Table 6.1

- Cleaning Pipes and Structures: Sediment bars, algae, litter, and organic debris were observed deposited in front of many of the Inflow pipes. Almost one third of the Inflow pipes had some degree of blockage and over 7% of the Inflow pipes were more than half blocked. Over 30% of the Outflow pipes were blocked with sediment, riprap, vegetation, and/or debris. The condition of some Outflow pipes could not be verified because they were not found or they were submerged. Blockage of the Outflow from the basin has a significant impact on the basins hydraulic characteristics, its ability to drain, and represents a possible threat to flooding.

  Communities should prioritize cleaning of pipes and/or other structures based on the basin data and ranking information.

  Typical costs associated with cleaning pipes and structures are presented in Table 6.1

- Basin Slope Stabilization: Erosion of side slopes was common due to a lack of adequate permanent erosion control measures. Erosion can lead to basin sedimentation, Outflow blockage, and safety concerns. Communities should prioritize slope stabilization needs based on the basin data and ranking information.

  Typical costs for slope stabilization are presented in Table 6.1.

The costs presented in Table 6.1 are estimated construction costs only. Depending on the magnitude of work and whether or not the community can implement the maintenance with its own staff and equipment, actual costs may be higher due to engineering, permitting and/or construction oversight. These costs are presented for planning purposes only.

Basin Modifications and Estimated Costs

OCDC and the participating Main 1-2 communities should review the basin specific information in Section 8 to determine which of their basins may not be fully functioning as designed. Where maintenance alone is not sufficient to achieve the design objectives, minor modifications may be necessary. Basin modifications refer to physical or structural changes that do not alter the type of basin, but are necessary for the basin to safely achieve its original design objectives.

Typical basin modifications that may be necessary include:

1. Install restrictor in the outflow pipe, if required, to control the basin discharge rate.
2. Modify outflow to reduce occurrence of blockage(s).
3. Install energy dissipater or level spreader at inflow locations to prevent erosion and reduce velocities. If the basin discharges directly to an open channel, the outfall may need to be stabilized.
4. Install fencing, bar screen, or grating.
5. Install overflow structure or emergency spillway to safely direct flows that exceed the capacity of the basin.

The following modifications are not typically necessary to meet original design objectives, but may be desirable to enhance and/or achieve water quality, aesthetic, and/or other benefits:

6. Establish vegetative buffer to improve soil stability, water quality, and aesthetics.
7. Install sediment trap/forebay to enable easier and more frequent maintenance.

8. Provide access road of gravel, vegetated geocellular confinement, or grass paver for access to perform maintenance, or repairs.
9. Install measures to reduce short-circuiting such as berms, baffles, fences, or walls to enhance the removal of suspended fine solids.
10. Daylighting storm sewer pipes into dry swales to provide some water quality pre-treatment, reduce runoff volumes, and decrease velocities.
11. Provide pre-treatment before discharging to basin such as: source controls, proprietary vortex separator, or grass swales.
12. Install pond fountain or bottom aerator.
13. Provide signage (regarding no swimming, wildlife, prohibited usage, etc.)

Tables 6.2A & B provide cost estimates for these basic basin modifications. Additional mobilization costs (approximately 10%) may need to be added in some cases to the cost estimates if the modification is limited in scope. The cost estimates should be used for planning purposes only.

Potential Retrofits and Estimated Costs

Basin retrofitting refers to re-constructing a basin to provide benefits in addition to those for which it was originally designed.

It is recommended that OCDC and the participating Main 1-2 communities review the data in their respective Table in Section 8 and prioritize the basins for retrofit based on the benefits that they want those basins to achieve as well as their priorities for basin maintenance and modification. Due to the considerable upfront costs required for retrofitting (and likely higher maintenance costs), the development of appropriate funding mechanisms are required to adequately implement retrofits as part of a long-term stormwater management program.

Because detention basins already exist, are generally accepted, and the property has been allocated for their use, they make good candidates for modification or re-construction to provide other benefits in addition to flood control. Most of the detention basins in the Main 1-2 Subwatershed were designed to provide only peak flood control, however these basins may be modified to provide other benefits such as:

- Providing regional detention to accept flows from a larger drainage area – these facilities can reduce construction and maintenance costs (MDEQ, 1999) but few areas in the Main 1-2 have adequate room for expansion without purchasing adjacent land.

- Water quality treatment – MDEQ recommends that treatment for water quality should be addressed throughout a watershed (MDEQ, 1999).
- Streambank erosion protection – basins that combine extended detention storage with peak flood control storage have the potential to protect streams from excessive erosion. Due to the extent of channel erosion throughout the Main 1-2, extended detention is recommended throughout the subwatershed.
- Groundwater recharge – promoting groundwater recharge by using infiltration practices is recommended to reduce impacts to stream temperatures and flows during drought. Because retention and infiltration practices are the only ones that reduce the volume of stormwater runoff, they are the best options for stormwater management. However, they are also the most susceptible to failure when not design and constructed in conformance with the best available guidance. For infiltration practices, the soil should have an infiltration rate of at least 0.52 in/hr (hydrologic soils group A or B).

Many new types of stormwater management facilities have been developed over the past few decades to achieve multiple objectives. The following discussion describes the types of detention facilities found in the Main 1-2 and clarifies some of the terminology before presenting specific retrofit options.

The majority of the detention basins in the Main 1-2 Subwatershed were conventional dry basins designed to provide flood protection. However some had unique design characteristics and it was useful to classify them into several types. There were ten different types of basins and three that provided a combination of two different types of detention for a total of thirteen basin categories. The basin type for each of the 373 detention basins is indicated in the database and Table 7.3A. Table 5.4 describes the characteristics of each type of basin and provides the number of each type. Table 5.5 lists the highest ranked retrofit potential sites. Table 6.3 compares the characteristics of various basin alternatives.

- Dry basins – This type of basin is the most common in the Main 1-2. It is typically an excavated basin with a restricted outlet at the elevation of the basin bottom. Dry basins may provide up to 10% Total Suspended Solids (TSS) removal (Schueler, 1995). The fact that sediment accumulation was not a pervasive problem may be because the dry detention facilities do not provide much pollutant removal benefits. 'Short-circuiting' was also common in many dry basins. Although this allows the basin to drain quicker during small rain events, it reduces water quality benefits. Dry basins without extended detention storage do not provide adequate streambank erosion protection (CWP, 2004). Dry

basins are not a recommended best management practice for water quality improvement (MDEQ, 1999).

- Wet basins – Wet detention basins maintain several feet (at least 3 ft) of water in a permanent pool (University of Wisconsin – Madison, 2004). The primary pollutant removal mechanism is through settling, but nutrient removal also occurs through biological activity in the pond. Pocket ponds can be used in areas that receive drainage of 1 to 5 acres. Ponds have good TSS removal at approximately 75% (Schueler, 1995). Pollutant removal and streambank protection benefits can be improved by combining a permanent pool with extended detention (such as in the wet extended detention basin).
- Dry extended detention – Approximately 7% of the basins in the Main 1-2 were dry extended detention. These basins slowly release the runoff from smaller (1 to 2 yr) storms, achieve approximately 30% TSS removal (Schueler, 1995). They do not have a permanent pool, but could be constructed with small 'micropools' at the inlet and outlet of the pond to further improve water quality. They can also protect against streambank erosion and provide some groundwater infiltration, but have limited pollutant removal.
- Dry catchbasin and parking lot – Dry basins with a catchbasin outlet and underground parking storage facilities provide no sediment removal unless catchbasin sumps are provided somewhere in the storm sewer system. Catchbasin sumps can provide approximately 22% TSS reduction (University of Wisconsin – Madison, 2004). However, these sumps must be maintained in order to be effective. Catchbasin sumps begin to act as a source of sediment when they become 50 to 60% full (Sutherland, 1998). Sediment accumulation in sumps, pipes, and structures was a ubiquitous problem.
- Wetlands – Stormwater wetlands are designed specifically for the purpose of treating stormwater runoff, and typically have less biodiversity than natural wetlands in terms of both plant and animal life. There was little or no detailed design information for the wetland detention facilities in the Main 1-2 because most were originally natural, non-uniform wetlands. MDEQ does not recommend altering natural ponds and wetlands for stormwater treatment and/or storage (MDEQ, 1999). The use of constructed 'artificial' stormwater wetlands is recommended in areas with appropriate hydrology because the TSS and nutrient removal of constructed stormwater wetlands is very high (Table 6.3) and they provide aesthetic value. There are several design variations of the stormwater wetland, each design differing in the relative amounts of shallow and deep water, and dry storage above the wetland (CWP, 2004).
- Retention – The terms 'detention' and 'retention' are sometimes used interchangeably. However, MDEQ defines a retention basin as a storm water management practice that 'captures stormwater runoff, and does not directly discharge to a surface water body' (MDEQ, 1999). Water leaves the basin mainly by infiltration, but may also leave through evaporation and transpiration. Retention

basins should have an emergency overflow to protect against flood damage when the basin capacity is exceeded. Because retention reduces the volume of stormwater runoff, they are one of the best options for stormwater management. However, when constructed to OCDC design requirements, retention basins require enough volume for two 100 yr storms which can be costly to construct.

- Pumped detention – Pumped detention basins offer the opportunity for a permanent wet pool to provide some water quality benefits. Out of the four pumped basins in the Main 1-2, only one had a permanent pool. Gravity outflow structures are preferred to pumped outlets where conditions allow due to possible problems with pump failures.
- Wet extended detention – These basins are similar to the wet basins described above but provide extended detention. They achieve up to 75% TSS removal (Schueler, 1995). Extended detention can also protect against streambank erosion, but was only present in 3-4% of the wet basins in the Main 1-2 subwatershed.
- Inline (online) and off-line detention – Inline detention generally involves the widening the floodplain width and constructing an embankment across the channel in order to provide detention storage within the floodway. The storage of water in excavated areas or closed conduits next to an open channel is termed off-line detention (Mays, 2001). The off-line facility can be designed to capture the first flush and/or large flood events and discharge them back to the channel over an extended period of time. There are two inline detention facilities identified in the Main 1-2, neither of which have adequate expansion room to enable them to be re-constructed as off-line basins. Off-line basins are recommended where room permits (MDEQ, 1999). Inline facilities can interfere with the sediment transport capacity of a stream and therefore may require high maintenance, provide minimal water quality benefits, significantly warm the water, and prevent migration of fish and aquatic life.
- Infiltration trenches, infiltration basins, and dry wells – Infiltration trenches and dry wells are similar in that they are generally an excavated trench that is filled with coarse aggregate and covered with a layer of pervious soil (MDEQ, 1999). Dry wells primarily infiltrate runoff from rooftops, while infiltration trenches capture runoff from streets and parking lots. Although these practices were not found during the inventory of the Main 1-2, they are recommended as possible retrofit options (Schueler, 1995 and MDEQ, 1999). For infiltration practices, the soil should have an infiltration rate of at least 0.52 in/hr (hydrologic soils group A or B). Based on preliminary field observations, infiltration practices may be appropriate in approximately 10% of the Main 1-2. Infiltration basins are also a recommended stormwater management practice, but they are not a good option for retrofitting existing basins due to the potential for failure (University of Wisconsin – Madison, 2004).

Possible basin retrofits include:

1. Convert Dry Detention Basin into Dry Extended Detention – There are 19 basins (<9% of the dry and dry catchbasin type of basins) in the Main 1-2 that have 75% or more room for expansion and should, therefore, be further evaluated for re-construction to provide extended detention. An additional six basins are estimated to have 50% expansion area available. Also, because the storm quantity (flood control) storage is provided on top of the extended detention storage, other basins could provide extended detention if they can be excavated deeper.
2. Convert Dry Detention Basin into Wet Extended Detention – There are 18 basins (<8% of the dry basin, dry catchbasin, and dry extended detention type of basins) in the Main 1-2 that have 75% or more room for expansion and have poorly drained soils and should, therefore, be further investigated for the ability to provide wet extended detention.
3. Convert Dry Detention Basin into Constructed Wetland Basin – There are 15 basins (<8% of the dry basin, dry catchbasin, and dry extended detention type of basins) in the Main 1-2 that appear to have 100% or more room for expansion and have poorly drained soils. Of these 15 basins, eight are larger than ¼ acre and should, therefore, be further investigated for the ability to provide constructed wetlands.
4. Convert Dry Pumped Detention Basin into Wet Pumped Detention Basin – there are four dry pumped detention basins and one wet pumped detention basin in the Main 1-2 subwatershed. Of the four dry pumped detention basins, one is smaller than ¼ acre and one is used by residents as part of their backyards. Therefore, two basins could be further investigated for the ability to provide a permanent pool.
5. Convert Any Basin into Regional Detention Facility – There are two basins in the Main 1-2 that have 100% or more room for expansion and are larger than one acre and could, therefore, be further investigated for the ability to provide regional detention.
6. Retrofit Any Dry Basin to Replace an Inflow Pipe with an Infiltration Trench or Dry Well – There are 20 dry basins with sandy or hydrologic group Type A or B soils were present. At these basins, either replacing a section of storm sewer by an infiltration trench or re-directing roof (or footing) drainage to a dry well could be further investigated.

Table 6.4 lists the estimated costs for these typical retrofits. The costs presented are construction costs only. Where retrofitting costs are not available, the typical cost of new construction is provided. It is important to recognize that retrofitting costs may be higher. An additional 25-30% should typically be

added to the construction costs for engineering, permitting, and construction oversight. The cost estimates are for planning purposes only.

The data analyses and recommendations in this section are not intended to be a compilation of all possible considerations, but provide some examples of how the data can be interpreted to assist in the planning process. Each community has been provided with the field and plan review data so that the database can be updated and modified as new information becomes available. The database can also be queried in many additional ways to meet community-specific priorities and needs.

Table 6.1: Estimated Costs of Typical Maintenance

Basin Maintenance Item	Cost	Unit	Assumptions	Recommended Maintenance Frequency
Removal of Sediment from Structures				
12" storm sewer cleaning	$5.75	linear ft.	Water will be supplied. Debris is non-hazardous with offsite disposal. The pipe material is CMP, clay, or concrete. Large truck access is available. The pipes are half full or less.	Annual
24" storm sewer cleaning	$11.75	linear ft.	Water will be supplied. Debris is non-hazardous with offsite disposal. The pipe material is CMP, clay, or concrete. Large truck access is available. The pipes are half full or less.	Annual
36" storm sewer cleaning	$15.50	linear ft.	Water will be supplied. Debris is non-hazardous with offsite disposal. The pipe material is CMP, clay, or concrete. Large truck access is available. The pipes are half full or less.	Annual
Standard curbside catchbasin cleaning	$125	each	Water will be supplied. Debris is non-hazardous with offsite disposal. The pipe material is CMP, clay, or concrete. Large truck access is available. The pipes are half full or less.	Annual
Clean sediment from catchbasin sumps and some storm sewer jetting	$750	1/2 day	1/2 day minimum.	Annual
Clean sediment from 48" dia. Overflow structure with 2 ft. deep sump	$350	each	Water will be supplied. Debris is non-hazardous with offsite disposal. The pipe material is CMP, clay, or concrete. Large truck access is available. The pipes are half full or less.	Annual
Clean sediment from Overflow structure sump, sediment sump that truck cannot directly access	$1,100	1/2 day	Includes use of support truck. 1/2 day minimum.	Annual
Remove Sediment from Basin				
Excavate sediment from small sediment forebay	$3,500	Lump Sum	Able to use small-sized equipment (Bobcat or tractor backhoe). Onsite disposal available.	Every 5 to 7 yrs
Small-scale mechanical excavation of basin sediment	$18,000 to $22,000	1,000 yd3	Basin can be dewatered. Onsite dewatering and disposal. Includes $5,000 for permitting and engineering.	Every 10 yrs
Small-scale hydraulic excavation of basin sediment	$20,000 to $25,000	1,000 yd3	Onsite dewatering and disposal. Includes $5,000 for permitting and engineering.	Every 10 yrs
Hydraulic excavation of basin sediment	$320,000 to $350,000	10,000 yd3	Type II landfill disposal. Cost includes construction only.	Every 20 yrs
Hydraulic excavation of basin sediment	$240,000 to $270,000	10,000 yd3	Onsite disposal. Cost includes construction only.	Every 20 yrs
Erosion Control				
Side slope stabilization	$8 to $12	yd2	Minimal grading, subsurface drainage, topsoil, seed, and heavy erosion control blanket	As needed

Table 6.1: Estimated Costs of Typical Maintenance (continued)

Basin Maintenance Item	Cost	Unit	Assumptions	Recommended Maintenance Frequency
Replace/Repair Pipes or Structures				
Replace geotextile fabric and gravel jacket around Outflow riser pipe.	$750	each	Old gravel and sediment has been removed.	After 2 yrs then every 10 yrs
Replace 18" dia. CMP end-section with bar screen and riprap	$1,400	each		As needed
Replace 18" dia. concrete end-section with bar screen and riprap	$1,800	each		As needed
Replace 36" dia. CMP end-section with bar screen and riprap	$3,000	each		As needed
Replace 36" dia. concrete end-section with bar screen and riprap	$3,500	each		As needed
Control of Nuisance Geese, Algae, and Aquatic Vegetation				
Mechanical weed harvesting small pond	$2,500 min.	approx. 1 ac.	Smaller equipment used. Herbicide application may be more cost-effective.	Annual
Mechanical weed harvesting large pond	$3,500 to $4,500	approx. 10 ac.	Typical range of costs. $150/hr at a harvesting rate of 0.5 ac/hr.	Annual
Algaecide application	$1,500 to$ 2,500	season	Monitoring and six applications to an approx. one acre pond.	Annual
Mowing	$500	0.5 ac.	Assumes no fence and the side slopes are not too steep.	Semi-annual
Heavy mowing with brush hog	$650-$950	ac.	Heavy mowing only. Does not include removal of materials. Cost varies with access and density.	Annual
Invasive upland plant control	$2,000	per season	Assumes 1 person for 4 days at $500/day	Annual
Goose D-Fence	$200	150 ft.	Retractable string fencing	Ongoing
Goose repellent	$150	ac.	2.5 gallon/acre of repellent concentrate. One application. Materials only.	As needed
Goose Buster Alarm	$1,000	each	Materials only	Ongoing

Table 6.2A: Estimated Costs for Typical Necessary Basin Modifications

Item No.	Basin Modification	Cost	Per	Assumptions
1	Install restrictor in the Outflow pipe	$300	Outflow	4" PVC pipe mortared into 12" concrete pipe.
2	Modify Outflow structure	varies	each	Costs vary due to type of structure and accessibility
3	Energy dissipator at Inflow pipe	$50-60	yd^2	Heavy riprap on gravel and geotextile filter.
4A	Install 6' fence	$8,700	500 ft	Aluminized steel chain-link industrial fencing with 12 ft. gate.
4B	Install bar screen	varies	each	New bar screen installed on end-section of 36" concrete pipe
5	Emergency overflow swale	$1,000	8-10 yd^2 spillway in top of berm	4 yd^3 excavation, grading, seed, turf reinforcement mat installed.

Table 6.2B: Estimate Costs of Additional Basin Modifications

Item No.	Basin Modification	Cost	Per	Assumptions
6	Plant vegetative buffer around wet basin – total cost	$5,200	1/4 ac. (11,000 ft^2)	Includes Items 6A-D.
6A	Rodeo herbicide application	$1,100	1/4 ac. (11,000 ft^2)	Two applications of Rodeo or equivalent glyphosate product to eradicate turf grass or ecologically invasive vegetation.
6B	Wet prairie mix seeding	$800	1/4 ac. (11,000 ft^2)	2.5 lb of pre-mixed seed applied.
6C	Wetland plant plugs	$800	1/4 ac. (11,000 ft^2)	200 wetland plantings with 1 yr guarantee
6D	Plant shrubs	$2,500	1/4 ac. (11,000 ft^2)	50 shrub plantings (24" container, mulch mat/collar) installed with 1 yr. guarantee
7A	Install sediment forebay	$23,000	10,000 ft^3	Includes excavation of 3 ft. deep sump with a solid base consisting of fabric-formed concrete mat for cleaning.
7B	Install sediment sump	$1,500	9 yd^3	Lined with crushed concrete.
8	Install gravel access road	$10	yd^2	4-6” fractured aggregate over geotextile fabric.
9A	Install earthen berm to minimize short-circuiting	$7,500	100 ft.	3 ft. high berm, seeded with turf reinforcement mat. Suitable fill material is available onsite.
9B	Install vinyl sheet piling for shoreline stabilization or to minimize short-circuiting	$17	ft^2	Includes installation, header caps, and whaler plates.
10A	Small-scale storm sewer daylighting	$10,000 to $12,000	100 ft.	Culvert removed and dry swale installed.
10B	Section of storm sewer removed and replaced by infiltration trench	$15,000 to $18,000	100 ft. (1,200 ft^3)	Culvert removed and infiltration trench installed.
11	Install proprietary vortex separator	$16,500	each	Vortechnics Model 5000 sized for 2.4 acre drainage area.
12A	Install pond fountain	$3,500	ac.	1 HP/ acre
12B	Install pond bottom aerator	$3,000	ac.	¾ HP/ acre
13	Signs (materials only)	$80-150 and up	each	Depending on size and materials

Table 6.3: Comparison of Detention Facility Alternatives (adapted from Schueler, 1999)

Type	Space Required*	Clogging Risk	Sediment Cleanout Frequency (yrs)	Total Suspended Solids Removal	Phosphorus Removal	Stream Warming	Streambank Erosion Protection
Conventional Dry Basin	0.5	Moderate	10-20	10 %	0 %	Moderate	Not adequately
Dry Extended Detention (ED)	1.0	High	10-20	30 %	10-15 %	Low	Yes
Wet Extended Detention	1.0	Low	2-5 (Forebay)	75 %	65 %	High	Yes
Constructed ED Stormwater Wetland	1.5	Low	2-5 (Forebay)	70 %	40 %	Moderate	Yes
Retention/ Infiltration	N/A	High	5	75 %	60-70 %	Low	Yes
Infiltration Trenches and Dry Wells	N/A	High	5	80 %	60 %	Low	Yes

* Space consumption (1 = space required for wet pond)

Table 6.4: Estimated Costs for Basin Retrofitting and New Basin Construction

Item No.	Basin Retrofit	Cost	Per	Comments
1A	Convert dry detention basin outflow to extended detention outflow	$2,000	each	Add extended detention outflow - 36" diameter pre-cast CMP riser with staged release holes and steel grate.
1B	Convert dry detention basin outflow to extended detention outflow	$2,500	each	Add extended detention outflow - 48" diameter pre-cast CMP riser with staged release holes and steel grate.
1C	Dry extended detention basin (new)	$49,000 $281,000	1 ac-ft 10 ac-ft	Excludes land costs.
2A	Convert dry detention facility to three-cell wet pond	$900,000	800 acres	Re-constructed Outlet and emergency spillway, access road, safety bench/wetland shelf, excavated pools.
2B	Construct wet extended detention basin (new)	$46,000 $232,000 $1,170,000	1 ac-ft 10 ac-ft 100 ac-ft	Excludes land costs.
3	Constructed stormwater wetland (new)	$67,100 $340,000 $1,728,000	1 ac-ft 10 ac-ft 100 ac-ft	Excludes land costs.
4	Convert dry pumped detention basin into seasonal wet pond	$19,000	basin	Modify pumped outlet to create a permanent pool. Modify low-flow channel to prevent short-circuiting.
5	Construct regional (dry extended) detention facility (new)	$1,623,000	100 ac-ft	Excludes land costs.
6	Construct infiltration trench	$6-8	ft^3 of water treated	Construction cost. Retrofitting cost may be more.

Section 7
Watershed-Wide Results

Table 7.1A: Database Attributes for General Basin Information

Data Attribute	Description
BASIN INFORMATION	
CVT	Code for community, village, or township where basin is located. Example data entry: RHC (City of Rochester Hills) Source: GIS
BASINID	Randomly specified individual number assigned to basin. Example data entry: 101 Source: assigned by HRC
SITENAME	Commonly used name for detention basin site. Example data entry: U.S. Storage Facility Source: Obtained from the plans provided by the community, or determined in the field (if not available on plans).
CVTREF	The reference number assigned to the basin by the city, village or township (if any). Example data entry: varies by community Source: City, village or township
SEC	Section where basin is located. Example data entry: 29 Source: GIS
QTRSEC	Quarter section where basin is located. Example data entry: SW Source: GIS
SIDWELL	Sidwell number of parcel where detention basin is located Example data entry : 07-477-015 Source: community, GIS
FILEINFO	Description of the file number used by the local community (if any) or the HRC job number if HRC did the original site plan review. Example data entry: 7-2-018 Source: Community, or HRC
PLANINFO	Description of information provided by community. Indicates if plans area available, name of design consultant, date of plans, and if plans are as-built (AB). Example data entry: Nudell Architects; 10/00 AB Source: plans provided by community
PLANAVAIL	Indicates if plans, details and/or calculations are available or not. Example data entry: y Source: information provided by community

Data Attribute	Description
BASIN INFORMATION	
MAINTAGREEMENT	Indicates whether or not there is a maintenance agreement for the basin. Example data entry: n Source: information provided by community
LOCATION	General description of geographic location, typically relative to major cross roads. Example data entry: Southwest corner of Crooks and Auburn Roads Source: Plans provided by community. Verified in field.
ASSETMAINT	Person or entity responsible for maintenance of detention basin. Example data entry: City Source: community
ASSETOWNER	Owner of parcel with detention basin Example data entry: Name, address, phone number Source: community
LANDUSE	Primary land use of area contributing to detention basin. Example data: Res. (i.e., residential) Source: GIS, maps. Verified in field through cursory observation of area.
CONTRIBUTINGACREAGE	Size of land area contributing to detention basin; in acres. Example data entry: 5.7 Source: plans and/or design calculations provided by community
DESIGNSTORM	Recurrence frequency of design storm event used to calculate required volume. Example data entry: 10-yr. 1-hr Source: plans and/or design calculations
ALLOWABLEDISCHARGE	The maximum discharge rate allowed by Oakland County standards or local community standards (if provided). Usually based on 0.2 cfs/acre in accordance with Oakland County standards, unless otherwise noted. In cfs. Example data entry: 0.87 Source: plans and/or calculations provided by community.
RUNOFFCOEFF	Runoff coefficient used to calculate runoff volume tributary to detention basin. Example data entry: 0.35 Source: plans and/or design calculations provided by community

Data Attribute	Description
BASIN INFORMATION	
STOREDEPTH	Detention basin overflow spillway elevation minus detention basin outlet pipe invert (or restrictor) elevation; in feet. Example data entry: 3 Source: plans. Verified in field.
STOREREQD	The calculated detention volume required, in ft^3. Example data entry: 34,400 Source: plans and/or design calculations provided by community
STOREPROVD	Total detention volume provided, in ft^3. Example data entry: 34,500 Source: plans and/or design calculations provided by community. Verified in field.
TOPAREA	Area at contour elevation of basin overflow spillway. Provided on plans, or calculated from information on plans; in ft^2. Example data entry: 13,000 Source: plans provided by community
MIDAREA	Area at contour elevation approximately halfway up side of basin; in ft^2. Example data entry: 8,000 Source: field measured
BOTTOMAREA	Area at contour elevation of outflow pipe invert (or restrictor). Provided on plans, or calculated from information on plans; in ft^2. Example data entry: 6,500 Source: plans provided by community
FREEBOARD	Depth of freeboard provided (i.e., elevation of top of berm minus elevation of spillway); in ft. Example data entry: 1 Source: plans provided by community. Verified in field.
POOLDEPTH	Depth of the permanent pool (if applicable); in ft. Example data entry: est. 4 Source: plans provided by community. Verified in field.
BASINSHAPE	Description of the general shape of the detention basin. Example data entry: rect. Source: plans
SIDESLOPE	The slope of the detention basin side walls. Recorded as the ratio of horizontal change per 1 foot of vertical change, i.e., to H:1. Example data entry: 6 (meaning 6:1) Source: plans provide by community. Verified in field

Data Attribute	Description
BASIN INFORMATION	
LENGTH	Length of the detention basin; in ft. Example data entry: 130 Source: plans
WIDTH	Width of detention basin; in ft. Example data entry: 100 Source: plans
BASINTYPE	Indicates if basin was designed as wet or dry basin, or as parking lot storage. Example data entry: dry Source: plans
COMMENTS	General comments and observations about unique basin characteristics. Example data entry: Erosion at SE inflow structure; broken end-section. Source: plans provided by community and observations made in field.
SEDIMENT	Depth of sediment accumulated in basin, if any; in ft. Example data entry: 0.2 – 0.5 Source: observed in field.
SOILS	General description of type of soil at basin site, based on brief visual observation in field including texture and drainage. Example data entry: loamy sand Source: observed in field based on….
VEGCLASS	Brief description of predominant class of vegetation(s) at basin site. Example data entry: turf, shrub Source: observed in field
VEGINDICATOR	Indicates presence of algae, purple loosestrife, buckthorn and invasive or unique plan species. Example data entry: P. Loosestrife Source: observed in field
EXPANSIONCAP	Rough estimate of potential to expand the detention basin, based on availability of land adjacent to the basin; in %. Example data entry: 100 Source: plans provided by community and observations made in field

Data Attribute	Description
BASIN INFORMATION	
RECOMMENDATIONS	Preliminary site-specific recommendations for possible maintenance and/or modifications. Example data entry: stabilize slope at SE inflow structure. Source: plans provided by community and observations made in field

Table 7.1B: Database Attributes for Basin Inlet Information

Data Attribute	Description
BASIN INLET INFORMATION	
INFLOWID	Identification number assigned to inlet(s) at detention basin. Example data entry: 1 Source: assigned by consultant based on plans provided by community. Number and locations of inlets verified in field.
DESCRIPTION (inflow)	Description of inlet(s) to detention basin. Example data entry: poorly defined swale Source: observed in field.
LOCATION (inflow)	Location of inlet. Example data entry: SW corner Source: plans provided by community. Verified in field.
DIAMETER (inflow)	Diameter of inlet, in inches. Example data entry: 15 Source: plans provided by community. Verified in field.
MATERIAL (inflow)	Material that inlet is constructed of. Example data entry: conc. Source: plans provided by community. Verified in field.
ELEVATION (inflow)	Elevation of invert of inlet to basin, or as otherwise noted. Example data entry: 669.00 Source: plans provided by community.
CONDITION (inflow)	Description of condition of inlet. Example data entry: blocked with sediment Source: observed in field.

Table 7.1C: Database Attributes for Basin Outflow Information

Data Attribute	Description
BASIN OUTFLOW INFORMATION	
OUTFLOWID	Identification number assigned to basin outlet(s). Example data entry: 128 Source: assigned by consultant based on plans provided by community. Number and locations of outlets verified in field.
DESCRIPTION (outflow)	Description of basin outlet(s). Example data entry: 3.1" restrictor in 18" pipe Source: plans provided by community. Verified in field.
LOCATION (outflow)	Description of outlet location. Example data entry: SE Corner Source: plans provided by community. Verified in field.
DIAMETER (outflow)	Diameter of outlet from basin or restricted orifice. Example data entry: 6 Source: plans provided by community. Verified in field.
MATERIAL (outflow)	Material of outlet from basin Example data entry: CMP Source: plans provided by community. Verified in field.
ELEVATION (outflow)	Elevation of outlet from basin or as otherwise indicated. Example data entry: 705.9 Source: plans provided by community; verified in field.
CONDITION (outflow)	Description of outlet condition. Example data entry: buried Source: observed in field.

Table 7.1D: Database Attributes for Basin Overflow Information

Data Attribute	Description
BASIN OVERFLOW INFORMATION	
OVERFLOWID	Identification number assigned to basin overflow structure. Example data entry: 1045 Source: assigned by consultant based on plans provided by community.
DESCRIPTION (overflow)	Description of basin overflow structure. Example data entry: Source: plans provided by community. Verified in field.
LOCATION (overflow)	Description of overflow structure location. Example data entry: SE corner Source: Observed in field.
ELEVATION (overflow)	Elevation of overflow structure or as otherwise noted. Example data entry: RIM 754.50 Source: plans provided by community
CONDITION (overflow)	Description of condition of overflow structure. Example data entry: Bar grate off. Source: observed in field.

Table 7.2: Abbreviations Commonly Used in Database

Abbreviation	Meaning/Definition
AB	as-built (drawing)
ABS	acrylonitrile-butadiene-styrene (pipe)
approx.	approximately
Arrowhd.	arrowhead
avg.	average
bot.	bottom
calc.	calculated
CB	catch basin
cfs	cubic feet per second
CI	cast iron
C/L	centerline
CMP	corrugated metal pipe
com.	commercial
conc.	concrete
const.	construction
Ct.	Court
Ctail	cattail
dia.	diameter
Dr.	Drive
d/s	downstream
Duckw.	duckweed
E	East
elev.	elevation
est.	estimated
ex.	existing
fert.	fertilizer
GIS	Geographic Information System
herb.	herbicide
ind.	Industrial
instit.	institutional
inv.	invert
Ln.	Lane
min.	minimum
n	no
N	north
N/A	not available; or, not applicable
NE	northeast
NW	northwest
OK	all correct; or, all right
perf.	perforated
pest.	Pesticide
P. Loosestrife	Purple Loosestrife
Purple L.	Purple Loosestrife
PVC	polyvinyl chloride
RCP	reinforced concrete pipe

Abbreviation	Meaning/Definition
Rd.	Road
rect.	rectangular
req'ts	requirements
res.	residential
rev.	Revised (drawing)
S	south
SE	southeast
spp.	species
SW	southwest
TOB	top of bank
Type A, B, C, D	hydrologic soil groups
VCP	vitrified clay pipe
veg.	vegetation
W	west
ws	water surface
y	yes
yr.	year
CVT (City, Village, and Township) Codes	
BFV	Village of Bingham Farms
BHV	Village of Beverly Hills
BLT	Bloomfield Township
RHC	City of Rochester Hills
SOC	City of Southfield
TRC	City of Troy
WBT	West Bloomfield Township

Table 7.3A: Detention Basin

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
BHV	101	Westwood Commons	flat file 13	10	NW	N/A	96568	5/2/1996	y	n	Thistle Ln., near Riverbank Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	3.9	N/A	N/A	15,000	N/A
BHV	102	Turnberry Sub.	flat file 13	3	SW	N/A	19970172	7/17/1996	y	n	Turnberry Ct., near 13 Mile and Lahser	Owner	N/A	Res.	5	10	N/A	0.35	3	3	10,802	11,846	8500
SOC	103	Walgreens - SE basin	7-1 a	7	SE	07-477-015	7-2-018	Nudell Architects 10/00	y	N/A	29030 Northwestern Hwy.	Owner	N/A	Com.	2.31 site	10	N/A	0.65	3.08	3	10,813 site	5,318 (11,160 site)	7250
SOC	104	Walgreens - NW basin	7-1 b	7	SE	07-477-015	7-2-018	Nudell Architects 10/00	y	N/A	29030 Northwestern Hwy.	Owner	N/A	Com.	2.31 site	10	N/A	0.65	3	1.6	10,813 site	1,034 (11,160 site)	1475
SOC	105	CDI Systems	7-2	7	SE	07-477-003	7-2-003	251; Z/L Assoc. 8/76	y. No detail.	N/A	29299 Franklin Rd.	Owner	N/A	Com.	1.3	10	N/A	0.33	2.3	5.3	5,532	7,000	18500
SOC	106	Claymoor Apartments	7-3	7	SE	07-476-042	7-2-007	331; Postiff Co. 5/9/73	y. No calcs.	N/A	29260 Franklin Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	5	N/A	20,075 at 724.20	42400
SOC	107	The Pines Apartments	7-4	7	SE	07-476-056	7-2-004	331; Postiff Co. 2/22/74	y. Weir detail on sheet 6 n/a. No calcs.	N/A	29500-29550 Franklin	Owner	N/A	Res.	N/A	N/A	N/A	N/A	5	6.5	18,364	18,550	55150
SOC	108	Weatherstone S. Townhouses	7-5	7	SE	07-476-063	7-2-013	251; Professional Engineering Assoc. 8/9/83	y. No calcs.	N/A	29600 Franklin Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	est. 5.97	6.2	N/A	28,800	42900
SOC	109	Weatherstone N. Townhouses	7-6	7	SE	07-401-025	7-2-016	331; Warner, Cantrell & Padmos 6/10/86AB	y. No AB size.	N/A	29900 Franklin Rd.	Owner	N/A	Res.	6	10	1.2	0.5	2	N/A	20403	est. 7175	N/A
SOC	110	Chelsea Crossing Condos	7-7	7	SW	07-326-034	7-3-009	252; Postiff Co. 6/25/74	y. No details or calcs.	N/A	26644 Farmbrooke Villa Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	calc. 7.7	3.3	N/A	96,000	63100
SOC	111	BP Gas Station	7-8	7	SW	07-326-019	7-3-017	253; Marathon Rev. 4/25/78	y	N/A	29150 Northwestern Hwy.	Owner	N/A	Com.	0.333 (0.41 ac. - site)	N/A	N/A	N/A	4	3.2	est. 2,420	2,456	1600
SOC	112	Fishbone's	7-9	7	SW	07-326-030	7-3-019	253; Nowak & Fraus rev. 11/8/79	y. No calcs.	N/A	29244 Northwestern Hwy.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	est. 2.6	6.5	N/A	est. 6,100	14800
SOC	113	Franklin Racquet Club	7-10	7	SW	07-326-028	7-3-010	252	n	N/A	29350 Northwestern Hwy	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SOC	114	LaFontaine Office Building	7-11	7	SW	07-301-008	7-3-027	254; Nowak & Fraus AB 3/4/85	y. Calcs from hand-written notes.	N/A	29580 Northwestern Hwy.	Owner	N/A	Com.	0.92	N/A	N/A	0.7	est. 2.8	2.3	N/A	est. 7,000	4800
SOC	115	DIL	7-12	7	SW	07-301-010	7-3-012	252; Nowak & Fraus rev. 6/21/77	No calcs.	y	29600 Northwestern Hwy.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	est. 2.5	2.4	N/A	16,950	10250
SOC	116	Pavillion Townhouse Condos	7-13	7	SW	07-352-001 thru 036	7-3-022	on site; Morrison & Peters rev. 5/5/81	y	N/A	27316-27375 Apple Blossom Ln.	Owner	N/A	Res./ Com.	Total 18.91 (8.54 site)	10	N/A	Avg. 0.61 (3.32 ac @ 0.2; 15.59 @ 0.7)	4	6.3	74376	77589	127000
SOC	121	Carson Center - W basin	7-15	7	SW	07-351-108	7-3-031	254; Zeitman Wozniak & Assoc. rev. 9/12/86	y		29333 Northwestern Hwy.	Owner	N/A	Com.	4.73 Site	10	N/A	0.7	2	3.25	24,237 site	14000	44600
SOC	122	Pilots Cove	7-16	7	SW	07-351-075 thru 094	7-3-016	253; Morrison & Peters AB 7/29/80	y. No calcs	y	26900-26926 Twelve Mile Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	calc. 4.56	3.7	N/A	est. 14045	8050
SOC	125	Fountain Park Office Complex	7-19	7	SW	07-351-032	N/A	JRJ Group 9/13/94AB	y	y	29000 Inkster Rd.	Owner	N/A	Com.	1.77	10	N/A	0.53 (low)	1.5	4.2	6500	8244	27100

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
101	Westwood Commons	6,000	3350	1,800	N/A	N/A	N/A	3	oval	6	4	100	30	Wet	May be no outlet? Sediment basin with 2 ft storage for sediment.	N/A	N/A	Turf, Iris		25	Fountain, no outlet structure, spillway to river.	Clean structures, buffer, add controlled outlet structure.
102	Turnberry Sub.	8,512	2840	4 (2,176 sft @ 1 ft depth)	1	N/A	N/A	N/A	oval	6 max	4	225 (top) 145 (middle)	55 (top) 35 (middle)	Dry Catchbasin		Minimal	N/A	Turf	No	0	Storm pipes to and from CB and overflows up into basin. Inflow 2 not found.	
103	Walgreens - SE basin	3,413	2400	737	N/A	1	N/A	N/A	irregular	n/a	3	est. MID95	est. MID22	Dry	SE basin - has only restrictor on site	0.2 - 0.5	Type C, Poorly Drained	Turf	No	0	Basin was being fertilized. Restrictor located at CB.	Nutrient control.
104	Walgreens - NW basin	1,322	925	14	N/A	1.65	N/A	N/A	irregular	6	2	est. MID62	est. MID35	Dry	NW basin - connected to SE basin	0.2	Type C, Poorly Drained	Turf	No	0	Flows unrestricted to basin 103.	
105	CDI Systems		3500	est. WS 4,025	N/A	N/A	est. 4	N/A	triangular	n/a	4	est. WS 115	est. WS 70	Dry Catchbasin		No	Loamy Sand, Type B	Turf	No	0	CB supposed to back up into basin, but no restrictor.	Verify restrictor.
106	Claymoor Apartments	est. 8,190	8500	est. 6,200	N/A	N/A	N/A	1	triangular	4	1	est. WS 117	est. WS 140	Dry	No overflow shown	2	Minimal	Tree, Shrub	Buckt., Purple L., Algae	0	4' fence.	Clean structures.
107	The Pines Apartments	est. 5,740	8500	est. 1,430	N/A	1	N/A	N/A	triangular	3	2	est. 100 MID	est. 62 MID	Dry	Discharges east to existing ditch. Pool volume estimated to be 17000 cft.	2.5	Muck	Tree, Shrub	Buckthorn, Purple L.	0	4' fence, bar grate is separated from overflow, outflow is buried.	Dredge, verify restrictor, repair bar grate.
108	Weatherstone S. Townhouses	est. 8,450	6900	est. 4,800	0.5	N/A	N/A	4	rectangular	est. 5	5	est. 160 MID	est. 30 MID	Wet	Discharges east to Farmbrook Rd. ditch.	No Pool Depth	N/A	Turf, Tree	Buckthorn	0	Water level too high - outlet blocked.	Clean structures. Consider modifying outlet.
109	Weatherstone N. Townhouses	N/A	7550	est. 3587MID	1.5	N/A	8	8	round	4	var	est.104	est.80	Wet	Check for spillway.	N/A	Hydric	Tree, Shrub	Poplar, Willow, Purple L.	100	Concrete bags found near outlet, site overgrown. Area from aerial.	Structures need cleaning.
110	Chelsea Crossing Condos	est. 26,085	19100	est. 16,555	N/A	N/A	N/A	2	irregular	3	4	est. 230 MID	est. 130 MID	Wet		2	Sandy Slope	Tree, Shrub, Algae	Willow, Purple L., Algae	0	Odor of decayed organics, litter, sediment.	Dredge, Nutrient Control.
111	BP Gas Station	est. 625	500	est. 300	N/A	N/A	N/A	N/A	triangular	1	2	N/A	N/A	Dry	Pond to be gravel.	1	Poorly Drained, Ponding	Grass, Forb	Cattail	0	Retaining wall. Inflow 260 from gas pumps has oil sheen. Outflow buried.	Verify 1.5" restrictor. Clean structures. Investigate illicit discharge.
112	Fishbone's	est. 2,360	2275	N/A	N/A	N/A	N/A	N/A	triangular	2	2.5	est. 135	est. 35	Dry	6 ft Fenced with barbed wire. Staked sod.	2	Sandy	Tree, Forb	Willow	0	Overgrown, litter, 6' retaining wall at N half, structures buried.	Clean structures, maintain, excavate sediment.
113	Franklin Racquet Club	N/A	2725	N/A	N/A	N/A	N/A	N/A	N/A	N/A	var	N/A	N/A	Dry		Some	Poorly Drained, Ponding	Tree, Shrub		0	Overgrown. Inflow not found - inaccessible. 4' fence, Outflow buried, ponding.	Clean structures.
114	LaFontaine Office Building	est. 3,500	2100	est. 2,470MID	N/A	0.4	N/A	N/A	triangular	6 (4 at inlet and outlet)	4	est. 89 (MID 75)	est. 80 (MID 65)	Dry	Inflow to 6 in perf. underdrain to outflow.	0.5	Sandy	Turf, Tree	No	0	New inflow added - area unvegetated. No 2" restrictor.	Verify restrictor. Stabilize Inflow 1077.
115	DIL	est. 9,660	4275	est. 4200 (MID 6930)	est. 0.5	N/A	N/A	N/A	parallelogram	5	3	est. 138 (MID 122)	est. 70 (MID 55)	Dry	4 ft chain-linked fence.	0.5	Sandy	Turf	No	0	No fence as was noted on plan. Outflow buried.	Verify restrictor. Clean structures.
116	Pavillion Townhouse Condos	28140	19600	0 (est. 21950MID)	1	N/A	N/A	N/A	rectangular		var	MID 254	MID 89	Dry	4 ft chain-linked fence and 10 ft gate.	Approx. 1	Hydric, Sediment	Tree, Shrub	Buckthorn, Phragmites	0	Overgrown. 4' fence. Inflows 277 and 278 not found.	Clean structures.
121	Carson Center - W basin	10100	13700	3900	N/A	N/A	2	3	irregular	est. 5.5	5	est. MID 240	est. MID 45	Wet	Discharges to Basin 469 unrestricted. Qa = 0.2 cfs/ac.	N/A	N/A	Turf	Algae, Phragmites, Purple L.	0	Inflows/Outflow under water. Geese, goose fencing. Flows unrestricted to basin 469.	Nutrient control.
122	Pilots Cove	N/A	2175	N/A	N/A	N/A	N/A	N/A	rectangular	3	4	est. 88 MID	est. 35 MID	Dry	6 ft chain-link fence. Sodded.	1	Type C, Poorly Drained	Turf	No	0	4' fence. Restrictor 6" instead of 4" per plan. Overflow swale not found.	Verify restrictor size.
125	Fountain Park Office Complex	6682	6450	4311	1	N/A	2.27	4	rectangular	6	5	est. 116	est. 85	Wet	Spring fed retention pond with 4 in restrictor in M.H. at south end of pond. Fountain. Pool volume 8200 cft.	Minimal	N/A	Turf	Algae	0	Has fountain, stone edging. Spring fed? Evidence from groundwater rust. Geese droppings.	

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	126	Fountain View Office	7-20	7	SW	07-351-111	N/A	Landtech rev. 4/27/04	y. New plan from Jonna.	N/A	E. side of Inkster Rd.	Owner	N/A	Com.	5.86	10	1.17	0.64	1.7	2.5	27010	27936	41900
SOC	127	Amenian Church	7-21	7	SE	07-477-010	N/A	Giffels-Webster Eng. 11/23/73	y	y	26210 Twelve Mile Rd.	Owner	N/A	Com.	3.6	N/A	N/A	0.6	2.8	2.8	13870	14400	90900
SOC	128	Pine Air Apts.	7-22	7	SE	07-476-059	7-2-009	331; Postiff Co. 9/15/77AB	n	N/A	26100 Twelve Mile Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	11	N/A	58177 in 1972 (enlarged in 1977)	357200
SOC	130	Pine Air Apts.	7-23	7	SE	07-476-057	7-2-009	331; Postiff Co. 9/15/77AB	no details	N/A	26170 Twelve Mile Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.5	N/A	7100	18000
SOC	131	Franklin Hills Apts.	7-24	7	SE	07-476-040	7-2-005	331; Spalding DeDecker rev. 10/5/69	some	N/A	25900 Twelve Mile Rd.	Owner	N/A	Res.	23.5 (18 + 5.5 offsite)	N/A	1.53 avg.	0.6 (0.4 for 5.5 ac. Offsite)	5	N/A	142000	141875	N/A
SOC	132	The Lakes Apts.	8-1	8	SW	08-351-010	N/A	Zeitmet-Wozniak & Assoc. AB 12/16/87; Design calcs 11/11/85 G. W. Peterson	some	N/A	25500 Twelve Mile Rd.	Owner	N/A	Res.	28.6	N/A	0.2	0.55	N/A	3.2	109386	250375	79200
SOC	133	Wellington Place Manor - SW basin	8-2 a	8	SW	08-376-026 thru 140	8-3-005	Nowak & Fraus rev. 3/10/92; Basney & Smith rev. calcs. 9/16/71	plan, calcs	N/A	Wellington West, W. of entrance	Owner	N/A	Res.	N/A	10	3	0.4	2.9	2.3	21456 (basins 133 & 134)	8085	7100
SOC	134	Wellington Place Manor - SE basin	8-2 b	8	SW	08-376-026 thru 140	8-3-005	Nowak & Fraus rev. 3/10/92; Basney & Smith rev. calcs. 9/16/71	plan, calcs	N/A	Wellington East, E. of entrance	Owner	N/A	Res.	N/A	10	N/A	0.4	2.9	N/A	21456 (basins 133 & 134)	14030	N/A
SOC	135	Wellington Place Manor - N basin	8-2 c	8	SW	08-376-026 thru 140	8-3-005	Basney & Smith rev. 10/15/71	plan, no details, no calcs	N/A	Wellington Ct.	Owner	N/A	Res.	N/A	10	1.7	0.4	2.2	5.5	42948	43780	85900
SOC	136	Woodvale Condos	8-3a	8	SW	08-377-005	8-3-001	331; J. E. Hiltz & Assoc. 6/7/72	y - no calcs	y	25116 Woodvale Dr., N basin	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.9	N/A	N/A	N/A
SOC	139	Chanticleer Condos	9-1	9	SW	08-376-005	9-3-011	Zeitmet-Wozniak & Assoc. 6/16/80; Design calcs 4/9/80 G. W. Peterson	y	N/A	29118 Chanticleer Dr.	Owner	N/A	Res.	19.6	10	3.92	0.5	est. 4	3.2	59584	59875	40400
SOC	140	Evergreen Nursing Home	11-1	11	NW	11-101-022	N/A	Nowak & Fraus 8/21/97AB	y	y	30800 Evergreen Rd.	Owner	N/A	Com.	1.63	10	0.667	0.3	3.2	3.7	2872	2900	35600
SOC	141	Cranbrook Place Apts.	11-2	11	NE	11-226-067	N/A	M. L. Brown & Son 3/17/83	y. No details.	N/A	18301 Thirteen Mile Rd.	Owner	N/A	Res.	15.42	10	N/A	0.51	3.25	5.5	53747.17	72290.56	107000
SOC	142	Beacon Hill	11-3	11	NE	11-226-003	11-1-002	256; Postiff Co. 9/25/74AB	no calcs	N/A	18161 Thirteen Mile Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	est. 6.6	3.7	N/A	N/A	13400
SOC	144	Belle Tire	11-5	11	NE	11-226-063	N/A	Boss Engineering 4/02/99	y	N/A	30699 Southfield Rd.	Owner	N/A	Com.	2.38	10	N/A	0.65	4	5.3	11158	10860 (+308 in pipe)	24000

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft²	MID AREA (Field) ft²	BOTTOM AREA (Plan) ft²	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
126	Fountain View Office	19334	16800	15680 (Median 16703)	1	0.6	6.7	5.5	irregular	4	1	est. 143MID	est. 143MID	Wet	Proposed development combining two lots. 1-yr extended detention with 10-yr storage to primary overflow elev. Pool volume estimated to be 53700 cft.	No	N/A	Unvegetated	No	0	Landscape stones around wet pond with geotextile liner. Basin under construction. Overflow 99 not built yet.	Re-inspect after construction completed and basin stabilized.
127	Armenian Church	est. 4815 MID	32450	N/A	est. 1	2	N/A	N/A	irregular	6 to 7	2	est. 107 MID	est. 45 MID	Dry		1	Sandy And Organic	Tree, Herb	Buckt., Phragmites, Purple L	0	4' fence, overgrown.	Clean structures.
128	Pine Air Apts.	N/A	32450	est. 28440MID	1.2	N/A	5.3	N/A	irregular	3	var	est.180	est.158	Dry	4 ft fence. No Inflows. Expanded in 1977.	1 In Outflow Str. Sump	Poorly Drained	Grass, Tree	Snake Grass, Purple L.	0	4' fence, some drainage to the south does not appear to be contained. Site overgrown.	Verify that drainage is detained.
130	Pine Air Apts.	N/A	7200	N/A	N/A	N/A	N/A	N/A	N/A	4	3	88	56	Dry		Minimal	Sandy Loam Type B/C	Turf, Tree	Buckthorn	0	Pipe south to CB buried. Overflow not found, could be buried.	Clean structures, uncover outlet.
131	Franklin Hills Apts.	est. 28375MID	21900	N/A	N/A	N/A	N/A	0.5	L-shaped	3	var	N/A	N/A	Pumped Detention	4 ft fence.	Some	N/A	Tree, Shrub	Buckthorn	0	No Inflow or Outflow pipes found. Files say that the pump is operating. May need dredging.	Clean structures. Verify that pump is operating. May need dredging.
132	The Lakes Apts.	N/A	24750	N/A	N/A	N/A	N/A	4	N/A	N/A	3	N/A	N/A	Inline Detention		N/A	Hydric	Tree, Turf, Forb	P. L., Turf, Willow	0	Inlets 407 and 408 not found.	
133	Wellington Place Manor - SW basin	2788	3100	N/A	N/A	N/A	1.5	1.5	rectangular	N/A	1	68	41	Wet	Southwest pond. 4 ft fence.	Minimal	N/A	Turf	Some algae	0	Fountain. No overflow (CB drains to 8"). Inflow 291 not found. Supposed to be connected to basin 134 but no pipe visible.	
134	Wellington Place Manor - SE basin	4838	4250	N/A	N/A	N/A	1.5	2	rectangular	N/A	1.5	118	41	Wet	Southeast pond. 4 ft fence. Flows to Basin 133 unrestricted.	Minimal	N/A	Turf	No	0	Fountain. No overflow. Supposed to be connected to basin 133 but no pipe visible.	CB on north side full of water so need to verify connection to basin 133.
135	Wellington Place Manor - N basin	19900	15600	N/A	N/A	N/A	2.5	2	irregular	1	2	TOP 275	TOP 60	Wet	(4 ft fence. 2 in asphalt bottom, turf sides, check outflow)	0.5	N/A	Turf, Tree	No	0	Blue dye, 3 fountains, west side unvegetated. Restrictor in MH9. Water flows in and out 18".	Stabilize west side.
136	Woodvale Condos	N/A	N/A	est. 4500MID	N/A	N/A	N/A	N/A	triangular	N/A	var	est. 95MID	est. 95MID	Dry	4 ft cl fence. Restrictor in storm sewer.	0.5	N/A	Grass, Shrub	Buckthorn	0	4' fence. 6 or 8" restricted storm at SW corner backs up into basin. Inflow 509 not found.	Clean structures.
139	Chanticleer Condos	24750	12600	0	1	N/A	N/A	N/A	irregular	N/A	2	est. 215	est. 90	Dry		No	Hydric	Sedge, Shrub	Cattail, Purple L.	25	Slope has slump failure. MH upstream of inlet had erosion which was armored with riprap.	Clean structures.
140	Evergreen Nursing Home	est. 10000	9625	N/A	N/A	N/A	N/A	N/A	irregular	N/A	3	est. 200TOP	est. 50TOP	Dry		No	Silty Loam	Turf		0	Spoke with maintenance staff, no prior history of overflow.	
141	Cranbrook Place Apts.	25217	19450	19396	N/A	N/A	N/A	N/A	rectangular	3	2	167TOP; 147BOT	151TOP; 131.5BOT	Dry	6-8 ft high locked fence	1	Poorly Drained	Grass, Tree, Shrub, Forb	Cattail, Buckthorn, Purple L	0	4' fence, overgrown, yard waste dumped at west side.	
142	Beacon Hill	9230 (5270MID)	3600	1309	N/A	N/A	N/A	N/A	rectangular	3	2	130TOP; 77BOT	71TOP; 17BOT	Dry	6 ft fence. No inflows and no overflow. New basin proposed?	N/A	Hydric	Shrub, Forb, Tree	Cattail, Purple L.	0	Site overgrown, can not access easily. No inflows/Outflows found.	Verify structures, may be buried. Clean out vegetation.
144	Belle Tire	6876	4500	2690	1	1	N/A	1	irregular	N/A	2	est. 80MID	est. 50MID	Dry	6 ft gated fence. Storm sewer restricted to 4 in at outlet and backflows into basin when necessary	N/A	Ponding	Turf	Algae	0	Outflow/Inflow blocked and underwater.	Verify restrictor. Clean structures.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	145	Birmingham Cosmetic Center	11-6	11	NE	11-226-064	N/A	B.F. Thompson 9/4/84	y	y	30603 Southfield Rd.	Owner	N/A	Com.	1.05	10	0.21	0.63	1.92	2.2	4732	4739	5500
SOC	146	Jewish Vocational Center	11-7	11	SE	11-479-068	11-2-010	256; Zeitmet/Wozniak 10/22/87AB	y	N/A	29699 Southfield Rd.	Owner	N/A	Com.	4.41 (incl. 0.82 offsite)	10	0.882	0.7	4.28	2.8	21969	22657	7900
SOC	151	Detroit Medical Center	16-1	16	SE	16-476-050	N/A	Nowak & Fraus 8/15/86Rev.	site plan only - no calcs	N/A	27177 Lahser Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	5.4	5	N/A	30290	25000
SOC	153	Victor Center Office - Retention Area 1	16-3	16	SW	16-302-031	16-3-035	Giffels-Webster Eng. 7/30/84	some	N/A	27400 Northwestern - S basin	Owner	N/A	Com.	N/A	N/A	0.71	N/A	4 ft	2.9	N/A	17000	12600
SOC	154	Hampton Hotel	17-1	17	SE	17-426-013	N/A	F. B. Weissman Rev. 10/11/84	y	N/A	27500 Northwestern	Owner	N/A	Com.	8.76 paved; 1.8 grass	10 yr, 1 hr	2.112	0.9 paved; 0.4 grass	6.58	7	64828	est. 92100	102400
SOC	158	Franklin River Apts - N basin	17-2 a	17	NE	16-101-016	17-3-002	Zeitmet/Wozniak 3/21/85Rev.	y	N/A	Twelve Mile and Franklin River Dr.	Owner	N/A	Res.	6.5 (plus 6 from Tel-12 Mall and 1.1 from Lancaster Apts)	10	7.2	0.6 (plus 0.9 at Tel-12 Mall and 0.2 at Lancaster Apts)	4.5	4.1	25028	26875	44300
SOC	159	Franklin River Apts - S basin	17-2 b	16	NW	16-101-016	17-3-002	Zeitmet/Wozniak 3/21/85Rev.	y	N/A	Thomapples Dr. and Franklin River Dr.	Owner	N/A	Res.	8.9	10	1.78	0.6	3.5	2.7	34269	34625	19400
SOC	160	Panian Chevrolet	17-3	17	NE	17-201-056	N/A	Roth Engineers 9/13/73 rev.	y - no calcs	y	28111 Telegraph Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	6.36	5.4	N/A	N/A	93700
SOC	161	Galleria Office Park	17-4	17	NW	17-176-009	N/A	Forber-Cohen/Nemer Properties 8/31/81 calcs	no - calcs only	Easement	NW corner of Northwestern and Lockdale	Owner	N/A	Com.	25.71 site	10	5.142 site	0.7	3.1 lower level and 1.6 upper level	5.2	120327 site	(127922 site) 47934 lower level and 58160 upper level	148700
SOC	162	Galleria - NE basin	17-5	17	NW	17-126-044	17-4-004b	334; MCS 6/28/89 AB	no - calcs only	N/A	SW corner of Twelve Mile and Lockdale	Owner	N/A	Com.	28.43 site	N/A	N/A	N/A	5.8	7.9	166729 site	96100	214300
SOC	163	Silver Triangle Office	17-6	17	NW	17-102-037	17-4-005	264; Nowak and Fraus 7/30/84BID and 10/28/96 parking add'n	y	n	25505 Twelve Mile Rd.	Owner	N/A	Com.	8.76	10	1.75	0.7	4	4	44917	N/A	19200
SOC	164	Meade Lexus East	17-7	17	NW	17-102-039	N/A	Spalding DeDecker 2/12/98	y	y	28300 Northwestern	Owner	N/A	Com.	22.04 (incl. 16.58 from Star Theatre)	10	4.41	0.7	4.9	4.3	112936	114773	104200

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
145	Birmingham Cosmetic Center	est. 3384MID	2500	N/A	N/A	0.5	N/A	N/A	rectangular	5	4	est. 72MID	est. 47MID	Dry	6 in PVC roof drain	No	Ponding, Poorly Drained	Turf	No	0	Recently fertilized. No restrictor.	Verify restrictor. Clean structures.
146	Jewish Vocational Center	N/A	2800	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	Dry Catchbasin	6 separate storage areas listed.	Minimal	Silty Loam	Turf	No	0	No 4" restrictor. Pipes flow in and out of middle CB.	Verify restrictor.
151	Detroit Medical Center	est. 6864MID	5000	N/A	N/A	N/A	N/A	N/A	rectangular	6	4	est. 156MID	est. 44MID	Dry	Restricted MH outlet backs into basin	No	Hydric	Turf	Phragmites	0	Overflow spillway and Inflow 462 not found. No 6" restrictor.	Verify restrictor. Clean structures.
153	Victor Center Office - Retention Area 1	N/A	4350	N/A	N/A	2.7	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry		2	N/A	Turf, Shrub	Phragmites, Purple L.	0	No restrictor in outflow. Oil at inflows.	Verify restrictor.
154	Hampton Hotel	N/A	14600	est. 14000MID	N/A	2	N/A	N/A	rectangular	N/A	1	est. 200MID	est. 70MID	Dry	It is believed that the other properties (River fts Edge Office, Cooper Canyon Restaurant, Soul Gardens Restaurant) also contribute to this basin. 6 ft gated fence.	Minimal	Hydric	Grass, Forb, Bush, Cattail	Purple L., Phragmite, Buckt	0	Strong odors, toilet paper at inflow 465. Brush dumped at Inflow 464.	Verify restrictor. Clean structures, brush, and sediment. Check for illicit connection.
158	Franklin River Apts - N basin	11000	10800	MID6720	N/A	0.5	N/A	N/A	rectangular	N/A	2	est. 105MID	est. 80MID	Dry	North basin	1	Hydric, Sediment	Tree, Turf, Forb	Purple L., Phragmites, Buckt	0	Hole in the ground above Inflow 466 - pipe may be separated.	Check Inflow pipe 466 for separation. Clean structures.
159	Franklin River Apts - S basin	12250	7200	4720MID	N/A	N/A	N/A	N/A	rectangular	N/A	2	est. 115MID	est. 50MID	Dry	South basin	2	Hydric, Sediment	Turf, Tree, Forb	Phragmites	0	Inflow 469 not found.	Clean structures.
160	Panian Chevrolet	N/A	17400	N/A	N/A	N/A	1.66	N/A	rectangular	3	2	198MID	98MID	Dry	Fenced with gate in NE corner.	0.5	Poorly Drained, Ponding	Turf	Purple L., Cattail, Sedge	50	Inflow 516 not found. No overflow. Truck tracks in basin. Inflow spillway 515 not graded properly (flows around).	Stabilize NW corner and Inflow 515. Clean structures.
161	Galleria Office Park	18275 lower level and 54425 upper level	28600	12650 lower level and 18275 upper level	N/A	N/A	N/A	N/A	triangular lower level and irregular upper level	N/A	2	N/A	N/A	Dry	Two-level basin with conventionally designed lower level and wooded area serving as upper level.	0.5	Hydric	Turf, Tree, Shrub	Buckthorn, Cattail	100	Only one Inflow pipe found.	
162	Galleria - NE basin	19488	27100	13650	N/A	1.9	N/A	N/A	rectangular	N/A	1	147 MID	110.5 MID	Dry	No inflow pipes on Phase IV site plan	0.5	Hydric, Sediment	Grass, Shrub	Cattail, Purple L.	0	Restricted down the storm line - could not verify restrictor size. Side slopes recently mowed. 4' fence.	Verify restrictor size. Repair Outflow 279 end-section.
163	Silver Triangle Office	N/A	4800	N/A	N/A	N/A	5	3	irregular	N/A	2	N/A	N/A	Wet	Two basins hydraulically connected. 4 ft cl fence.	N/A	Poorly Drained	Turf, Forb	Buckthorn, Purple L.	0	North side 50% unvegetated. No restrictor in weir. Offline detention of Pernick Drain. Inflow 517 not found.	Verify restriction. Stabilize north slope.
164	Meade Lexus East	26580	24200	21480	1.6	1	1.7	2	irregular	3	1	est. 300	est. 70MID	Wet	East basin - This basin serves the Lexus site east of the Pernick Creek and the much larger Star Theater site east of Case Road. It is believed that Star Theater also stores in pipes underground on the Star site.	Minimal	Underwater	Shrub	P. L., Buckthorn	0	Has fountain, retaining wall on east side.	

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	166	Homestead Village	17-8 a	17	NW	17-102-039	N/A	Spalding DeDecker 2/12/98 (Calcs - John R. McAdams Co. 5/7/98)	y	y	28500 Northwestern Hwy.	Owner	N/A	Com.	3.07 site (1.37 for Meade Lexus and 1.7 form Homestead Village)	10	0.573	0.95 for 1.65 ac. And 0.30 for 1.42 ac.	N/A	3.9	20069 (5747 Lexus and 14322 Homestead)	20086 (12407 south pond, 5647 north pond, and 2032 underground)	42750
SOC	168	Essex Office Center	17-9	17	NW	17-102-012	17-1-006	264	y	N/A	28400 Northwestern Hwy.	Owner	N/A	Com.	3.79	10	0.75	0.7	3	6.5	19409	19900	35600
SOC	169	Wyatt Office Plaza	17-10 a	17	NW	17-151-011	N/A	Zeimet-Wozniak 3/22/88	y	N/A	28411 Northwestern Hwy.	Owner	N/A	Com.	8.2	10	1.64	0.7	3.5	3.9	42017	42017 (32880 basin plus 23148 underground)	13000
SOC	170	Embassy Suites	17-10 b	17	NW	17-151-005	18-1-038	335; Zeimet - Wozniak 1/8/86	y	N/A	28100 Franklin Rd.	Owner	N/A	Com.	5.48	N/A	1.1	0.7	3.5 basin (h = 5.75)	2.9	27792	27979 (21239 parking, 5028 pond, and 1712 pipe)	13200
SOC	171	Ameritech	17-11	17	SE	17-451-013	N/A	Jickling & Lyman 6/18/74	y	N/A	24524 Eleven Mile Rd.	Owner	N/A	Com.	2.97	N/A	0.594	0.7	est. 6	7.3	14045	N/A	33400
SOC	173	Southfield Crossing Center	17-13	17	SW	17-352-001	N/A	N/A	y	y	25650 Eleven Mile Rd.	Owner	N/A	Com.	4.566	10	0.2	0.8	2	2.9	27431.175	28122.31	39400
SOC	174	American Commerce Center, basin 2	17-14	17	SW	17-351-016; 18-476-007; 18-476-008	N/A	J&L Consulting 2/23/98 calcs	no	y	25800 Eleven Mile Rd.	Owner	N/A	Com.	12	0.5 in runoff - first flush	N/A	N/A	N/A	8	N/A	17000	46500
SOC	175	Country Village Plaza	15-1	15	NE	15-226-033	15-1-014	Summa Eng. 7/8/00AB	y	N/A	20097 W. Twelve Mile Rd.	Owner	N/A	Com.	0.72	10	0.14	0.7	0.5 ft in CB4; 0.3 ft in CB3	N/A	509	599	N/A

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
166	Homestead Village	3650 north basin, 3860 south basin	10950	MID1245 north basin, MID1385 south basin	N/A	0.5	1	2	irregular	varies	2	N/A	N/A	Wet	West basin - This basin, in the n.w. corner of the Lexus site west of the Pernick Creek, serves both the Lexus west lot and part of the hotel site. Wetland shelf at 1-yr storm elev. 6 ft fence and retaining wall.	N/A	N/A	Cattail	Algae, Phragmites	0	Expanded 3 pool wet basin with wetland shelf. Middle and S basins connected by four 24" conc. pipes. N basin algae mat.	Nutrient control in north basin.
168	Essex Office Center	N/A	5475	N/A	N/A	N/A	2	3	irregular	5	2	est. 140	est. 30	Wet	2 in asphalt pond bottom. Railing and boulder wall. Only half of site drains to basin.	N/A	Hydric	Turf	Lawn	0	No inlets found, possible underwater. Fountain.	Outlet screen needs cleaning - blocking 50%.
169	Wyatt Office Plaza	11920	3300	5200	N/A	N/A	5	N/A	triangular	N/A	1.5	N/A	N/A	Wet and Parking	May be eliminated if MDOT install ramp to WB I696. 4 ft fence. Water backs up into pipes when basin is full providing extra storage. Discharges to Peterson Drain	2	N/A	Forb, Tree	Phragmites, Cattail	0	Solid cover on overflow. 4' fence.	Change overflow cover.
170	Embassy Suites	N/A	4550	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	2	est. 243MID	est. 21MID	Dry Catchbasin and Parking		No	Clayey - Type C	Turf	No	0	No 4" restrictor found.	Verify restrictor.
171	Ameritech	N/A	4575	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2	N/A	N/A	Pumped Detention	4 ft fence. Pumped to 6 in line.	Pointbar In Deep Area	Partially Paved, Silt	Forb	Phragmites	0	Basin made up of two cells connected by 18" pipe, one cell is paved - oil sheen observed. Outflow not found.	Verify outlet.
173	Southfield Crossing Center	11695.32	13600	1643.71	N/A	N/A	N/A	N/A	N/A	5	2	N/A	N/A	Dry Catchbasin	Pipes used as storage. Various spillways from parking lot. 2 separate basins connected.	N/A	Poorly Drained	Turf	No	0	Parking lot runoff to 9 gabion spillways. Underdrain. Basin is two basins hydraulically connected by CBs. No 4" restrictor.	Verify restrictor.
174	American Commerce Center, basin 2	est. 12630	5800	N/A	N/A	N/A	N/A	3.5	irregular	N/A	3	N/A	N/A	Wet and Wetland	This basin is part of the American Commerce Center's combined wetland/detention facility. This basin, Basin #2, receives all storm water runoff from parking lots, walks and landscape areas from the Brookdale Senior Housing complex, Barton Mallow, and the . discharges to wetland and storm sewer south at elev. 691.5.	Some	Hydric	Grass, Forb	Algae	100		Nutrient control.
175	Country Village Plaza	2520 at CB4; 1790 at CB3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	Parking	Discharges to small basin on Evergreen frontage in lawn area. Storage due north in entry drive.	N/A	N/A	N/A		0	6" restrictor in field but 3" on plans. 6" roof drain to CB.	Verify restrictor.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	178	Courtyard Office Park	18-1	18	NE	18-276-046	18-1-032	266	n	N/A	28200 Franklin Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4.2	N/A	N/A	24600
SOC	179	Spring Hill Suites	18-2	18	NE	18-276-045	N/A	Environmental Engineers, Inc.	y	N/A	28555 Northwestern Hwy.	Owner	N/A	Com.	1.89	10	N/A	0.7	N/A	4.3	9687	9909	10000
SOC	180	Maple Tree Apts.	18-3	18	NE	18-277-044	18-1-019	265; Postiff 12/6/78	some - No storm sewer	N/A	28545 Franklin Rd.	Owner	N/A	Res.	52.7 acres at restrictor (12 site and 40.7 offsite)	10	10.6	0.53 site and 0.15 offsite	est. 2.86	4	48410	52450	104200
SOC	181	Tyler Estates 2	18-4	18	NE	18-177-049 thru 065; and 18-251 040 thru 059	N/A	Beckman Wehbe Corp.	y	N/A	Senator Cir.	Owner	N/A	Res.	13.19	10	0.2	0.53	4	4.8	32470	33868	27600
SOC	182	Tyler Estates 4	18-5	18	NE	N/A	N/A	Beckman Wehbe Corp.	y	N/A	Senator and Tyler	Owner	N/A	Res.	5.33	10	0.2	0.53	4	N/A	12785	13418	N/A
SOC	183	Tyler Estates 3	18-6	18	NW	18-178-001 thru 017	N/A	Beckman Wehbe Corp.; AB 7/14/00	y	N/A	26805-26982 Monroe Dr.	Owner	N/A	Res.	7.61	10	0.2	0.5	3	4	19533	20352	14280
SOC	184	Tyler Estates 1	18-7	18	NW	18-176-043 thru 055	N/A	Beckman Wehbe Corp.	y	N/A	Tyler Rd., near Isleworth Ct.	Owner	N/A	Res.	3.82	10	0.2	0.5	4	2.4	9805	9678	23400
SOC	185	Villas of Pebble Creek East	18-8	18	NE	18-177-027 thru 048 and 18-251-021 thru 039	18-4-010	315	y	N/A	26403-26792 Isleworth Pt.	Owner	N/A	Res.	15.43	10	3.09	0.35	N/A	2.2	33326	38652	36700
SOC	186	Villas of Pebble Creek	18-9	18	NW	18-176-029 thru 042	18-4-011	316	some	y	Pebblecreek Pkwy., Castlegate	Owner	N/A	Res.	5.94	N/A	1.19	N/A	N/A	3.9	12830	64477	99800
SOC	187	Pebblecreek Park	18-10	18	NE	18-177-024	N/A	Zeimet Wozniak & Assoc. 6/14/95 Rev.	y	N/A	Tyler and Isleworth	Owner	N/A	Res.	19.6	N/A	3.92	0.55	4	5.5	67474	73500	88800
SOC	188	Walnut Grove Condos	18-11	18	NW	18-126-008 thru 029	18-4-002	267; Professional Engineering Associates 12/17/79 rev.	y	Y	26815-26563 Walnut Grove Ln.	Owner	N/A	Res.	3.2	N/A	0.64	N/A	3.5	4.9	12322	N/A	18600
SOC	190	Pebble Stone Estates	18-13	18	SW	18-327-017 thru 020	N/A	N/A	y	N/A	27017 Pebbestone Ave.	Owner	N/A	Res.	1.71	10	0.34	0.4	N/A	3.1	4389.5	4481	19600
SOC	191	Blue Cross Blue Shield - NE basin	18-14	18	SW	18-351-014	N/A	PT&P 5/25/88 rev.; calcs from Nowak and Fraus	no storm or details	N/A	27000 Eleven Mile Rd.	Owner	N/A	Com.	5.967 site	10	1.19	0.8	5	4.6	35848 site	36446 site	23200
SOC	192	American Commerce Center - basin 1	18-15	18	SE	N/A	N/A	J&L Consulting 2/23/98	some	N/A	26500 American Dr.	Owner	N/A	Com.	N/A	0.5 in runoff first flush	0.125 cfs/ac	N/A	N/A	7.8	N/A	68000	62200

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft²	MID AREA (Field) ft²	BOTTOM AREA (Plan) ft²	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
178	Courtyard Office Park	N/A	5850	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	Dry		Some At Inlet	Poorly Drained	Shrub, Tree	Buckthorn, Willows	0	Sediment and vegetation blocking inlet.	
179	Spring Hill Suites	N/A	2325	N/A	N/A	N/A	N/A	N/A	irregular	N/A	5	N/A	N/A	Dry Catchbasin	There are both a sodded detention basin and parking lot storage-two outlet structures were identified, an unrestricted one in the sodded detention basin and one in the parking lot CB w/ the 4 in restrictor	N/A	Loamy Silt	Turf	No	0	Cobble bottom. No restrictors. Appears to have more than one Outflow.	Verify restrictor.
180	Maple Tree Apts.	N/A	26050	N/A	N/A	1.6	N/A	N/A	irregular	3 ditch, 5 upper slope	2	est. 445	6 channel bottom	Inline Detention		0.5	Hydric	Forb, Shrub	Buckthorn	0	Sediment a problem at both inlets.	Clean out inlets, unbury inlet 553, clean debris from outlet structure.
181	Tyler Estates 2	15088	5750	1846	1	0.5	N/A	N/A	N/A	5	4	N/A	N/A	Dry	Outlet only	N/A	Hydric	Turf	Cattail, Rush	0	No restrictor on Outflow.	Verify restrictor.
182	Tyler Estates 4	6160	4500	549	1	N/A	N/A	N/A	rectangular	6	var	N/A	N/A	Dry		Yes	N/A	None	No	25	Under construction. Outflow not built yet.	Clean structures. Stabilize side slopes. Re-inspect when construction complete.
183	Tyler Estates 3	10816	3570	2752	1	6.2	N/A	N/A	rectangular	6	3	N/A	N/A	Dry		N/A	Topsoil	Turf	No	0	Recently constructed. Outflow 50% obstructed by rock.	Verify restrictor.
184	Tyler Estates 1	4491	9750	348	1	1	N/A	N/A	rectangular	6	4	N/A	N/A	Dry Extended Detention		Minimal	Hydric, Ponding	Turf Slopes	Purple L., Cattail, Phragmit	0	Overflow spillway not adequately stabilized.	Stabilize spillway.
185	Villas of Pebble Creek East	20386	16700	5158	1	3	N/A	N/A	irregular	6	4	N/A	N/A	Dry		Minimal	Hydric, Ponding	Turf Slopes	Purple L., Cattail, Willow	75	Vegetation blocking Inflow 927.	Verify restrictor (plan shows 8"). Clean structures.
186	Villas of Pebble Creek	N/A	25600	N/A	N/A	1	N/A	N/A	triangular	N/A	4	N/A	N/A	Dry		Minimal	N/A	Turf	Cattail	0	Fountain is obstructing outflow 223.	Verify restrictor.
187	Pebblecreek Park	29000	16150	9000	N/A	N/A	N/A	9	irregular	N/A	2	est. 310	est. 80	Wet	No outflow shown	Point Bars Observed	Hydric, Ponding	Turf	Lawn	0	Northern slope has toe erosion, slumped in at areas.	May need stabilization.
188	Walnut Grove Condos	N/A	3800	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	Dry Catchbasin		Minimal	N/A	Turf	No	0	4' fence. Storm pipes to and from structure with 12" x 18" openings to basin. 4" roof drain.	Verify restrictor. Remove broken conc. weir and sand bags from structure.
190	Pebble Stone Estates	N/A	6300	N/A	N/A	1	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry		>0.5 of sediment at Inflow	Hydric, Ponding	Tree, Bare Soil	Cattail	0	North bank is bare, recent construction.	Verify restrictor. Stabilize north side.
191	Blue Cross Blue Shield - NE basin	11040	5000	4100	N/A	N/A	N/A	N/A	triangular	N/A	3	est. 140MID	est. 80MID	Dry Catchbasin	Storm sewer drains to a restricted outlet and CB back up into basins for storage. Calcs may be for another site - do not seem to match basins.	Minimal	N/A	Turf, Shrub	No	0	Cobble bottom.	Verify restrictor. Place perf. cover on overflow MH.
192	American Commerce Center - basin 1	est. 25000	8000	N/A	N/A	1	N/A	1	N/A	3	3	N/A	N/A	Wet Extended Detention	This basin is part of the American Commerce Center's combined wetland/detention facility. This basin, Basin #1, receives all storm water runoff from parking lots, walks, and landscape areas from the (7) sites listed here. Water from this basin then drain. Basin has baffle system to lengthen flow route.	2.5	Clayey	Turf, Shrub	Algae, Purple L.	100	Inflow sumps full of sediment.	Clean structures.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	200	Cumberland Office Center	19-1	19	NW	19-100-221	N/A	OHM 2/21/86Approved	y	N/A	27301 Eleven Mile Rd.	Owner	N/A	Com.	8.66	10	1.73	0.675	4.7	4.3	42497	40475 (plus 2966 pipe storage)	37100
SOC	201	Oxford Estates	19-2	19	SW	19-301-034 thru 047 & 19-351-048 thru 051	N/A	Zeitmet/Wozniak 8/1/01Rev.	y	N/A	27220-27387 Oxford Ct.	Owner	N/A	Res.	10.89	10	2.18	0.41	4	2.3	29734	32080	37950
SOC	202	UPN 50	19-3	19	NW	19-100-222	19-4-004a	337; Austin Co. 6/30/86	y	N/A	26905 Eleven Mile Rd.	Owner	N/A	Com.	8	10	1.6	0.76	4.75	6	46650	46820	73400
SOC	205	Franklin Terrace Apts.	20-1	20	NE	20-201-001	N/A	Basney & Smith 10/21/77AB	site plan and partial calcs	N/A	26962 Eleven Mile Rd.	Owner	N/A	Res.	N/A	N/A	0.44	N/A	4	3.5	14274	16650	15400
SOC	207	Lakeland Nursing Center - S basin	20-3 a	20	NE	20-201-002	N/A	Finnicum Brownlie 3/10/94	y. No calcs	N/A	26900 Franklin Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	2.2	N/A	N/A	3520
SOC	208	Lakeland Nursing Center - N basin	20-3 b	20	NE	20-201-002	N/A	Edmund London & Assoc. rev. 4/15/03	y	N/A	26900 Franklin Rd.	Owner	N/A	Com.	0.94	10	0.19	0.49	2.45	4	3146	3170	N/A
SOC	209	Irene's Myomassology	20-4	20	NE	20-253-013	N/A	N/A	y	N/A	26061 Franklin Rd.	Owner	N/A	Com.	2.26	10	0.45	0.63	6	4.9	10185.78	10229	10500
SOC	210	Riverside Office Bldg.	20-5	20	SE	20-401-002	20-2-030	339	y	N/A	25925 Telegraph Rd.	Owner	N/A	Com.	9.84	N/A	1.96	N/A	N/A	14	48586	50949	100000
SOC	211	Nippendenso	20-6	20	SW	20-401-003	20-2-026	270	y	y	24777 Denso Dr.	Owner	N/A	Com.	6.04	10	1.21	0.8	N/A	8	33360	N/A	133150
SOC	212	Denso International - W basin	20-7	20	SW	20-326-220	20-2-26a	270; calcs - Nowak & Fraus 6/8/85; Nathan Levine 1/29/88 plan	No. No calcs of expansion.	N/A	24777 Denso Dr.	Owner	N/A	Com.	29	10	Qo = 0.31	0.8 for 21.75 ac. And 0.2 for 7.25 ac.	4	N/A	135758	121917 (106188 basin and 15729 parking)	N/A
SOC	213	Tim Hortons	20-8	20	SE	20-451-002	N/A	N/A	y	N/A	25311 Telegraph Rd.	Owner	N/A	Com.	0.726	10	0.2	0.68	4	4.5	3593.715	5269.75	3650
SOC	214	GE Plastics - N basin	20-9	20	SE	20-426-030	20-2-021	269	some	N/A	25900 Telegraph Rd.	Owner	N/A	Com.	0.3	N/A	0.88	N/A	N/A	1.6	N/A	N/A	1100
SOC	215	Trowbridge Apts.	20-10	20	SE	20-426-029	N/A	N/A	y. No calcs	N/A	24111 Civic Center Dr.	Owner	N/A	Com.	6.3	N/A	N/A	0.5	6	3.5	21424	21861	19600
SOC	216	Oakwood at Southfield Apts.	21-1	21	NW	21-100-137	N/A	Zeimet-Wozniak 2/8/88 calcs	y	N/A	26300 Berg Rd.	Owner	N/A	Res.	29.28	10	5.86	0.6	N/A	4.4	125723	128988 (80000 basin and rest in pipes	59800
SOC	217	Village House Condos	21-2	21	NW	21-100-026 thru 121	21-4-002	272	some calcs	N/A	Berg Rd., E. of Hooper	Owner	N/A	Res.	8.0565	N/A	4.5	N/A	6	5.4	68850	N/A	35100
SOC	218	Woodcreek Apts. - pond 1	21-3 a	21	NW	21-100-127	N/A	S.J. Harris 5/28/85	y	N/A	23630 Civic Center Dr., W. basin	Owner	N/A	Res.	12.029site	N/A	2.28site	0.55	N/A	4.5	43788site	45186site	48700

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
200	Cumberland Office Center	12776	8600	7016	0.5	N/A	N/A	1	rectangular	3	2	est.245TOP	est.72TOP	Dry		1	Clayey	Shrub	Buckthorn, Cattail	0	Crushed conc. placed as an access road in basin. Low flow swale cut. Overflow not found. Outflow partially blocked.	Clean structures. Add overflow.
201	Oxford Estates	13216	16500	3280	1	0.2	2	3	oval	N/A	5	est. 185MID	est.50MID	Wet	2 ft. sacrificial storage.	Yes. From Constr. Site	N/A	Turf		0	Area under construction - no erosion controls. Basin flooded. Standpipe clogged.	Clean structures. Remove sediment.
202	UPN 50	18166	12250	5026 (13670MID)	2	1.8	N/A	N/A	irregular	2.5	1.5	est. 195MID	est. 68MID	Dry	West portion of site (est. 1.7 ac.) had existing storm draining south to ditch undetained. Ditch may now be enclosed (11/16/92).	None	Poorly Drained	Tree, Forb	Phragmites, Willow, forb	0		Add grate for overflow structure, clean structures.
205	Franklin Terrace Apts.	6345 (4162MID)	4400	1980	1	N/A	N/A	N/A	irregular	N/A	1.5	N/A	N/A	Dry	4 ft fence. Discharges to Pernick Drain.	2	N/A	Grass, Forb	Purple L., Buckthorn	0	4' fence.	Verify restrictor.
207	Lakeland Nursing Center - S basin	N/A	1600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	est. 85	est. 45	Dry	South basin at Franklin Road bridge. No restrictor shown.	Minimal	Poorly Drained	Turf	No	0	Small dry basin plus some pipe storage, but no restrictor.	Verify restrictor.
208	Lakeland Nursing Center - N basin	3457	N/A	est. 1027MID	1	N/A	N/A	N/A	irregular	N/A	var	N/A	N/A	Dry	North basin - 'micowetland stormwater filtration system'. 4 in roof drain only	Under constr..	silt, clay	none	No	0	Under construction. Inflows from footing and roof drains only. 6" plastic pipe to Over 151.	Re-inspect in the spring.
209	Irene's Myomassology	N/A	2150	N/A	1	2	N/A	N/A	rectangular	N/A	1.5	82	80	Dry Extended Detention		Minimal	Poorly Drained	Turf	Algae, Phragmites, Cattail	0	4' fence with gate.	
210	Riverside Office Bldg.	N/A	7100	N/A	N/A	N/A	N/A	4	triangular	N/A	1.5	N/A	N/A	Wet		No Pool Depth	N/A	Turf, Tree	Duckweed	0	2 fountains and 3 bottom aerators. No 6" restrictor. Inflows 398 and 399 not found - underwater? Solid cover on overflow MH.	Verify restrictor. Clean structures.
211	Nippendenso	N/A	16600	N/A	N/A	N/A	N/A	N/A	triangular	N/A	2	N/A	N/A	Dry	Detention basin drains into natural wetland/swale	Some At Inflow 401	Poorly Drained	Turf, Tree	Phragmites	0	4' fence. MH closed so there is no overflow. Restrictor at MH.	Clean structures.
212	Denso International - W basin	74213	49750	N/A	N/A	N/A	N/A	N/A	rectangular	3	1	363MID	73MID	Dry	Fenced. Expanded by 17413 sft in Phase II 1/29/88.	Some	Hydric	Tree, Shrub, Forb	Buckthorn, Phragmites	0	6' fence. No outflow or overflow found - buried?	Clean structures. Verify Outflow and overflow.
213	Tim Hortons	N/A	800	N/A	N/A	N/A	N/A	N/A	triangular	4	2	N/A	N/A	Dry Extended Detention		Minimal	Silty Loam	Turf		0	Recently constructed. Perforated riser to 12". No overflow - solid MH cover.	
214	GE Plastics - N basin	N/A	700	N/A	N/A	N/A	N/A	N/A	irregular	N/A	1	N/A	N/A	Dry		Minimal	poorly drained - Type C	Turf	no	0	6" Inflow and Outflow. No 4" restrictor.	Verify restrictor.
215	Trowbridge Apts.	9813	5600	0	1.2	N/A	N/A	N/A	irregular	4	var	N/A	N/A	Dry Extended Detention		10 CYD Dumped By Gazebo	Muck	Tree		100	Excavation from gazebo dumped on to north bank. Outflow buried.	Clean structures. May need to excavate.
216	Oakwood at Southfield Apts.	31250	13600	10750	N/A	0.5	est. 6	4	irregular	6	4	est. 180MID	est. 75MID	Wet	Restrictors in storm leaving structures 39, 41, 42, 43, 45, and 6.	Minimal	N/A	Turf	Algae, Duckweed	0	Fountain, stone edging. No outflow found. Swale draining to basin at SE side. Goose droppings.	Verify restrictor size - no plans or calcs.
217	Village House Condos	10500	6500	4200	N/A	N/A	0	N/A	rectangular	3	2	150	70	Dry	Basin last inspected in 1980.	Minimal	Hydric	Turf	Phragmites, Buckthorn	0	Abandoned pump station. No restrictor found. Not much drains to basin.	Verify restrictor and drainage to basin. Replace outflow bar grate.
218	Woodcreek Apts. - pond 1	N/A	10800	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry Catchbasin	Calcs are based on the total of both ponds.	N/A	Sandy Loam, Type B	Turf	No	0	Basins 218 and 219 are supposed to drain to MH with restrictor - no 8" restrictor.	Verify restrictor. Clean structures.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	219	Woodcreek Apts. - pond 2	21-3 b	21	NW	21-100-127	N/A	S.J. Harris 5/28/85	y	N/A	23550 Civic Center Dr., E. basin	Owner	N/A	Res.	12.029site	N/A	2.28site	0.55	N/A	4.5	43788site	45186site	20100
SOC	220	Park Place Apts.	21-4	21	NW	21-100-128	N/A	S.J. Harb & Assoc. 5/3/85AB	y	N/A	22990 Civic Center Dr., near First Center	Owner	N/A	Res.	5.55 (14.8 site)	N/A	1.11	N/A	N/A	3.2	21279	21300	22100
SOC	221	First Center	21-5	21	NW	21-100-122	N/A	Harley, Ellington, Pierce, Yee Assoc. 10/5/81	utilities plan only	storm easement	26901 Northwestern Hwy.	Owner	N/A	Com.	32.88	10	6.58	0.68	3.57	2.8	148360	155560 (132680 (basin plus 22970 in pipe)	160500
SOC	222	Omni Office	21-6	21	NE	21-202-022	20-1-005	337	y	N/A	26877 Northwestern Service Dr., near Firs	Owner	N/A	Com.	15.392	N/A	3.08	N/A	3.68	6.5	72037	90575.89	91000
SOC	224	Heatherwood Condos	21-8	21	NE	21-202-029	N/A	N/A	y	N/A	22800 Civic Center Dr.	Owner	N/A	Res.	4.62	10	0.41	0.9	4	2.2	15400	20155	15100
SOC	225	Monticello Apts.	21-9	21	NE	21-202-028	21-1-011	272; Archon Assoc. Inc. 12/12/86Rev.	some calcs. Poor plans - no details	N/A	22650 Civic Center, near building 22760	Owner	N/A	Res.	9.07 (storage for 7.42ac. only)	N/A	N/A	0.5	est. 1.8 basin (1 ft wetland)	2.1	52647	55200 Site (15200 Basin)	14900
SOC	226	Willowtree Apartments	21-10	21	SE	21-202-020	21-1-003	271	Partial plans. No calcs.	N/A	22262 Civic Center Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SOC	228	Irvine Rehab Center	22-1	22	SW	22-351-097	N/A	N/A	y	N/A	25700 Lahser	Owner	N/A	Com.	1.68	10	0.33	0.45	3	N/A	5021	5088	N/A
SOC	229	Northwest Detroit Dialysis	22-2	22	SW	22-351-098	N/A	PEA 9/11/03AB	y	n	25664 Lahser	Owner	N/A	Com.	0.3	10	0.06	0.7	1.5	1	1538	2801	650
SOC	230	Oakland Commons - E basin	22-3 a	22	NW	22-201-017	N/A	N/A	y	N/A	20750 Civic Center Dr.	Owner	N/A	Com.	21.73	10	0.2	0.75	7	6.8	118813	130934	74400
SOC	231	Oakland Commons - W basin	22-3 b	22	NW	22-201-017	N/A	N/A	y	N/A	20750 Civic Center Dr.	Owner	N/A	Com.	21.73	10	0.2	0.75	7	6.8	118813	130934	74400
SOC	232	Oakland Town Square	22-4	22	NW	22-176-012	N/A	N/A	y	N/A	26100 Northwestern Hwy.	Owner	N/A	Com.	26.139	10	0.299	0.67	8.5	5.7	127075	127143	62300
SOC	233	Oakland Commons	22-5	22	NE	22-201-017	22-1-002A	Nowak & Fraus 10/19/98	y	N/A	20700 Civic Center Dr.	Owner	N/A	Com.	14.99	10	3	0.75	9	8.7	83420	170740	214750

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft²	MID AREA (Field) ft²	BOTTOM AREA (Plan) ft²	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
219	Woodcreek Apts. - pond 2	N/A	4500	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry Catchbasin	Calcs are based on the total of both ponds.	N/A	Sandy, Type B	Turf	No	0	Basins 218 and 219 are supposed to drain to MH with restrictor - no 8" restrictor.	Verify restrictor. Clean structures.
220	Park Place Apts.	N/A	6900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	Dry Catchbasin	Two connected dry basins with one restrictor. 13100 ft3 detention pond, 5450 ft3 detention pond, and 2750 ft3 parking lot storage. High water elev. 684.5	No	N/A	Turf	No	0	Fenced. No inflows.	
221	First Center	37200MID	57300	N/A	N/A	2.8	4	N/A	triangular	N/A	2	est. 290MID	est. 270MID	Dry		Minimal	Poorly Drained	Turf, Bulrush, Buckthorn	Algae, Phrag, Purple L.	0	6" PVC in SW corner. 4' fence.	
222	Omni Office	16500	14000	7700	0.9	N/A	0	N/A	rectangular	3	1.5	150	110	Dry and Parking	Site also has parking areas to provide some storage.	N/A	Inundated, Silty Clay	Tree, Shrub, Forb	Buckthorn, Cattail, Willow	0	Site overgrown, could not find outlet or overflow. Fenced.	Verify outlet, clean if necessary.
224	Heatherwood Condos	7800	6800	2250	N/A	2	0	N/A	irregular	4	2	N/A	N/A	Dry		N/A	Poorly Drained	Cottonwood	Cattail, Willow	0	All structures underwater, water in CBs.	Clean structures. Verify Outflow.
225	Monticello Apts.	est. 8000MID	7100	N/A	N/A	2.1	N/A	3	irregular	N/A	2	est. 135MID	est.. 65MID	Wet	May have calculated detention that discharges into adjacent wetland. No storage provided for 1.65 acre Area B.	Minimal	Hydric	Forb, Aquatic	Phragmites, Cattail, Willow	0	Has fountain. 4' fence.	
226	Willowtree Apartments	N/A	104650	N/A	N/A	N/A	N/A	N/A	N/A	3	var	N/A	10	Wet and Wetland	May have calculated detention that discharges into adjacent wetland.	Muck, Sediment	Hydric	Cattail, Tree	Phragmites, Buckthorn	100	Open drain and wetland area with no storage. Mosquito larvae in water. Possible overflow CB in SE corner full of sediment.	Re-visit site. 12" conc. Inflow on E side is buried with broken end-section.
228	Irvine Rehab Center	6385	54600	360	1	N/A	0	N/A	irregular	6	var	270	40	Wetland		N/A	Hydric	Turf, Grass, Willow	Phragmites. Purple L., Buckt	0	Storm sewers discharge to wetlands to ditch to the south. No spillway or outlet to the south.	Clean structures. Verify restrictor at Outflow 250.
229	Northwest Detroit Dialysis	2052	650	est. 1860MID	0.25	0.25	N/A	N/A	rectangular	4	3	est. 64MID	est. 30MID	Dry Extended Detention	Discharges to wetlands in the rear.	1	Poorly Drained, Ponding	Turf	No	50	6" PVC roof drain E side. Oil sheen.	Excavate to 1550 ft3.
230	Oakland Commons - E basin	30545	10900	853	1	N/A	0	N/A	irregular	5	3	230	100	Dry Extended Detention	Connected with basin 231. Calcs are the same because they are hydraulically connected. Areas differ. Additional capacity provided by nearby wetland.	Minimal	Hydric	Grass, Forb	Algae, Cattail, Bulrush	100	6" PVC tile drain at E side. Outflows to basin 231. Basin partly mowed. Volume for basins 230 and 231.	
231	Oakland Commons - W basin	27962	10900	34	1	N/A	0	N/A	irregular	5	3	170	70	Dry Extended Detention	Connected with basin 230. Calcs are the same because they are hydraulically connected. Areas differ. Additional capacity provided by nearby wetland.	Minimal	Hydric	Grass, Forb	Algae, Cattail, Bulrush	100	Overflow 130 not found. Volume for basins 230 and 231.	
232	Oakland Town Square	24780	10900	5050	N/A	3	4	N/A	rectangular	5	3	180	160	Dry		N/A	N/A	Turf		0		
233	Oakland Commons	N/A	25100	N/A	N/A	1.2	9	N/A	irregular		5	est. 210MID	est. 60MID	Dry	Dry basin with sediment trap at primary inlet and temporary riser. Check if riser removed. Other Inlet to mid-slope, check for erosion.	Minimal	Hydric	Turf	Cattail, Sedge, Forbs	0	Overflow spillway 166 not properly graded. Two cell basin	Nutrient control. Replace bar grate on Inflow 565.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	234	City Center Office Center	22-6	22	NE	22-226-020	N/A	N/A	no calcs	N/A	26777 Central Park Blvd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4.3	N/A	N/A	22600
SOC	235	Residence Inn	22-7 a	22	NE	22-227-063	22-1-010	275	y	N/A	26700 Central Park Blvd., near I-696 Serv	Owner	N/A	Com.	3.79	10	0.76	0.6	4	2.6	14581	18558	5300
SOC	236	Residence Inn	22-7 b	22	NE	22-227-063	22-1-010	275	y	N/A	26700 Central Park Blvd., near I-696 Serv	Owner	N/A	Com.	1.57	10	0.31	0.6	3.8	2.1	6066	7746	1250
SOC	237	Park Place Town Center	22-8	22	SE	22-428-001 thru ?	N/A	N/A	Plans illegible, partially complete. No details. No indication of restrictor.	y	Boardwalk and Evergreen	Owner	N/A	Res.	N/A	1	0.7	0.62	6.5	1.3	7467	12300	14900
SOC	238	Park Place Town Center	22-9	22	SE	22-426-002 thru ?	N/A	N/A	n	y	Northwestern and Evergreen	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	7.1	N/A	N/A	82300
SOC	239	Hawthorne Suites	22-10	22	SE	22-426-004	N/A	N/A	y	y	25100 Northwestern Hwy.	Owner	N/A	Com.	3.07	10	0.093	0.7	4.36	4.7	8616.64	18517.2	21400
SOC	240	Lawrence Tech	22-11	22	SW	22-451-003	22-2-004	OHM 5/21/98	y	N/A	21000 W. Ten Mile Rd.	Owner	N/A	Com.	7.383	10	1.477	0.55	2.57	2.5	28250	17772	40100
SOC	242	Meadowcrest Apts.	25-2	25	NW	25-156-002	N/A	Archon Assoc., Rev. 12/1/89	grading and utility plans and calcs	N/A	17380 Mt. Vernon, E. of Lathrup	Owner	N/A	Res.	5.154	10	1.038	0.7	2.7	2.5	26415	26503	12500
SOC	246	Blue Water Productions	26-2	26	SW	26-177-020	N/A	Atwell-Hicks, Inc. Approved plans 4-7-01	y	y	696 Service Dr. and Mt. Vernon	Owner	N/A	Com.	9.86	10	2	0.58	N/A	3.8	40381	44572	56250
SOC	247	Single Family Homes	26-3	26	NW	26-177-024,023,022,&021	N/A	N/A	y	N/A	24653 Lafayette Circle	Owner	N/A	Res.	3.05	10	0.2	0.5	N/A	4.9	10372	13032	13900
SOC	250	MDOT Regional	27-1	27	NE	27-226-014	N/A	N/A	n	N/A	Evergreen and Ten Mile Rds.	Owner	MDOT	Com.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SOC	257	WRIF/WXYZ Studios	27-3	27	NE	27-201-005	N/A	N/A	some	N/A	20777 W. Ten Mile Rd.	Owner	N/A	Com.	3.2	N/A	0.2	0.64	N/A	3.5	6000	5741	16300
SOC	258	Word of Faith - basin A	27-4 a	27	SE	27-426-006 & 008	N/A	Zeimet-Wozniak 3/10/99 calcs	y	y	2000 W. Nine Mile Rd. - E basin	Owner	N/A	Com.	17.2	10	3.44	0.27	2.3	N/A	26109	29171	N/A
SOC	259	Word of Faith - basin B	27-4 b	27	SE	27-426-006 & 008	N/A	Zeimet-Wozniak 3/10/99 calcs	y	y	2000 W. Nine Mile Rd. - N basin	Owner	N/A	Com.	7.8	10	1.56	0.7	3.45	6.3	40142	45442	99800
SOC	260	Meadowbrook Villas	27-5	27	SW	27-303-001 thru 041	27-3-007	346; Seiber, Keast & Assoc. 6/29/95 expansion plan	y	N/A	23474-23574 Lahser Rd.	Owner	N/A	Res.	5.5	10	1.1 (Qo = 0.49)	0.408	3.68	5.1	14496	15264	51000
SOC	261	Southfield Townhomes	27-6	27	SW	27-301-029	N/A	Cantor Eng. 3/23/77 rev.	n	N/A	23580 Lahser Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.5	N/A	N/A	23400
SOC	262	Detroit Federal Credit Union	28-1	28	NE	28-226-002	N/A	N/A	y	N/A	24333 Lahser Rd.	Owner	N/A	Com.	9.9	10	0.67	0.3	5	5.4	5865	17420	18400
SOC	266	Sure Guard Storage	28-5	28	NW	28-151-033	N/A	N/A	y	N/A	24200 Telegraph Rd.	Owner	N/A	Com.	3.16	100	N/A	0.76	3.45	3.8	30308	19184	29100
SOC	269	Autumn Ridge Condos	29-1	29	NE	29-201-018 Thru ?	29-1-016	N/A	y	N/A	24501-24621 Ten Mile Rd.	Owner	N/A	Res.	14.6	N/A	2.92	0.55	6.6	1.3	43648	50261	14600

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
234	City Center Office Center	N/A	5250	N/A	N/A	2	N/A	N/A	N/A	6	4	N/A	N/A	Dry	Used as backflow?	N/A	Silty, Wet	Turf	No	0	No Inflow. Outflow unrestricted with separated end-section. Overflow not found.	Verify restrictor. Repair Outflow 227.
235	Residence Inn	N/A	2050	N/A	N/A	N/A	0	N/A	0	6	3	180	50	Dry		Excessive	N/A	Cattail		0	Overgrown, silted in, inaccessible. Appears to be a buried Inflow pipe on W side. Outflow and Overflow not found (buried).	Verify Outflow. Dredge. Maintain vegetation.
236	Residence Inn	2800	600	75	N/A	3	0	N/A	triangular	6	2	80	70	Dry		N/A	Silty Loam	Turf	No	0	Plan shows Inflow 226 as swale. Basin is bisected by a fence. Overflow off property.	
237	Park Place Town Center	N/A	11500	N/A	N/A	N/A	N/A	5	N/A	6	6	260	80	Wet		N/A	Hydric	Forb, Turf	Algae, Cattail, Rushes	0	Has fountain, did not find inlet, possible underwater.	Verify inlet.
238	Park Place Town Center	N/A	11600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	Dry Extended Detention		Minimal	Hydric, Underwater	Forb	Cattail, Rushes, Phragmites	0		
239	Hawthorne Suites	9408	4550	0	N/A	0.5	N/A	N/A	N/A	N/A	6	230	50	Dry		N/A	Silty	Turf	Algae	0	Crushed conc. bottom. Outflow 70% buried.	Clean structures.
240	Lawrence Tech	14720; est. 9000MID	16050	N/A	0	0.2	N/A	N/A	rectangular	6	4	est. 180MID	est. 90MID	Dry Extended Detention		Minimal	Hydric	Turf	Bulrush, Algae	25	Overflow energy dissipator not constructed (nor needed).	Clean structures.
242	Meadowcrest Apts.	N/A	5000	N/A	N/A	N/A	N/A	N/A	irregular	vary	5	est. 105	est. 60	Dry Catchbasin	Pipes to and from CB in the middle of the basin. Storm backs up in to basin. No overflow shown.	Minimal	Clayey, Type C/D	Turf	No	100	CB sump full.	Clean structures.
246	Blue Water Productions	N/A	14800	N/A	1.3	N/A	N/A	3	triangular	N/A	2	N/A	N/A	Wet		Minimal	Hydric	Turf	Lawn	0	Pipe in Outflow structure 256 is angled downward toward sump.	
247	Single Family Homes	N/A	2850	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	1	N/A	N/A	Dry		Minimal	Hydric	Forb	Cattail	0	Did not find Inlet 537, found another overflow structure upland on the NE side, it was covered in erosion fabric.	
250	MDOT Regional	N/A	65200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	var	N/A	N/A	Wetland		N/A	Hydric	Shrub	Cattail, Willows	0	Overgrown. Outflows to creek overland - no Outflow structure.	Verify Outflow.
257	WRIF/WXYZ Studios	N/A	4650	N/A	N/A	1	N/A	N/A	N/A	6	2.5	N/A	N/A	Dry		None	Hydric	Forb	Horsetail, Phragmites, Ctail	100	Basin has swale that contributes most of the flow.	
258	Word of Faith - basin A	41536	N/A	est. 8950MID	0.6	N/A	N/A	N/A	irregular	N/A	var	N/A	N/A	Wetland		N/A	Hydric	Grass, Tree	Phragmites	100	Not a formal basin. Outflow not found.	Stabilize edge of parking lot.
259	Word of Faith - basin B	25825	15800	est. 13500MID	0.8	2.6	N/A	N/A	irregular	6	2.5	N/A	N/A	Dry	Storage elev. 661.8	Some	Some Sand - Type B	Turf	Phragmites	100	6.5' high wood weir in overflow structure with 8" opening.	Stabilize south side at parking lot.
260	Meadowbrook Villas	6488	10000	est. 4490MID	est. 2	N/A	N/A	N/A	irregular	3	3	N/A	N/A	Dry	Expanded in 1995. Fenced.	At Structures	Hydric	Turf, Forb, Tree	Cattail, Willow	0	Two cell basin with berm through middle. Pumped outflow.	Verify pump is working.
261	Southfield Townhomes	N/A	9375	N/A	N/A	N/A	0.92	1	irregular	5	1.5	N/A	N/A	Dry	Fence, fountain	Some At Outflow	Hydric	Turf, Tree	Willow, Algae	0	No restrictor and some erosion/sediment at Outflow 309.	Verify restrictor. Stabilize Outflow or modify structure.
262	Detroit Federal Credit Union	9850	3400	1125	1	2	0	N/A	oval	6	4	110	110	Dry		Minimal	Hydric	Turf	Phragmites, Purple L., Ctail	0		Clean structures.
266	Sure Guard Storage	8892	7650	1828	N/A	0.5	N/A	N/A	N/A	4	2	175	70	Dry	basin was improved?	Minimal	N/A	Turf	Lawn	0		
269	Autumn Ridge Condos	13500	11250	425	N/A	0.2	0	4	irregular	5	3	170	80	Wet		N/A	N/A	Sedge, Cattail	Purple L.	0	Inflow 493 not found - underwater?	Clean structures. Verify restrictor plate.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft³	STORE PROVD (Plan) ft³	STORE PROVD (Field) ft³
SOC	270	Riverwood	29-2	29	NE	29-201-006	N/A	Zeimet Wozniak & Assoc. 7/17/87 Rev.	y	N/A	24461-24491 Ten Mile Rd.	Owner	N/A	Res.	4.65	10	0.222	0.9	N/A	N/A	32093	32350	N/A
SOC	272	Gordon Food Service	29-3	29	NE	29-276-054	N/A	omm egineering 4/20/98 rev.	y	N/A	24489 Telegraph Rd.	Owner	N/A	Com.	2.43 site	100	N/A	0.769	2.5	3.3	23161site	24857 site (12349 parking, 7105 front basin, 4760 west basin, and 643 pipe)	8200
SOC	273	Standard Federal Bank	29-4	29	SE	29-476-024	N/A	PEA 4/3/89	y	N/A	23055 Telegraph Rd.	Owner	N/A	Com.	1.2	10	0.52	0.64	0.3	3.7	N/A	N/A	19200
SOC	274	Kristy Woods Condos - W basin	29-5 a	29	SW	29-378-027 thru 037	N/A	N/A	y	y	23004-23174 Nine Mile Rd., W. of Kristy	Owner	N/A	Res.	2.6	10	0.52	0.5	4	5.4	8841.56	9597	19400
SOC	275	Kristy Woods Condos - E basin	29-5 b	29	SW	29-378-027 thru 037	N/A	N/A	y	y	23004-23174 Nine Mile Rd., E. of Kristy	Owner	N/A	Res.	2.6	10	0.52	0.5	1	3	8841.56	9597	7900
SOC	278	Fire Station 2	32-1	32	NW	32-151-013	32-4-017	N/A	some	N/A	25753 Nine Mile Rd.	Owner	N/A	Com.	2.69	10	0.54	N/A	N/A	4.9	11100	12645	52100
SOC	279	Reid Glass	32-2	32	NE	32-228-017	32-1-020	N/A	y	N/A	22110 Keifer	Owner	N/A	Com.	0.48	10	0.87	0.55	4	3.1	168	367	2400
SOC	281	EZ Link Storage	32-4	32	SE	32-400-014	32-2-028a	N/A	no calcs	N/A	20945 Link Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	5	5.4	N/A	N/A	74925
SOC	285	Page Toyota	33-1	33	SW	33-301-007	33-3-013	Louis Cantor Co. 11/2/81	y	y	21262 Telegraph Rd.	Owner	N/A	Com.	5.26	N/A	1.05	0.69	4.5	9	30363	30456 (22626 basin, 7830 pipe and structures)	34650
SOC	286	Ingersoll	33-2	33	NW	33-151-004	N/A	N/A	y	N/A	22122 Telegraph Rd.	Owner	N/A	Ind.	3.47	10	0.594	0.46	1.5	2.8	12480	15812	22300
SOC	287	New Hope Church	33-3	33	NW	33-101-034	33-4-009	362	y	y	23455 Nine Mile Rd.	Owner	N/A	Com.	3.43	10	0.686	0.9	5	4.4	23671	24330	20200
SOC	288	Sam's Club	33-4	33	SE	33-452-029	33-2-009	360	some	N/A	22500 Eight Mile Rd.	Owner	N/A	Com.	37.9	N/A	N/A	N/A	N/A	4	191167	192600	68300
SOC	293	Plum Hollow Woods	34-2 a	34	NW	34-153-019 thru 047	N/A	N/A	y	N/A	21612-21934 Rose Hollow	Owner	N/A	Res.	7.51	10	0.5	0.4	2	3.4	19277	2648	5900
SOC	294	Plum Hollow Woods	34-2 b	34	NW	34-153-019 thru 047	N/A	N/A	y	N/A	21612-21934 Rose Hollow	Owner	N/A	Res.	7.51	10	0.5	0.4	3	2.6	19277	18322	12500
SOC	295	Plum Hollow Woods	34-2 c	34	SW	34-153-019 thru 047	N/A	N/A	y	N/A	21612-21934 Rose Hollow	Owner	N/A	Res.	7.51	10	0.5	0.4	3	4.3	19277	1723	6550
SOC	296	National Storage	34-3	34	SW	34-353-031	N/A	N/A	some	y	21940 Eight Mile Rd.	Owner	N/A	Com.	2.36	N/A	0.5	N/A	N/A	2	12051	14255	15200

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
270	Riverwood	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	Parking		In Receiving Channel	N/A	N/A	N/A	0	CB sump full, stream is aggrading.	Clean Structures.
272	Gordon Food Service	N/A	2500	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	3	N/A	N/A	Dry	Two connected dry basins with parking/pipe storage. No restrictor calcs or outlet detail. Appears to be restricted where the storm leaves the last MH and backs up into basins.	At Outlet	Silty	Turf		0	Inlet for roof drainage at SW corner of basin (12" conc.).	Verify restrictor.
273	Standard Federal Bank	N/A	5200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry	There is parking lot storage as well, w/ a 2 in restrictor in the d/s catch basin	Minimal	Silty Loam	Turf	No	0	Restrictor at CB at Telegraph entrance so it includes parking lot storage. Inflow 496 not found. East basin not built.	
274	Kristy Woods Condos - W basin	3992	3600	130	1	N/A	N/A	N/A	rectangular	N/A	3	N/A	N/A	Dry		Minimal	Silty Loam	Turf	No	0	No 3" restrictor. Inflow 499 not found. Rearyard storms do not drain to basins.	Verify restrictor. Verify detention of rearyard CBs.
275	Kristy Woods Condos - E basin	2332	2600	0	1	N/A	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry	This basin serves as additional storage for Det No. 274	Minimal	Silty Loam	Turf	No	0	No inflowing pipes. Connected to basin 274. Rearyard CBs do not drain to basin.	
278	Fire Station 2	N/A	10625	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	2.5	N/A	N/A	Dry		Minimal	Hydric	Turf, Forb	Purple L., Cattail, Rush	0	Did not find one of the inlets, did not find outlet or overflow structure, overgrown.	Clean out all structures, most are buried or blocked.
279	Reid Glass	N/A	1125	N/A	N/A	N/A	0	N/A	oval	6	4	60	20	Dry	Basin 2	N/A	Sandy Loam	Forb		0	No 4" restrictor.	Verify restrictor.
281	EZ Link Storage	11000	13875	600	N/A	0.5	0	N/A	triangular	6	1.5	200	100	Dry		Minimal	Hydric	Turf, Forb	Purple L., Cattail	0	Unable to verify outgoing pipe from beehive, needs cleaning.	Outlet beehive needs some cleaning.
285	Page Toyota	N/A	3850	N/A	N/A	N/A	N/A	N/A	rectangular	4	1	est. 65MID	est. 60MID	Dry	6 ft fence.	Minimal	Hydric, Underwater	Forb	Wildflowers	0	Basin is deep, some standing water, no end section on any of the structures.	Clean structures.
286	Ingersoll	8400	7950	0	N/A	N/A	0	N/A	rectangular	5	1	210	80	Dry	C factor seems too low.	Minimal	Silt, Hydric	Willow	Buckthorn, Purple L., Phragm	0	Litter. Overgrown.	Needs maintenance of veg., litter.
287	New Hope Church	9900	4600	1260	N/A	0.5	0	1.3	rectangular	5	1.5	210	50	Dry		Minimal	hydric, ponding	turf, forbs	Cattails, sedges	0	site is fenced (4'), second overflow at 9 Mile Rd.	
288	Sam's Club	N/A	17050	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	Dry Extended Detention	Taco Bell's storm sewer connects to Sam's Club's and then onto the Detention Basin	Silt On Bottom	N/A	Forb, Cattail	Purple L., Algae	0	Inflow 480 smells like sewage. Inflows 478 and 482 not found. Oil sheen, discolored discharge.	Investigate illicit connection. Clean structures.
293	Plum Hollow Woods	2831	1750	64	N/A	N/A	0	N/A	irregular	5	3	130	50	Dry	Basin is connected to 2 others (294, 295) on site. Required volume is the sum of all three. C facter seems low.	Minimal	sandy loam	Turf		0	2-4" PVC from sump pumps, restrictor for 293-294, no individual restrictor	Verify restrictor
294	Plum Hollow Woods	N/A	4800	N/A	N/A	N/A	0	N/A	irregular	5	5	220	60	Dry	Basin is connected to 2 others (293, 295) on site. Required volume is the sum of all three. C facter seems low.	Minimal	sandy loam	Turf		0	sump pump to inlet 474, no individual restrictor, restrictor for basins 293-294	Verify restrictor
295	Plum Hollow Woods	N/A	1500	N/A	N/A	1.2	0	N/A	irregular	5	3	45	60	Dry	Basin is connected to 2 others (293, 294) on site. Required volume is the sum of all three. C facter seems low.	Minimal	moderately well drained	Turf		0	no restrictor found	Verify restrictor
296	National Storage	N/A	5250	N/A	N/A	2	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry		None	Poorly Drained	Turf	Lawn	0	Cobble bottom, inlet also serves as outlet.	

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	297	RRRSOC	35-1	35	SW	35-351-036	N/A	N/A	y	y	19200 Eight Mile Rd.	Owner	N/A	Com.	4.16	10	1.027	0.65	3	5	17500	19339	27000
RHC	303	True Green Chemlawn	28-303-015-0154	28	SW	N/A	517	1984 John W. Payne	y	n	2711 Commerce	Owner	Trugreen of Detroit-Rochester Hills, C/O Rash #916-22-47150, P.O. Box 1600, Rowlett. TX 75030-1600	Com.	2.3	10	N/A	0.71	est. 2	2	9,699	10,460	9000
RHC	305	M.O.L. Investment	28-351-020-0123	28	SW	N/A	405 (83-405MF)	1983	y	n	2776 Commerce	Owner	Schain Properties LLC, 2776 Commerce Dr., Rochester Hills, MI 48304-3402	Com.	2.3	10	N/A	0.7	4.25	6.2	9,265	N/A	25100
RHC	307	Hi-Tech	28-376-019-0129	28	SW	15-28-376-019	603	1987	no calcs	n	2798 Product Dr.	Owner	Hi Tech Mold and Engineering Inc., 2775 Commerce Rd., Rochester Hills, MI 48309-3815	Ind.	N/A	10	N/A	N/A	approx. 3	3.2	4,161	5,159	2300
RHC	308	Guardian Angel	28-377-008-0001	28	SW	15-28-377-008	N/A	1984. plan for addition 8/22/01 Cheryl Ball, John Asselin & Assoc.	No details	n	1715 Northfield Dr., near Crooks	Owner	Kassab Management LLC, 291 Cross Creek Blvd., Rochester Hills, MI 48306-4566	Ind.	0.64 (orig. 1.15)	10	N/A	0.8 (orig. 0.48)	2.07	2.6	5064.4 (orig. 4,000)	N/A	1750
RHC	309	Northfield Industrial	28-377-016-0132	28	SE	N/A	831	1978 AB 9/19/78 Morrison & Peters	n	y	E. of Product, N. of Northfield	Owner	Northfield Industrial Park, 1180 Big Beaver Rd., Troy, MI 48083-1934	Ind.	N/A	N/A	N/A	N/A	est. 15	N/A	N/A	est. 308,400	N/A
RHC	311	Devondale Warehouse	29-402-008-0329	29	SE	N/A	134	1980 Feldhauser Assoc.	y	n	2385 Devondale	Owner	Robert L. Moncrieff, 6230 Sandshores Dr., Troy, MI 48085-1357	Com.	0.2	10	N/A	0.6	1.5	1.3	4,861	5,400	7800
RHC	312	Lueders Drain Regional - Phase II	29-426-004-0115	29	SE	N/A	005; HRC 870725	HRC 4/24/96 AB	y. No calcs.	y	S. of Austin Ave.	Owner	Oakland County Drain Comm., Ch. 20 Lueders Drain Dist.,1 Public Works Dr., Waterford, MI 48328-1907	Com.	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	526600
RHC	313	NY Coney	29-427-004-0122	29	SE	N/A	123	1989 Urban Land Consultants	y	y	2652 Crooks Rd.	Owner	Christenson and Christenson Commercial, 435 E. Maple Rd., Troy, MI 48083-2720	Com.	2.67	10	N/A	0.9	5.18	4.2	18,565	19,568AB	18500
RHC	314	Colonial Mini Storage	29-427-017-0002	29	NE	N/A	N/A	1989 (12/2/87 GWE)	some	n	2570 Colonial Dr.	Owner	Nolan Brothers of Texas Inc., P.O. Box 101835, Fort Worth, Texas 76185-1835	Com.	6.59 Colonial MiniStorage	10	N/A	0.8 Colonial MS	N/A	N/A	39,850 Colonial MS	N/A	N/A
RHC	315	Red Roof Inn	29-427-018-0001	29	SE	15-29-427-033 and 15-29-427-018	N/A	1988	some	yes, Mcdonald's also	2500 Colonial Dr.	Owner	Acor North America Red Top Property LLC, P.O. Box 117508, Carrolton, Texas 75011-7508	Com.	4.07 Red Roof; 1.21 McDonalds	10	N/A	0.9; 0.9	N/A	N/A	28,108 Red Roof; 8,361 McDonalds	N/A	N/A
RHC	318	Lueders Drain Regional - Midvale basin	29-452-019-0358	29	SE	N/A	RHC E90-011; HRC 870725	10/20/1988 HRC	some. no calcs	n	N. of Midvale Dr.	Owner	Paul Colwell, 24215 W. River Rd., Grosse Ile, MI 48138-1658	Res.	N/A	N/A	N/A	N/A	est. 4	N/A	N/A	est. 320,000	N/A
RHC	319	Auburn Place	29-477-029-0328	29	SE	N/A	621; Micro85-621	1985 AR Decker & Assoc.	y	n	NW corner of Crooks and Auburn Rd.	Owner	Curtis Properties Inc.,5364 Cheltenham Dr., Troy, MI 48098-2470	Com.	3.22	10	0.64	0.8	5	5.3	19,344	17,700 and 4,170 on parking area	20400

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
297	RRRSOC	N/A	5400	N/A	N/A	N/A	0	N/A	oval	N/A	2	240	6	Dry	Vegetated swale, no inlets on plan. Restriction is over entire outlet pipe as is goes toward evergreen. Pipe size goes fron 18 in RCP to 8 in pvc. Pipe storage included on plan, but not in this review.	1	sandy	grasses, forbs and trees		0	material dumped on south side (has broken glass) poorly graded, no inflows, out 254 backs up to basin	Verify allowable Q
303	True Green Chemlawn	N/A	4500	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	6	est. 153	est. 30	Dry Catchbasin		Minimal	N/A	Turf	No	0	Plans show some rear parking lot storage.	Verify restrictor.
305	M.O.L. Investment	N/A	4050	middle est. 3,520	N/A	N/A	N/A	N/A	rectangular	5	3	110.5	27.6	Dry		Minimal	N/A	Turf	No	0	Cobble bottom.	Verify restrictor, clean structures.
307	Hi-Tech	est. 2,550	730	N/A	N/A	N/A	N/A	N/A	V-shaped	N/A	4	est. 180	est. 10-25	Dry Catchbasin	Records 1991.	Minimal	N/A	Turf	No	0	Outlet structure eroded around frame.	Stabilize outlet.
308	Guardian Angel	N/A	675	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	Dry	Note on plan says addition not built. Three 0.5 ft x 0.5 ft openings in bottom of 6 ft high concrete wall to the south for drainage. Records 1991.	Minimal	N/A	Turf	No	75	No inflows to basin.	Verify restrictor.
309	Northfield Industrial	est. 42,050 (20,560 at middle)	23300	N/A	N/A	N/A	N/A	N/A	rectangular	3	3	est. 290 (235 at middle)	est. 235 (88 at middle)	Pumped Detention	ADCO Properties Project; drains to 310. Flooding 1999.	Some - Turbid Water	N/A	Grass, Sedge, Forb	Algae, Pondweed	0	6' fence with barbed wire, pumped basin, outlet pipe not seen - underwater?	Verify outflow pipe is not blocked.
311	Devondale Warehouse	est. 10,200	6000	N/A	0.5	N/A	N/A	N/A	rectangular	4	3	top est. 170	top est. 60	Dry	shallow depression bermed on two sides	No	Type B/C	Turf	No	100	Black residue from metal shop.	Clean parking lot CB and pavement - metal finings.
312	Lueders Drain Regional - Phase II	N/A	87800	N/A	est. 2.2	2.2	est. 2.5	3	irregular	N/A	var	N/A	N/A	Wet	Records 1990.	Needs Dredging	N/A	Tree, Shrub, Forb	Cattail, Phragmites, Algae	0	E side of basin has turf, has significant toe erosion.	Dredge, verify restrictor.
313	NY Coney	est. 6,600	4400	est. 2,275	1	N/A	N/A	N/A	boot-shaped	3	1	middle est. 88	middle est. 48	Dry	6 ft. fence; low flow channel; temporary sediment trap at inflow pipe	Minimal	Sandy	Grass, Forb	No	100	No fencing.	Verify restrictor.
314	Colonial Mini Storage	N/A	137600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Wetland	3 sites drain to wetland (Red Roof Inn, McDonalds, Colonial MiniStorage). Records 1990.	N/A	N/A	Wetland, Tree	No	0	Area from City GIS. Storm discharging to ditch along NE side of wetland, no controlled outlet.	
315	Red Roof Inn	N/A	137950	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Wetland	3 sites drain to wetland (Red Roof Inn, McDonalds, Colonial MiniStorage). Records 1990.	N/A	N/A	Shrub, Forb, Duckweed	Buckthorn, Nettles	0	Area from City GIS. Inflows 111 and 112 not found, no controlled outlet, storm discharges to wetland.	
318	Lueders Drain Regional - Midvale basin	est. 85,000	246200	est. 75,000	est. 1	N/A	N/A	1	roughly triangular	6	var	est. MID 400	est. MID 325	Wet		Approx. 2	N/A	Tree	Buckthorn, Algae	100	No outlet found. 18" appears to be entering basin from MH at Midvale Dr. - not found.	Verify restriction. Dredge. Clean structures.
319	Auburn Place	est. 6,825	3850	est. 1,890	N/A	N/A	N/A	N/A	rectangular	14 - 21%	2	est. MID 90	est. MID 45	Dry	minor sediment and debris, cattails, no buffer. Records 1990.	Some, <1	Poorly Drained Sediment	Grass, Sedge	Reed, Cattail	0	50% 6' fence and 50% 4' wall, restrictor two MHs downstream, recently mowed.	

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
RHC	320	Crooks Road Medical Center	29-477-034-0069	29	SE	N/A	N/A	1988 Nowak & Fraus	y	y	2840 Crooks Rd.	Owner	(North bldg.) 2820 Crooks, OSC Properties, 2820 Crooks,Suite 200, Roch. Hls., MI 48309-3607,(South bldg.) 2840 Crooks, Levon & Ann Derdian, 3510 Metemora, Metamora, MI 48455-9345	Com.	2.66	10	N/A	0.8	2.6	N/A	15,981	N/A	N/A
RHC	321	Michigan Humane Society	30-376-003-0110	30	SW	N/A	177	1982 Gillett Assoc.	y	n	3600 W. Auburn	Owner	Michigan Humane Society, 7401 Chrysler Dr., Detroit, MI 48211-1942	Com.	10.01	3.5 in over site at 0.2cfs/ac	N/A	n/a	2.87	3.9	126,418	N/A	100600
RHC	322	Rochester Hills Corp. Ctr. Sub.	30-377-004-0101	30	SE	N/A	622	10/30/85 Lehner Assoc.	y	y	2937 Waterview Dr.	Owner	Rochester Hills Corp., 250 Martin Street, Suite 100, Birmingham, MI 48009-3382	Ind.	63.145	2 - 100 yr	N/A	0.8	4	4	1,667,028	1,785,445	1468200
RHC	323	Combustion Research	30-451-038-0108	30	SE	15-30-451-038	480	1975	y	n	2516 Leach Rd.	Owner	Winifred B. Johnson, 2611 Lake Charnwood, Troy, MI 48098-2177	Ind.	1.84 site	10	N/A	0.7	2.4	2.5	9,430 site	3,021	6700
RHC	325	Meadowbrook Ice Cream	30-452-040-0105	30	SE	N/A	466	1984 (AB 1/12/00 GWE)	y	n	2885 Leach Rd.	Owner	Fred Mehrpay, 911 Westview Rd., Bloomfield Hills, MI 48304-2065	Com.	0.38	10	N/A	0.42	1.75	2	1,138?	1,535	3800
RHC	326	Meadowbrook Ice Cream	30-452-040-0106	30	SE	N/A	466	1999 (AB 1/12/00 GWE)	y	n	2885 Leach Rd.	Owner	Fred Mehrpay, 911 Westview Rd., Bloomfield Hills, MI 48304-2065	Com.	0.76	10	N/A	0.42	2.28	2.3	2,277	2,147	2500
RHC	327	Allen Brothers	30-452-057-0001	30	SE	N/A	1922	1989 (AB 2/8/01 AES Engineers)	y	y	2691 Leach Rd.	Owner	R & G Property Company, 2691 Leach, Rochester Hills, MI 48309-3558	Com.	1.33	10	N/A	0.6	3.86	5.2	5,671	7,373	8400
RHC	328	Rochester Hills Exec - A	30-477-006-0111	30	SE	N/A	571	1986 GWE	y	y	2993 Technology Dr., West basin A	Owner	Rochester Hills Executive Park, 500 Stephenson Highway, Troy, MI 48083-1118	Ind.	35.91	10	N/A	0.75	3.5	2.8	199,850	193,560	268000
RHC	329	Adams Oaks	31-055-035-0232	31	NW	N/A	327	1996	some	y	3845 Beecherest	Owner	Adams Oaks LLC, P.O. Box 255005, West Bloomfield, MI 48325-5005, parcel i.d. 15-31-155-032	Res.	15.18 (per DA plan)	N/A	N/A	0.4	est. 4	5	N/A	N/A	93750
RHC	330	State Farm Insurance	31-201-005-0096	31	NE	N/A	156 (Micro 80-156)	1981 (1/24/75 Giffels Webster Engineers)	y	n	3345 W. Auburn Rd.	Owner	Joseph L. Zajac, 870 Peach Blossom Lane, Rochester Hills, MI 48306-3347	Com.	1.07	10	N/A	0.72	1.76	1	5,693	6,336	3600
RHC	331	Robert Evans Drain Regional - Outlot B	31-201-048-0354	31	NE	N/A	N/A	1976 (8/2/74 Johnson & Anderson)	n	n	Willet Ave.	Owner	Drainage Board for Ch. 20 The Robert J Evans Relief Drain, 1 Public Works Drive, Waterford, MI 48328, 1-248-858-0958	Res.	N/A	N/A	N/A	N/A	14	9	N/A	N/A	3094000
RHC	332	American House	31-301-008-0231	31	SW	N/A	3573	1987 (Micro 83-857.3)	y	n	3741 Adams Rd.	Owner	Prudential Huntoon Paige Karen Quast, 379 Thornall Street, Suite 10, Edison, New Jersey 08837-2226	Com.	25.78	10 (100)	N/A	0.46	6.5	N/A	100,588.71 (165,350.45)	294530.05 (total vol. 662,151.8AB)	N/A
RHC	333	United Methodist Church	31-301-030-0095	31	SW	15-31-301-012	751	1986 Giffels Webster Eng.	y	n	3821 Adams Rd.	Owner	Grace Evangelical Free Church of Bloomfield Hills, 100 North Crooks Rd., Suite 110B, Clawson, MI 48017-2800	Com.	7.02	10	N/A	0.37	2	2	16,300	23,558	28600
RHC	334	Assisted Living Complex	31-326-032-0297	31	SW	15-31-326-003; 15-31-326-017	518 (Micro 84-518)	1985 Zeitmet Wozniak	y	y	3500 South Blvd.	Owner	Pomdan Associates, 74 E. Long Lake Rd.,FL 1, Bloomfield Hills, MI 48304-2380	Com.	13.5	10 and 100	N/A	0.55	3	3.2	(95,853 - 100 yr)	n/a	67200

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
320	Crooks Road Medical Center	est. 13,500	16150	N/A	N/A	N/A	N/A	1	rectangular, one end wider	N/A	1	est. TOP 225	est. top 60	Wetland		1	N/A	Turf, Shrub	Phragmites, Purple L., Duckw	0	Inflow 97 and Outflow 56 not found. AB plan says outflow not built.	Clean structures. Construct outlet.
321	Michigan Humane Society	N/A	25800	N/A	0.7	1.4	6	5	irregular	N/A	5	est. 330	est. 275	Wet		1	N/A	Tree, Shrub	Buckthorn, Algae	0	Area estimated from aerial.	Verify restrictor. Outflow pipe may need repair.
322	Rochester Hills Corp. Ctr. Sub.	N/A	367050	418,612	4	N/A	4	4	irregular	4 (6 below water)	N/A	N/A	N/A	Retention	Records 1990. Pool volume 1667000 cft.	N/A	Sandy	Turf, Trees, Forbs	Lily pads	0		
323	Combustion Research	6,376	2700	5,708	0.3	1.2	N/A	1	L-shaped	5	2	est. MID 110	est. MID 30	Dry		Minimal	Poorly Drained	Turf	No	100	L-shaped basin, Fire protection basin 324 not there.	Verify restrictor - blockage, basin 324 not present - verify adequate storage.
325	Meadowbrook Ice Cream	1,621	1900	0 (est. MID 1,005)	0	N/A	N/A	N/A	rectangular	6	1.5	est. 70	est. 25	Dry Catchbasin	file says built undersized	Minimal	Sandy, Type A/B	Turf	No	0	8" plastic pipe to CB from rooftop.	
326	Meadowbrook Ice Cream	2,207.40	1100	0 (est. MID 710)	0	0.4	N/A	N/A	rectangular	N/A	2	est. 125	est. 20	Dry	file says built undersized	Minimal	Sandy	Turf	No	0	Poorly defined spillway in East berm, dirt stockpiled at S. end.	Remove stockpile, debris.
327	Allen Brothers	est. 2,800	1600	N/A	0.5	N/A	N/A	N/A	oval	N/A	2	est. 92 (MID 80)	est. 31 (MID 20)	Dry	cobble stone flowline	Minimal	N/A	Turf	No	0	Cobble bottom.	Clean structures.
328	Rochester Hills Exec - A	104,240	95700	est. MID 35,560	2	4.5	1.9 (1986)	N/A	rectangular with extension	6	3	est. 180 (pond ext. 240)	est. 210 (pond ext. 45) @ 35	Dry	Records 1990.	3.5 at overflow	Hydric	Forb, Tree	Phragmites, Reed	0	Inflow 105 not found, outflow not built per plan, side slopes not mowed.	Verify outflow.
329	Adams Oaks	est. TOP 28,000 at 855	18750	est. 13,200 (MID 20,000)	3	1.7	4	2	oval	N/A	2.5	est. TOP 280 (MID 250)	est. TOP 100 (MID 80)	Wet	concern over cattails; 10 in restrictor in MN A 24 in pipe to proposed Chester Drain to north. Records 1995 (TP).	2 (4 Pool Depth Per Plan)	Sand	Turf	Cattail, Bulrush, Sedge	0	No controlled outflow, pet waste, mosquitoes, blue dye, pesticide sign.	Remove yard waste from overflow, clean structures, buffer.
330	State Farm Insurance	est. 16,000	3600	N/A	0	N/A	N/A	N/A	L-shaped	N/A	N/A	est. 144 x 63 and 63 x 110	N/A	Parking	with CB at the bottom, it should be dry	In CB Sump	Asphalt	N/A	No	0	CB to 12" CMP with new end section at drain, restrictor removed.	Verify restrictor/storage, clean structures, 4" drain to CB.
331	Robert Evans Drain Regional - Outlot B	N/A	343800	N/A	N/A	N/A	N/A	5	irregular	2	var	est. 940	est. 400	Wet	Robert J. Evans Relief Drain inline detention pond - contact OCDC for calcs	At Inflows	Historically Peat Bottom	Turf, Woods	Buckthorn, Purple L.	0	Resident complained of algae, odor - needs dredging.	Dredging. Nutrient control.
332	American House	51,327.41	51300	4,339.23	2.5	4	1	N/A	rectangular	N/A	2	est. 327	est. 167	Pumped Detention	drains to basin 335. 18 in along E side not detained? Only swale draining to basin? NW inflow bulkheaded?	Some E. Side	Sandy, Type A/B	Turf	Cattail	0	Outflow through pump in NE corner of property, fenced.	
333	United Methodist Church	24,350	14300	4,775	1	N/A	N/A	N/A	rectangular	N/A	N/A	est. 175	est. 150	Dry		No	Sandy	Tree, Sedge	No	100	Overflow not found. No evidence that it receives much water.	
334	Assisted Living Complex	est. 33,000 at 863.0	21000	est. 25,000MID	0.5	N/A	4	0.5	triangular	6	2.5	est. 285	est. 232	Wet	temp. sediment trap in NW corner	Some At Inflows	Sand	Turf	Algae, Bulrush	0	Outlet 4 ft above bottom? - wet pond built in sandy soils.	Clean structures.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft³	STORE PROVD (Plan) ft³	STORE PROVD (Field) ft³
RHC	335	Pinetrace Sub. - park B	31-326-900-0072 gce	31	SW	N/A	104	10/9/1990 Zeitmet Woznial & Assoc.	y	y	W. of Sahalee Dr. and Merion Ct.	Owner	Pine Trace Village (Homeowners Association)- James Carson, 3459 Warwick, Rochester Hills, MI 483009	Res.	16.03	10	N/A	0.47	1.65	N/A	57,862 (86,945 - 100 yr)	70,000	N/A
RHC	336	Pinetrace Sub. - park A	31-377-900-0071 gce	31	SW	N/A	104	10/9/1990 Zeitmet Woznial & Assoc.	y	y	E. of Greenwood Dr., N. of Seminole Ct.	Owner	Pine Trace Village (Homeowners Association)- James Carson, 3459 Warwick, Rochester Hills, MI 483009	Res.	37.47	10	N/A	0.35	2.95	6.6	61,903 (129, 823 - 100 yr)	90,250 (162,475 - 100 yr)	158000
RHC	338	Pine Trace Golf Club	31-400-015-0353	31	SE	N/A	N/A	1986	n	n	3600 South Blvd.	Owner	Pine Trace Golf Club, 3600 Pine Trace Blvd., Rocheser Hills, MI 48309-3978	Com.	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	59400
RHC	339	Kingston Pointe North	32-126-094-0001	32	NW	N/A	N/A	1999	y	y	Florence Dr.	Owner	Kingston Pointe LLC, 2025 W. Long Lake Rd., Suite 104, Troy, MI 48098-4100	Res.	12.36	10	N/A	0.35	4	3	31,859	32,232	48000
RHC	340	Kingston Pointe South	32-126-108-0001	32	NW	N/A	N/A	1999; MCS 10/23/98	y	y	2520 Jackson	Owner	Kingston Pointe LLC, 2025 W. Long Lake Rd., Suite 104, Troy, MI 48098-4100	Res.	5.74	10	N/A	0.35	2.5	2.8	12,400	12,571	31400
RHC	341	Rockhaven Estates Condos	32-126-901-0332 gce	32	NW	N/A	397	1993; Oakwood Engineering, Inc. 10/94	y	y	3083 Honor Dr.	Owner	Rockhaven Estates (Homeowners Association), Eric Muir, 2508 Brilliance, Rochester Hills, MI 48309 1-248-299-9009	Res.	7.83	100 (1-yr, 48 hr)	N/A	0.35	2	5.8	29,934 (4,786)	N/A	94400
RHC	342	Kingston Pointe South	32-201-053-0001	32	NW	N/A	N/A	1999; MCS 10/23/98	y	y	2439 Jackson	Owner	Kingston Pointe LLC, 2025 W. Long Lake Rd., Suite 104, Troy, MI 48098-4100	Res.	8.61	10	N/A	0.35	2	2.1	18,601	18,633	31000
RHC	343	American House	32-226-001-0100	32	NE	N/A	503	1989; RK Engineering 9/15/92	y	y	2251 W. Aubum Rd., W. of Crooks	Owner	American House Elmwood Ltd., 6405 Telegraph Rd., Suite J-2, Bloomfield Hills, MI 48301-1775	Com.	3.69	10	N/A	0.9 and 0.2	3.85	3.9	12,548	16,024AB	18100
RHC	344	Pine Trace Regional - SE basin	32-300-017-0351	32	SW	N/A	N/A	1987	no details or calcs	n	3600 South Blvd., discharges to Borden D	Owner	Pine Trace Golf Club, 3600 Pine Trace Blvd., Rocheser Hills, MI 48309-3978	Com.		N/A	N/A	N/A	3.5	N/A	N/A	prop. 300,000	N/A
RHC	345	Walnut Brook Estates	32-376-902-0331 gce	32	SW	N/A	808	2000; Anayas Engineering, Inc. 1/26/00	y	y	3695 Cedar Brook Dr.	Owner	Walnut Brook Estates, Rochester Hills Development,Gary Leigh, President, 3607 Walnut Brook Dr., Rochester Hills, MI 48309, 1-248-299-0030	Res.	43.78	10	N/A	0.35	4.56	3.1	94,580	109,919	56000
RHC	346	South Blvd. Municipal - N basin	32-401-005-0373	32	SE	N/A	HRC 870013	1987; HRC 10/27/87	n	n	N. of South Blvd	Owner	Leuders Drain, City of Rochester Hills, 1000 Rochester Hills Drive, Rochester Hills, MI 48309-3034	Res.	N/A	N/A	N/A	N/A	N/A	1.85	N/A	N/A	583900
RHC	347	South Blvd. Municipal - S basin	32-401-005-0374	32	SE	N/A	HRC 870013	1987; HRC 10/27/87	y. No calcs	n	N. of South Blvd	Owner	Leuders Drain, City of Rochester Hills, 1000 Rochester Hills Drive, Rochester Hills, MI 48309-3034	Res.	N/A	N/A	N/A	N/A	10	N/A	N/A	2,000,000	N/A

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
335	Pinetrace Sub. - park B	38,000	35450	32,000	0.9	N/A	N/A	2.5	round	N/A	2	est. 210	est. 210	Wet	Exisiting basin (no details). 100 yr overflow to CB 41 and 42. Records 1992.	Turbid Water	N/A	Tree, Forb, Willow	Phragmites, Cattail	0	Inflow not visible, fountain not on, flows to Borden Drain, outflow riser underwater.	Check blocked overflow, clean structures.
336	Pinetrace Sub. - park A	45,125	23900	19,250	N/A	N/A	6.15	5	round	3	4	est. 200	est. 155	Wet	100 yr overflow to MH3. Records 1992.	N/A	N/A	N/A		0		
338	Pine Trace Golf Club	N/A	59350	N/A	N/A	N/A	N/A	10	N/A	N/A	var	N/A	N/A	Wet	no basin plans or calcs	Minimal	n/a	turf	Algae	0	2-8" PVC - pump house well, 2 connected ponds, s. pond to weir to swale to small N pond to weir to wetland, grass clippings	
339	Kingston Pointe North	14,039	16000	MID 8,679	1	N/A	2 temp.	3	rectangular	N/A	3	MID 135	MID 66	Dry Extended Detention	temporary 1-year extended detention provided with 3 ft depth (removed?)	Minimal	N/A	Turf	Algae, Cattail, Willow	50	2' sediment storage, temp. riser still in place, spillway not graded/stabilized, > area and < depth than design.	Buffer, remove riser, grade/stabilize overflow.
340	Kingston Pointe South	7,374.87	11200	3,003.44	0.5	0.5	2 temp.	1.5	rectangular	N/A	3	MID 103	MID 58	Dry Extended Detention	temporary 1-year extended detention provided with 1.5 ft depth (removed?)	0.5	N/A	Turf, Cattail, Bulrush	Algae, Sedge	0	Litter, grass clippings, flows to wetland, west slope unvegetated.	Stabilize west slope, clean structures.
341	Rockhaven Estates Condos	N/A	16300	N/A	N/A	N/A	N/A	N/A	rectangular	6	3	TOP 214	TOP 105	Dry Extended Detention	100-yr and 1-yr, 48 hr extended detention; no as-built volumes	Minimal	N/A	Sedge, Forb	Purple L., Algae, Cattail	0		Clean structures.
342	Kingston Pointe South	11,666.76	14800	7,149.56	0.5	1.5	5	5	rectangular	6	3	MID 115	MID 86	Wet	Pool volume estimated to be 19325 cft.	Minimal	Poorly Drained	Turf, Cattail	Algae, Phragmite, Reed	0	Under construction, east slope unvegetated.	Stabilize east slope, clean structures.
343	American House	6,750AB	4600	1,575AB (MID 4,162)	0.1	N/A	N/A	N/A	rectangular	6	3	TOP 135 (MID 120)	TOP 50 (MID 33)	Dry	Excludes 1.03 ac. Accounted for in original detention calc - where is that stored? C factors seem low. Discharges to Sprague Drain.	Minimal	Hydric	Turf Sideslopes	Phragmites, Buckthorn, Ctail	50		Clean structures.
344	Pine Trace Regional - SE basin	N/A	41350	est. 72,000MID	N/A	N/A	8	3	N/A	6	var	EST MID 360	est mid 200	Wet		Some	N/A	Turf	Purple L., Phragmites, Algae	0	Natural pond. No outlet weir.	Verify that outlet was constructed.
345	Walnut Brook Estates	45,000	18100	10,000	1.5	0.6	N/A	N/A	triangular	6	2	est. 318 MID	est. 180 MID	Dry	file says that restrictor not installed 1/18/01. to Lueders Drain	Minimal	Poorly Drained, Ponding	Turf, Sedge, Reed	Purple L., Cattail	0	Spillway 0.6' above overflow structure, TOB 1.3' above riprap spillway, bottom graded to drain, Inflow 223 and 226 not found.	Verify restrictor and storage depth, outflow underwater - blocked?, remove yard waste from Inflow 225.
346	South Blvd. Municipal - N basin	N/A	315600	N/A	N/A	N/A	N/A	N/A	irregular	N/A	N/A	N/A	N/A	Wetland	no plans or calcs, outlet detail (weir 3) only	N/A	Hydric	Tree, Wetland		0	Area from aerial at elev. 796, steel sheeting and gabion overflow weir.	
347	South Blvd. Municipal - S basin	est. 750,000	328300	N/A	N/A	N/A	N/A	N/A	irregular	6	N/A	est. 1,000	est. 750	Wetland		N/A	Hydric	Tree, Wetland		0	Area from aerial at elev. 796, outflow under access road to Sprague Drain, Inflows 228 and 230 not found.	Consider multi-staged outlet.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft³	STORE PROVD (Plan) ft³	STORE PROVD (Field) ft³
RHC	348	Sanctuary in the Hills - basin A	32-401-015-0001	32	SE	15-32-401-004	89-114	1989: Fenn & Assoc. 2/22/02	y	yes and wetland easement	Sanctuary	Owner	Sanctuary of Rochester LLC, 2038 Big Beaver Rd., Suite 200, Troy, MI 48084-3410	Res.	4.29	10	N/A	0.4	2	0.6	11,012	23,453	6400
RHC	349	Deerfield Elementary	32-426-018-0097	32	SE	N/A	Micro 89-122	1989; TMP Assoc. 7/24/89	y	n	S. of Cattail Cir.	Owner	Avondale School, 260 Squirrel Rd., Auburn Hills, MI 48326-3255	Inst.	4.77	10	N/A	0.63	4.5	3.5	21,500	26,417	45500
RHC	350	Crooks Crossing East	32-426-026-0001	32	NE	N/A	231	1997	y	y	2153 Alsdorf Ave.	Owner	Crooks Crossing East, Rosen and Schott, Richard Rosen, 1400 Woodward, # 100, Bloomfield Hills, MI 48304	Res.	0.44	10	N/A	0.35	est. 1	N/A	946.3	1,472	N/A
RHC	351	Crooks Crossing East	32-426-027-0002	32	NE	N/A	231	1997	y	y	2089 Alsdorf Ave.	Owner	Crooks Crossing East, Rosen and Schott, Richard Rosen, 1400 Woodward, # 100, Bloomfield Hills, MI 48304	Res.	0.89	10	N/A	0.35	est. 1	1.9	1,924	4,025	9500
RHC	352	Meadowcreek Condos	32-426-050-0001 gce	32	SE	15-32-426-004	040	1999 (6/21/02 Fenn and Assoc.)	y	yes (not recorded)	2220 Lagoon Dr.	Owner	Meadow Creek Estates LLC, 2038 Big Beaver Rd., Suite 200, Troy, MI 48084-3410	Res.	21.18	10	N/A	0.39	6.88AB	6.8	52,633	50,200AB	88400
RHC	353	Northbrook Sub. - basin 2	33-126-010-0304	33	NW	N/A	340	1993 (6/28/94 Raj Khatri, P.E. and P.S.	y	y	Gilsam Ct., near Auburn and Crooks	Owner	(owner) Singh of Northbrooke, P. O. Box 25505, West Bloomfield, MI 48325-5005,(homeowners assoc.) David Turer, 1646 Newstead, Rochester Hills, MI 48309, 1-248-853-1613	Res.	10.18	10 (100)	N/A	0.35	5.61	6.3	21,992.76 (40,051.18)	49,337.6AB	61700
RHC	354	Northbrook Sub. - basin 1	33-126-020-0303	33	NW	N/A	340	1993 (6/28/94 Raj Khatri, P.E. and P.S.	y	y	Davenport, near Aubum and Crooks	Owner	(owner) Singh of Northbrooke, P. O. Box 25505, West Bloomfield, MI 48325-5005,(homeowners assoc.) David Turer, 1646 Newstead, Rochester Hills, MI 48309, 1-248-853-1613	Res.	13.12	10 (100)	N/A	0.35	4	4.5	22,770.5 (40,320.77)	26649.6AB	41000
RHC	355	Avondale Middle School	33-200-001-0094	33	NE	N/A	006	1993	y	y	Dearborn and Aubum	Owner	Avondale School Number 10 Fractional, 2950 Waukegan St., Auburn Hills, MI 48326-3264	Inst.	6.54	10	N/A	0.71	4.75	7.6	748134	68058	110500
RHC	356	Meadowbrook Elementary	33-200-018-0093	33	NE	15-33-200-001	006	1993	y	y	Dearborn and Aubum	Owner	Avondale School, 260 Squirrel Rd., Auburn Hills, MI 48326-3255	Inst.	11.8	10	N/A	0.49	4.4	6.4	79282	80706	247600
RHC	357	Kensington Sub.	33-201-012-0073	33	NE	N/A	252	1991	y	y	Lexhan and Aubum	Owner	Biltmore Properties, 2025 Long Lake Rd., Suite 104, Troy, MI 48098-4100	Res.	12.62	10	N/A	0.4	2.35	5.6	32790	38300	83500
BFV	358	Jamestown South	5	8	NE	N/A	N/A	AB 10/3/02 Mickalich & Assoc.	no calcs	N/A	24255 Thirteen Mile Rd.	Owner	N/A	Res.	3.09	10	N/A	0.59	5.35	4.9	12,873.11	14,193.19	20000
BFV	359	Jacobson Bldg.	3	5	NE	N/A	N/A	Rev. 1/20/89 Giffels Webster Eng.	some	N/A	32400 Telegraph Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	4	2.5	N/A	est. 9,320	5950
BFV	360	Woodlynne	6	4	SW	N/A	N/A	Rev. 9/30/87 Zeimet Wozniak & Assoc.	some	N/A	S. of Woodlynne	Owner	N/A	Res.	23.87	10	N/A	N/A	4	3.6	N/A	est. 121,500	136000
TRC	361	Charnwood Hills 4 - N basin	294	6	NE	N/A	n/a	AB 12/22/76	no details	N/A	Near Beech Rd. and South Blvd, off Ridge	City of Troy	N/A	Res.	27.1	10	N/A	0.36	5	1.8	60,731	N/A	68300
TRC	362	Charnwood Hills 4 - S basin	294	6	NE	N/A	n/a	AB 12/22/76	no details	N/A	Near Beech Rd. and South Blvd, off Ridge	City of Troy	N/A	Res.	4.3	10	N/A	0.34	3.5	0.9	8,945	N/A	8400

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
348	Sanctuary in the Hills - basin A	13,782	10700	9,785	N/A	2	6	7	rhombus-like	4; 6 below WS	4	est. 128	est. 93	Wet	Pool volume estimated to be 29760 cft.	Minimal (plan Shows 6 Pool)	N/A	Turf	Algae, Buckthorn, Cattail	0	Fountain, dye, inflows not found - underwater?	Verify restrictor. Clean structures.
349	Deerfield Elementary	calc. 4,782	13000	est. MID 9,760	N/A	N/A	N/A	N/A	irregular (L-shaped)	N/A	2	N/A	N/A	Dry		No Pool Depth	Hydric	Tree, Shrub, Forb	Buckthorn, Phragmites, Reed	0	Area from City GIS, wetland, 4' fence, overgrown, overflow spillway not found.	Clean structures.
350	Crooks Crossing East	3,200	1200	N/A	N/A	N/A	N/A	N/A	rectangular	4	N/A	160	20	Dry Catchbasin	Discharges north to 77" x 121" storm under Alsdorf Rd. No restrictor shown, top of detention 804	Minimal	N/A	Turf	No	0	Fenced - no access, no longer provides detention per City.	Verify adequate storage off site.
351	Crooks Crossing East	5,000	5000	N/A	est. 1	N/A	N/A	N/A	rectangular	4	N/A	250	20	Dry Catchbasin	Discharges north to 77" x 121" storm under Alsdorf Rd. Top of detention 807.	Minimal	N/A	Turf	No	0	No longer provides detention per City.	Verify adequate storage off site.
352	Meadowcreek Condos	16,332AB	13000	2,506AB	1	0.8	N/A	N/A	rectangular	6	2.5	est. 170 (MID 135)	est. 107 (MID 67)	Dry	Plan shows 0.197 ac. temporary sediment basin.	Turbid Water	Clayey	Turf, 50% Unvegetated	Algae	75	Over excavated for sediment storage, temp. inflow from sediment trap is 21" conc. with 3" sediment.	Stabilize side slopes, clean structures.
353	Northbrook Sub. - basin 2	est. 17,050	9800	est. MID 8,000	>1	2	N/A	N/A	round	N/A	3	est. 110	est. 155	Dry		Some At Inflow 134	N/A	Grass, Cattail	Canary Grass, Purple L.	0		Clean structures.
354	Northbrook Sub. - basin 1	calc. 11,440	9100	est. MID 8,580	1.2	1	N/A	N/A	rectangular	N/A	1.5	208 (MID 195)	55 (MID 44)	Dry		Minimal	N/A	Turf, Cattail	Purple L.	0	Outflows south to pond.	Clean structures.
355	Avondale Middle School	N/A	14500	N/A	N/A	1	N/A	N/A	irregular	0.109	4	N/A	N/A	Dry	South basin	Sediment On West Slope	Hydric	Turf, Wetland	Cattail	25	Inlets blocked by cattails.	Clean structures.
356	Meadowbrook Elementary	N/A	38700	N/A	1	0.5	N/A	N/A	triangular	N/A	4	390	245	Dry	North basin	No Pool Depth	Hydric	Turf	Cattail	0	Sediment and weeds blocking path to basin.	Verify restrictor.
357	Kensington Sub.	N/A	14900	N/A	1.5	N/A	N/A	N/A	irregular	6	5	130 est	165(longest)	Dry	Records 2001 (TP).	Minimal	Clayey	Turf, Grass	No	0	Underdrain to outflow, bypass is 15" pipe.	Verify restrictor.
358	Jamestown South	est. 6,900	4100	est. 225	1	0.75	N/A	N/A	square	6	3	78	78	Dry		Minimal	Poorly Drained, Ponding	Turf	Algae	0	Minor erosion, no 3" restrictor visible.	Verify restrictor.
359	Jacobson Bldg.	est. 2,330 at middle	2375	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	3	est. 133 at middle	est. 18 at middle	Dry Catchbasin		Minimal	Type C	Turf	No	0	6" roof drain, no other inflows, no restrictor visible.	Verify restrictor.
360	Woodlynne	45,000 at 717.0	37700	15,750	2	N/A	2	3	rectangular	6	3	475 at middle	60 at middle	Wet	basin in permitted wetland area. Pool volume estimated to be 20000 cft.	Minimal	N/A	Turf, Landscaping	Bulrush	50	Fountain, blue dye, mosquitoes, turtle, frog.	Verify restriction, buffer.
361	Charnwood Hills 4 - N basin	N/A	38000	N/A	N/A	N/A	N/A	N/A	pentagon	6	3	N/A	N/A	Dry Extended Detention		Minimal	N/A	Turf	No	0	Perforated riser to 12".	
362	Charnwood Hills 4 - S basin	N/A	9350	N/A	N/A	N/A	N/A	N/A	square	N/A	2.5	N/A	N/A	Dry Extended Detention		Minimal	N/A	Turf	No	0	Perforated riser to 4".	

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft³	STORE PROVD (Plan) ft³	STORE PROVD (Field) ft³
TRC	363	Charnwood Hills Sub. 6	335	6	NE	N/A	N/A	no plans; calcs only	no plans	N/A	Tanglewood, near Coolidge	City of Troy	N/A	Res.	45.5	10	N/A	0.28	2.5	5.1	73,200	N/A	20000
TRC	364	Windridge Sub. 2	286	7	SW	N/A	N/A	AB 11/27/74 Nowak & Fraus	no basin details	N/A	Vineyard St., near Adams, N. of Long Lak	City of Troy	N/A	Res.	31	10	N/A	0.36	8.3	3	69,460	approx. 71,000	39000
TRC	365	River Meadow	448	18	SE	N/A	N/A	2/27/90 George Jerome & Co.	y	N/A	Prestwick Ct., near Wattles and Beech	City of Troy	N/A	Res.	1.92	10	N/A	0.32	3	4.6	3,700	3,700	5000
TRC	366	Strawberry Hill Sub.	300	18	NW	N/A	N/A	AB 2/2/78 N. Alix	can't read detail sheet	N/A	Orchard Ridge, near Long Lake and Adam	City of Troy	N/A	Res.	30.6	10	N/A	0.35	4.63	4	53,000	42,442 (plus 11,000 in sewers & structures)	32400
TRC	367	Adams Pointe	457	18	NW	N/A	N/A	Rev. 10/20/97 Professional Engineering Assoc.	y	N/A	Adams Pointe Ct.	City of Troy	N/A	Res.	9.84	10	N/A	0.3	4.15	4.3	17,314	25,648	32700
TRC	369	Elm Court Sub.	459	5	NW	N/A	N/A	AB 2/16/99 Seiber, Keast & Assoc.	some	N/A	Elm Ct., near Coolidge and South Blvd.	City of Troy	N/A	Res.	N/A	N/A	N/A	N/A	2.56	0.8	N/A	N/A	13200
TRC	370	Crescent Ridge Sub. 3	394	5	NE	N/A	N/A	Rev. 7/30/91 MCS Assoc.	y	N/A	N. end of Lome	City of Troy	N/A	Res.	13.94 ac at 0.64; 62 ac. at 0.32	2 - 100 yr storage elev. Noted	N/A	0.6	2.2	3.4	191,134	est. 358,000	378000
TRC	371	Manchester Woods	376	6	SW	N/A	N/A	Rev. 8/25/88 Giffels-Webster Engineers	no calcs	N/A	Beech Rd., N. of Manchester Ct.	City of Troy	N/A	Res.	N/A	10	N/A	N/A	2.5	2.5	18,635	24,144	17700
TRC	372	Orchard Hills	310	6	NE	N/A	N/A	AB 3/7/79 Hoyem - Basso Assoc.	y	N/A	Coolidge and South Blvd.	City of Troy	N/A	Res.	50	10	N/A	0.3	2	4.6	87,975	100400 (plan detail shows 88,500)	199000
TRC	373	Longview Acres	301	7	SW	N/A	N/A	AB 1/25/78 MCS Assoc.	some	N/A	near Adams and Long Lake, Longview Ct.	City of Troy	N/A	Res.	79.78	N/A	N/A	N/A	6	7.9	N/A	155,936	130000
TRC	374	Forest Creek 1	315	5	NW	N/A	N/A	April, 1978 Giffels-Webster Engineers	y	N/A	Mountain and Apple	City of Troy	N/A	Res.	51.6 (Total 91.52)	10 yr (2 - 100 yr storage elev. 800.60)	N/A	N/A	1.33 (100-yr, 2.1 ft)	1.4	275,780 for 10 yr (426,650 for 100 yr)	203,300 for 10 yr (>790,000 for 2-100 yr)	266000
TRC	375	Forest Creek 2	344	5	NW	N/A	N/A	Rev. 10/16/86 Giffels-Webster Engineers	no calcs or details	N/A	White Birch and Forest Park	City of Troy	N/A	Res.	39.92 (Total 91.52)	N/A	N/A	N/A	N/A	1	N/A	N/A	2075
BLT	376	Eastway Farms Sub.	N/A	11	NE	N/A	N/A	AB 6/2/01, Kieft Eng.	y	N/A	Ginger Ct. and Palms	Owner	N/A	Res.	13.04	100 year	N/A	0.38	3.5	3.7	55166	67602	12700
BLT	377	Meadowlands of Bloomfield	N/A	6	SW	N/A	N/A	AB 11/14/88, John Seelbach	y	N/A	Bloomfield Ct., near Square Lake and Han	Owner	N/A	Res.	23.6	100 year (back to back)	N/A	0.38	6	5	243700	244500	181700
BLT	378	Meadowlake Sub.	N/A	6	SW	N/A	N/A	AB 11/14/88, John Seelbach	y	N/A	E. Hammond Lake, near Square Lake	Owner	N/A	Res.	1.1 sub., 2.5 park	N/A	N/A	0.35 sub, 0.15 park	1	N/A	18900	23750	N/A
BLT	379	Bloomfield North Estates	N/A	1	NW	N/A	N/A	AB 4/9/90, MCS Associates	some	N/A	Square Lake and Squirrel Rds.	Owner	N/A	Res.	72.2	N/A	N/A	N/A	5	2.6	145681	171099	110000
BLT	380	Palmer Woods	N/A	11	NE	N/A	N/A	AB 2/6/90 Giffels Webster	y	N/A	Wellsley & Eastways	Owner	N/A	Res.	6.53	100 year (back to back)	N/A	0.3	6.72	4	64647	69666	33800
BLT	382	Willisons Bloomfield Farms Sub. - pond 1	N/A	24	NE	N/A	N/A	AB 6/19/84 Zeimet-Wozniak & Associate	some	N/A	Browning Ct., near Wattles and Adams	Owner	N/A	Res.	N/A	100	N/A	N/A	2	1	N/A	67875	13800

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
363	Charnwood Hills Sub. 6	N/A	3900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry Catchbasin		No Pool Depth	Hydric	Turf	Cattail, Purple L.	0		Outflow may need repair.
364	Windridge Sub. 2	N/A	13000	N/A	N/A	N/A	N/A	N/A	oval	vary	3	N/A	N/A	Dry		N/A	N/A	Grass, Forb	No	25	Beehive overflow to south MH, Inflow 12 not found, turf upper side slopes, bottom has buffer area.	
365	River Meadow	N/A	1080	N/A	1	N/A	N/A	N/A	rect.	6	2	N/A	N/A	Dry		Minimal	N/A	Turf	No	0	Concrete low flow channel.	
366	Strawberry Hill Sub.	13,857	6500	6697 (8,400 avg.)	1.25	N/A	3.91	N/A	square	N/A	1.5	est. 92 at middle	est. 92 at middle	Dry		Minimal	Type B/C	Turf	No	0	Locked fence with barbed wire, concrete culvert.	
367	Adams Pointe	12,800 at 827.00	7600	4,752 at 824.00 (7,210 at middle)	1	3.5	N/A	N/A	rhombus-like	6	3	est. 168 at ELEV. 827 (118 at middle)	est.76 at ELEV. 827 (61 at middle)	Dry		Turbid Water	Poorly Drained	Turf	Bulrush	0	Under construction.	Clean structures.
369	Elm Court Sub.	28,999 (water surface)	16450	N/A	1	N/A	N/A	3	N/A	N/A	N/A	N/A	N/A	Wetland		2	Clayey	Grass, Rush, Willow, Cattail	Purple L., Buckthorn, Algae	75		Nutrient control.
370	Crescent Ridge Sub. 3	94,250 at 804.70	111200	21,250 at 794.70	2.95	1	7.5	8	rectangular	6	5	N/A	N/A	Wet	Pool volume estimated to be 358000 cft.	None Visible	N/A	90% Sedge/Forb, Turf	Algae, Curly-leaf Pondweed	0	Inflow 21 underwater, Natural Way pesticides signs, Inflow 1051 from com. property to north.	Verify restriction and com. discharge allowed, fert/pest/herbicide control.
371	Manchester Woods	N/A	7100	N/A	approx. 2 ft	2.7	N/A	N/A	rectangular	6	3	N/A	N/A	Dry		Minimal	Type B - Sandy Loam	Turf	No	0	Overflow MH should not be solid cover, Inflow 22 larger than plans, second inflow.	Change MH cover to open CB.
372	Orchard Hills	est. 44,250 at middle (vol./depth)	43300	N/A	0.5	N/A	N/A	N/A	irregular	6	3	N/A	N/A	Dry		Minimal	N/A	Turf, Grass		0		
373	Longview Acres	N/A	16400	N/A	3	N/A	6	4	triangular	10 (6 to 1 below normal water level)	3	N/A	N/A	Wet		N/A	N/A	Turf	No	50	Fountain, 6' max. pool depth, geese, ducks.	Verify restrictor.
374	Forest Creek 1	5.75 ac at 797.00 (173,900 at 796.81; 186,300 at 798.0; 196,760 at 799.0)	190000	N/A	1.5	N/A	11	10	square	6	3	N/A	N/A	Retention	drain tiles shown on south end. Volumes from Phase 2 calcs. Pool volume estimated to be 173900 cft.	1-2	Clayey	Turf, Riprap, Tree	Reed, Cattail, Algae, Sedge	0	Goose fencing 50% shore, only 1 stage overflow.	Verify various stages of overflow.
375	Forest Creek 2	N/A	2075	N/A	N/A	3	N/A	1	V-shaped	N/A	2	N/A	N/A	Wetland	May have been a temporary sediment basin.	<1	Clayey, Hydric	Forb, Tree, Shrub	Buckthorn, Purple L, Cattail	25	Triangular wetland, mosquitoes, west properties dumping grass clipping, wood chips on stream bank.	Verify outflow, clean structures.
376	Eastway Farms Sub.	Est. 25350(top)	3450	Est. 13750	1	0.8	3 min.	4	irregular	6	3	190	150	Wet		>10 YD3 At Inflows	N/A	Turf	Cattail, Bulrush, Fine Rush	0	Fountain, blue dye, sediment from construction.	Dredge, buffer.
377	Meadowlands of Bloomfield	55200 at 942.00	36300	26300 at 936.00 Avg. 40750	1	0.5	N/A	4	square	6	3	260	215	Retention		N/A	Hydric	Turf	Cattail, Algae	0	Inflow 42 underwater. Mowed to edge.	Veg. buffer.
378	Meadowlake Sub.	28000 at 922.8	41200	19500 at 921.9 Avg. 23750	N/A	N/A	N/A	3	oval	0.0016	3	300	150	Wet	Existing before construction of sub.	N/A	N/A	Woods	Algae, Wetland spp.	0	Natural water feature. No Inflows, no Outflow structure. Not very accessible.	Verify detention/outlet.
379	Bloomfield North Estates	est. 50700 at 858.7	42150	2200, calculated from volume at 859	n/a (spillway at 863.70)	1	N/A	N/A	rectangular	4	2	390	130	Dry		Minimal	Poorly drained.	Turf	Cattail, Willow, Sedge	0	Litter. 4' fence.	
380	Palmer Woods	20169	8450	3543	N/A	1	1	4	irregular	6	2	180	95	Retention		None Visible	N/A	Turf, Stone Edging	Algae	0	Fountain. No outflow found.	Nutrient control.
382	Willisons Bloomfield Farms Sub. - pond 1	N/A	13800	N/A	N/A	N/A	N/A	2.5	irregular	3	4	185	90	Wet		No Pool Depth	N/A	Tree, Shrub, Forb	No	0	No controlled outflow.	

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
BLT	383	Willisons Bloomfield Farms Sub. - pond 2	N/A	24	NE	N/A	N/A	AB 6/19/84 Zeimet-Wozniak & Associate	some	N/A	Browning Ct., near Wattles and Adams	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3	N/A	49400	56100
BLT	384	Spruce Hills	RB-51	32	SW	N/A	N/A	AB 7/22/96 Zeimet-Wozniak & Associate	y	N/A	Wing Lake and Fourteen Mile Rd.	Owner	N/A	Res.	17.5	10	N/A	0.03	N/A	2	30839	31001	58500
BLT	385	Quarton Orchards	RB-39	27	NW	N/A	N/A	AB 3/3/88 Zeimet-Wozniak & Associate	y	N/A	York Ct., near Lahser and Quarton	Owner	N/A	Res.	6.6	10	0.645	0.31	3	2.3	5940.195	12154	20700
BLT	387	Pinetree Estates - basin B	N/A	11	NW	N/A	N/A	AB 9/26/97 Giffels Webster	y	N/A	Sequoia Ct.	Owner	N/A	Res.	6.47	5	N/A	0.41	4.46	1.2	13441	9000	1500
BLT	388	Pinetree Estates - N. basin	N/A	11	NW	N/A	N/A	AB 9/26/97 Giffels Webster	y	N/A	Brownley Ct.	Owner	N/A	Res.	3	10	N/A	0.39	1.46	1.6	7455	7682	3300
BLT	389	Pinebrooke Manor Condos	RB-35	25	NW	N/A	N/A	4/1/86 Urban Land Consultants	y	N/A	Pinbrooke Ct., near Big Beaver and Wood	Owner	N/A	Res.	5.63	10	0.49	0.41	6.25	4.6	14897	14850	20300
BLT	390	Carrillon Hills	RB-32	17	SE	N/A	N/A	10/14/87	y	N/A	Carollin Ct., near Franklin and Long Lake	Owner	N/A	Res.	15	100 year (back to back)	0.667	0.3	7.71	7.6	47394.41	94789	82200
BLT	391	Applegrove	N/A	30	SW	N/A	N/A	AB 7/16/85 Zeimet-Wozniak	y	N/A	Applegrove, near Inkster and Maple	Owner	N/A	Res.	6.3	10	0.2	0.4	6.5	8	16171	74960	99200
WBT	393	Aldingbrooke - basin2	N/A	29	NE	N/A	N/A	AB 1/30/80	y	N/A	forest grove and bridgeview	Owner	N/A	Res.	29.9	100	N/A	0.5	2.2	2.15	175842	184950	190920
WBT	394	Amberleigh Sub.	N/A	33	NE	N/A	N/A	AB 9/27/99 Zeimet Wozniak	y	N/A	W. of Brook Hollow Ct. and S. of Beechtr	Owner	OCDC, Ch. 18	Res.	40.2	500	N/A	43	5.4	5.3	197493	206450	245700
WBT	395	CVS Pharmacy	N/A	27	SW	N/A	N/A	AB 8/10/99 Johnson & Anderson	No information provided on plans	N/A	Maple Rd., E. of Farmington, basin in back	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	45000
WBT	396	West Bloomfield Medical Bldg - W basin	N/A	34	NE	N/A	N/A	AB 12/5/88 Johnson and Anderson	some	N/A	W. of Orchard Lake Rd., N. of 14 Mile, in	Owner	N/A	Com.	N/A	100	N/A	N/A	N/A	6	N/A	N/A	98500
WBT	397	West Bloomfield Medical Bldg - E basin	N/A	34	NE	N/A	N/A	AB 12/5/88 Johnson and Anderson	some	N/A	W. of Orchard Lake Rd., N. 14 Mile, in fro	Owner	N/A	Com.	N/A	100	N/A	N/A	N/A	4.5	N/A	N/A	32600
WBT	399	Jack Cauley Chevrolet - basin A	N/A	34	SE	N/A	N/A	AB 2/27/79 Wolf and Nudel Architects	some	N/A	7100 Orchard Lake Rd., in rear	Owner	N/A	Com.	N/A	N/A	N/A	N/A	8.2	N/A	N/A	N/A	N/A
WBT	400	Jack Cauley Chevrolet - basin C	N/A	34	SE	N/A	N/A	AB 2/27/79 Wolf and Nudel Architects	some	N/A	7100 Orchard Lake Rd., SE basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	4	2.1	N/A	N/A	9200
WBT	401	Jack Cauley Chevrolet - basin B	N/A	34	SE	N/A	N/A	AB 2/27/79 Wolf and Nudel Architects	some	N/A	7100 Orchard Lake Rd., NE basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	3	4.4	N/A	N/A	23200
WBT	402	Gateway Center - basin A	N/A	34	SE	N/A	N/A	AB 9/24/99 Seiber, Keast and Associates	some	N/A	NW of Orchard Lake and 14 Mile Rds. - W	Owner	N/A	Com.	26.55	100	N/A	0.44	5	4.5	119533	120706	123750
WBT	403	Gateway Center - basin B	N/A	34	SE	N/A	N/A	AB 9/24/99 Seiber, Keast and Associates	some	N/A	NW of Orchard Lake and 14 Mile Rds. - S	Owner	N/A	Com.	18	100	N/A	0.71	4.4	3	159365	160169	118400
WBT	404	Gateway Center - basin C	N/A	34	SE	N/A	N/A	AB 9/24/99 Seiber, Keast and Associates	some	N/A	NW of Orchard Lake and 14 Mile Rds. - N	Owner	N/A	Com.	8.13	100	N/A	0.71	3.69	3	71953	73081	74500
WBT	405	Jewish Community Center - basin A	N/A	29	SE	N/A	N/A	Addendum No. 2; 9/20/91 Zeimet/Wozniak	some	N/A	6600-6800 W. Maple Rd. - N basin	Owner	N/A	Inst.	9.04	100	N/A	0.55	9.2	3	59477.91	85632	33700

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
383	Willisons Bloomfield Farms Sub. - pond 2	7800 est.	18700	6125 est.	N/A	1	N/A	1	rectangular	5	2.5	160	90	Wet		Sediment Bar At Outflow	N/A	Tree, Forb	No	0	No inflowing storm - may not provide much detention?, fountain may need repair.	
384	Spruce Hills	19125	29250	1750	1	N/A	N/A	N/A	irregular	N/A	20	N/A	N/A	Dry Extended Detention	information on the plans for 10yr. event as well	N/A	N/A	Turf, tree, wetland spp.	sedge, cattail	25	Riser holes blocked. Good vegetated buffer.	Clean structures.
385	Quarton Orchards	12950	9000	0	N/A	N/A	N/A	N/A	oval	N/A	6	150	85	Dry		Minimal	Hydric	Turf	Purple L., Cattail	25	Outlet and both inflows blocked, remove mesh from overflow CB.	Clean structures.
387	Pinetree Estates - basin B	N/A	1100	N/A	N/A	N/A	N/A	N/A	N/A	2	5.5	N/A	N/A	Dry Catchbasin		Minimal	Poorly Drained	Turf	No	0	No detention.	Verify restrictor.
388	Pinetree Estates - N. basin	4765	2050	600	1	N/A	N/A	N/A	triangular	N/A	5.5	N/A	N/A	Dry		Minimal	Type C	Turf	No	0		Clean structures.
389	Pinebrooke Manor Condos	6300	4420	900	N/A	N/A	N/A	N/A	oval	N/A	5	N/A	N/A	Dry		Minimal	N/A	Turf	No	0	4'-6' stone low flow channel.	Verify restrictor.
390	Carrillon Hills	22300	10800	500	N/A	0.5	N/A	N/A	rectangular	5	5	200	115	Dry		N/A	Hydric, Ponding	Turf Sides	Purple L., Cattail	25	Overflow not found.	Clean structures.
391	Applegrove	13600	12400	7360	N/A	1	N/A	3	irregular	5	5	N/A	N/A	Wet		Sediment Bar at Inflow	N/A	Turf	No	0	Fountain.	Verify restrictor.
393	Aldingbrooke - basin2	N/A	88800	N/A	N/A	N/A	N/A	8	irregular	5	4	N/A	N/A	Wet		Minimal	N/A	Turf	no	0	No buffer; receiving stream incised (photo); outfall bar grate broken, causing blockage	buffer
394	Amberleigh Sub.	53000	46350	21500	0.5	1	3.6	0.3	triangular	6	4	245	285	Dry	detention basin has forebay with standing water	Basin/Forebays Full	N/A	Sedge And Forb	No	0	Geese, sediment traps full, active construction. No 8" restrictor.	Verify restrictor. Dredge, nutrient control, buffer.
395	CVS Pharmacy	N/A	11250	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.5	N/A	N/A	Dry		1	Sediment; Muck; Poorly Drained	Tree, Turf	Cattail	100	Cattails, litter, sediment, oil sheen.	Litter removal, pre-treatment.
396	West Bloomfield Medical Bldg - W basin	N/A	16400	N/A	N/A	1	N/A	0.5	rectangular	5	3	145	160	Dry		1	N/A	Turf	Cattail	25	Litter, no restrictor.	Verify restrictor, dredge, clean structures.
397	West Bloomfield Medical Bldg - E basin	N/A	7250	N/A	N/A	N/A	N/A	5	triangular	5	2	145	120	Wet		Minimal	N/A	Turf, Gravel Edging	Algae	0	Fountain, blue dye, GEESE.	Buffer.
399	Jack Cauley Chevrolet - basin A	23750	14850	6600	N/A	N/A	N/A	N/A	rectangular	5	2	190	125	Dry		<1	Hydric	Shrub, Sedge, Forb	Cattail, Rushes, Algae	0	Pump stn, new asphalt, workers dumping into CB, car wash and repair bays drain to 3 CBs, grey residue and erosion at Inflow 1025	Investigate illicit discharges, pre-treatment, dredge.
400	Jack Cauley Chevrolet - basin C	10000	4350	3040	N/A	1.3	N/A	N/A	rectangular	N/A	4	120	90	Dry		Minimal	Poorly Drained	Turf	No	100	8" restrictor instead of 6" per plans, <50% storage volume than plans show.	Verify detention requirements.
401	Jack Cauley Chevrolet - basin B	N/A	5300	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2	170	40	Dry		Minimal	V. Poorly Drained	Turf	No	100	Unrestricted basin draining to basin 400.	
402	Gateway Center - basin A	39185	27500	6407	N/A	N/A	N/A	2	irregular	6	2	N/A	N/A	Wet		<1	N/A	Turf, Grass, Conifers	Cattail, Algae	0	Deerflies and larvae; some of East slope slumping; some blue dye.	Clean OUT 46; nutrient control.
403	Gateway Center - basin B	65118	39500	7573	N/A	1.3	N/A	N/A	irregular	6	3	N/A	N/A	Wetland		<1	Hydric	Turf, Shrub, Wetland	Cattail, Some Phragmites	0	2-stage overflow, 2-yr storage depth 1.5', outflow blocked, 25% < required storage.	Clean/modify structures.
404	Gateway Center - basin C	26402	24900	12204	N/A	0.9	N/A	4	rectangular	6	2.5	127	207	Wet		Minimal, No Pool Depth	N/A	Sedge And Forb	Cattail	0	2-stage overflow, good buffer and water quality.	Clean structures, Outflow 50 buried.
405	Jewish Community Center - basin A	18720	11225	2080	N/A	N/A	N/A	N/A	triangular	N/A	N/A	125	185	Dry	This basin is connected to Basin 406 w/ a 24 in pipe	Minimal	N/A	Wetland	Cattail	0	No Inflow/Outflow pipes dry depression with berm to 3' deep wetland and pond.	Vegetate bottom.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
WBT	406	Jewish Community Center - basin B	N/A	29	SE	N/A	N/A	Adendum No. 2; 9/20/91 Zeimet/Wozniak	some	N/A	6600-6800 W. Maple - S basin	Owner	N/A	Inst.	5.16	100	N/A	0.55	N/A	12	26209.3	26904	709700
WBT	407	Maplecreek Condo 2	N/A	34	NW	N/A	N/A	AB 12/12/94 Giffels-Webster	no calcs	N/A	Walnut Creek Circle	Owner	OCDC, Ch. 18	Res.	10.45	100	N/A	0.32	3	2.2	N/A	N/A	46300
WBT	408	J&S Office Center	N/A	35	SW	N/A	N/A	8/13/84 for SESC Permit Bi-Con	Plans Incomplete	N/A	E. of Orchard Lake Rd., N. of Fourteen Mi	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	41600
WBT	409	Maple Creek Condos 4	N/A	34	NW	N/A	N/A	8/16/95 for OCRC Review	some	N/A	Trailview & Maple Creek	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	6	6	N/A	N/A	81100
WBT	412	Maple Farms	N/A	27	SW	N/A	N/A	Schrader-Porter & Assoc.	no calcs	N/A	N. of Maple Rd. & E. of Farmington	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	3100
WBT	413	Michigan Cosmetic Center	N/A	34	NE	18-34-200-227	N/A	J.A.D. Engineering Services, Inc.	some	N/A	N. of Daly Rd.	Owner	N/A	Com.	0.88	100	N/A	N/A	7	7.8	17864.68	18305	35900
WBT	414	Maple Creek Condos 4	N/A	34	SW	N/A	N/A	8/16/95 OCRC Review	some	N/A	Trailridge & Treeline Dr.	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	N/A	5	N/A	N/A	172400
WBT	415	Maple Creek Condos 3	N/A	34	NE	N/A	N/A	AB 9/94 Giffels Webster Engineers	Plan incomplete. No calcs.	N/A	Forestview Dr.	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	7.45	5.3	N/A	N/A	149000
WBT	416	Maple Creek Condos 2	N/A	34	NE	N/A	N/A	AB 9/94 Giffels Webster Engineers	Plan incomplete. No calcs.	N/A	end of Maple Creek Ct.	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	1.47	2.65	N/A	N/A	338550
WBT	417	Townhomes at Maple Creek - E basin	N/A	34	SE	N/A	N/A	AB 8/16/99 Ziemet/Wozniak	Plan incomplete. No calcs.	N/A	Crackling Creek Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	29500
WBT	418	Townhomes at Maple Creek - W basin	N/A	34	SE	N/A	N/A	AB 8/16/99 Ziemet/Wozniak	Plan incomplete. No calcs.	N/A	Hawkswood Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	5.2	N/A	N/A	45800
WBT	419	Maple Place - W basin	N/A	32	NE	N/A	N/A	AB 3/19/87 Zeimet/Wozniak	Plan incomplete. No calcs.	N/A	Maple Lakes	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	177000
WBT	420	West Bloomfield Corp. Ctr.	N/A	34	SE	N/A	N/A	AB 11/18/86 Giffels-Webster	Plan incomplete. No calcs.	N/A	W. of Orchard Lake Rd., 14 1/2 Mile	Owner	N/A	Com.	N/A	100	N/A	0.61	5	5.7	N/A	N/A	58000
BLT	421	Bloomfield Chase	N/A	9	SW	N/A	N/A	Approved 8/9/96 Nowak and Fraus	y	N/A	Hickory Grove and Telegraph	Owner	N/A	Res.	13.695	10	N/A	0.35	5	3.8	29592	29926	16900
WBT	422	Maplewoods Sub.	N/A	27	SW	N/A	N/A	Revised AB 12/29/92 Zeimet/Wozniak	plans incomplete	N/A	Peggy St.	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	N/A	2.5	N/A	N/A	41600
WBT	424	Oakbrooke Sub. - north	N/A	23	SE	N/A	N/A	Rev. 4/10/87 Warner, Cantrell and Padmos	plans incomplete	N/A	E. of Middlebelt	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	123400
WBT	425	Oakbrooke Sub. - south	N/A	24	SW	N/A	N/A	Rev. 4/10/87 Warner, Cantrell and Padmos	plans incomplete	N/A	E of Middlebelt	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	10000
WBT	426	Orchard Pine Office Center	N/A	35	SW	N/A	N/A	AB--no date; approvals 3/97 Stenrose Associates, Inc.	plans incomplete	N/A	E. of Orchard Lake Rd., N. of Fourteen Mi	Owner	N/A	Com.	1.375	100	N/A	0.62	3.7	5.3	N/A	15117	17400
WBT	427	Potomac Towne 3 - basin 3	N/A	28	SE	N/A	N/A	AB 11/21/74 Basney and Smith	Plans incomplete	N/A	5274 Potomac Run S.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBT	428	Shenandoah in the Woods	N/A	20	SE	N/A	N/A	AB 10/25/88 Robert H. Laity	Plans partially complete, profiles not included	N/A	N. of Woodpond, W. of Woodrun	Owner	N/A	Res.	46.61	N/A	N/A	0.3	5.1	5	209745	435600	408900
WBT	429	Ridgewood Pt. - S basin	N/A	28	NW	N/A	N/A	Record Drawings 12/6/79 Giffels-Webster	plans incomplete. no calcs	N/A	S. of Pinetree Dr. - S basin	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3.5	N/A	N/A	122850

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
406	Jewish Community Center - basin B	12640	59150	0	N/A	N/A	N/A	12	irregular	N/A	6	100	132	Wet	This basin is connected to Basin 405 w/ a 24 in pipe	Minimal	N/A	Turf, Shrub	Curly Pondweed, Cattail	0	Area from aerial, fountain not on, broken wellhead, outflow not seen, use aerial.	
407	Maplecreek Condo 2	N/A	21000	N/A	0.5	1	N/A	2	irregular	6	4	315	120	Wet		Minimal	N/A	Willow, Forb	Cattail, Duckweed, Bulrushes	25	Fountain - not on.	Verify restrictor, clean structures, nutrient control.
408	J&S Office Center	est. 8100	6900	N/A	N/A	N/A	N/A	N/A	rectangular	6	3	90	90	Dry Catchbasin		<0.5	Poorly Drained	Turf	No	0	Cobble bottom, ponding.	Clean structures.
409	Maple Creek Condos 4	N/A	13500	N/A	1	0.5	1	0.75	oval	6	1.5	112	75	Dry		0.3	N/A	Turf, Grass	Algae, Cattail	0	Outfall to stream OK.	Verify restrictor, clean structures, increase buffer, nutrient control.
412	Maple Farms	N/A	1020	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	3	46	63	Dry Catchbasin		Minimal	Clay And Fill	Turf	No	0	Outflow buried, excessive algae. Inflow underwater.	Nutrient control, clean structures, veg. buffer.
413	Michigan Cosmetic Center	6100	4600	0	1	1	N/A	1	rectangular	N/A	1	120	60	Dry Extended Detention		No Pool Depth	N/A	Landscape	Algae, Rushes	0	Fenced, slumping SW sideslope, 36" riser to 12" to 30" riser to restricted pipe to 30" riser to 12".	Slope stabilization, pretreatment.
414	Maple Creek Condos 4	N/A	34500	N/A	1	N/A	3	2.5	irregular	6	4	220	335	Wet	receives flow from nearby wetland and sediment basin	>1 In Trap, 0.75 Basin	N/A	Turf, Tree	Wetland	0		Buffer.
415	Maple Creek Condos 3	N/A	28100	N/A	N/A	1.7	N/A	0.5	irregular	6	3	N/A	N/A	Dry Extended Detention		>1, No Pool Depth	N/A	Grass, Tree	Sedges, Rushes, Arrowhead	50	Sediment basin riser still in place.	
416	Maple Creek Condos 2	N/A	127750	N/A	1	N/A	2	N/A	irregular	N/A	6	595	250	Dry		Minimal	Hydric	Wetland	Purple L., Some Algae	0	Geese, active construction eroding to Inflow 63.	Verify restrictor, dredge, erosion control, clean structures.
417	Townhomes at Maple Creek - E basin	N/A	9850	N/A	N/A	0.6	3.5	2	N/A	6	2.5	N/A	N/A	Wet		0.5	N/A	Turf, Fine Rushes	Algae			
418	Townhomes at Maple Creek - W basin	N/A	8800	N/A	N/A	0.9	N/A	2	irregular	N/A	3	N/A	N/A	Wet		<1	N/A	Turf, Tree, Forb	Algae, Cattail	50		Clean structures, nutrient control.
419	Maple Place - W basin	N/A	29500	N/A	N/A	N/A	N/A	7	irregular	5	2.5	N/A	N/A	Wet		1	N/A	Turf	Some Attached Algae	0	Algaecide application posted; drains unrestricted to basin 903; inflows underwater; fountain. Goose droppings.	Veg. buffer. Goose and nutrient control. Use as sediment trap for second basin.
420	West Bloomfield Corp. Ctr.	N/A	10200	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	2	75	782	Dry		<1	Hydric	Turf	Cattail	0		Clean structures.
421	Bloomfield Chase	11200	4440	2400	1	1.3	0	N/A	rectangular	5	3	140	80	Dry		Minimal	N/A	Turf, Tree, Shrub	Cattail, Daylilies	0		Verify restrictor.
422	Maplewoods Sub.	N/A	16650	N/A	N/A	N/A	N/A	N/A	irregular	N/A	5.5	N/A	N/A	Dry		Minimal	N/A	Turf	No	0	Backyard depression, pipes to and from CB structures.	Area used by residents - retrofit may be discouraged.
424	Oakbrooke Sub. - north	N/A	30850	N/A	N/A	N/A	N/A	2.5	irregular	6	4	N/A	N/A	Wet		1	N/A	Grass, Tree, Shrub, Turf	Cattail, Reed Canary Grass	0	Some buffer provided, 2 fountains not operating.	
425	Oakbrooke Sub. - south	N/A	3400	N/A	N/A	N/A	N/A	2	irregular	N/A	6	N/A	N/A	Wet		Minimal	N/A	Turf		0	Asphalt lined pool, fountain, water feature, detention provided?	
426	Orchard Pine Office Center	N/A	3300	N/A	N/A	N/A	N/A	1	rectangular	5	1.5	86	50	Dry		1	N/A	Turf, Shrub	Cattail, Algae	0		Dredge, nutrient control.
427	Potomac Towne 3 - basin 3	N/A	12000	N/A	N/A	N/A	N/A	5	irregular	N/A	5	N/A	N/A	Wet		Minimal	N/A	Turf, Tree	Curly Pondweed	0	Outflow not seen, turbid water.	Buffer.
428	Shenandoah in the Woods	N/A	81800	N/A	N/A	0.5	N/A	6	irregular	N/A	4	N/A	N/A	Wet		some at in 1035	N/A	Turf, Cattail	Algae, Cattail, Purple L.	0	Appears to outlet to N. swale at golf course - no structure; half of lake has no buffer, litter, possible S. and E. inflows.	Buffer, nutrient control, clean CB sumps, investigate Outlet and sedimentation.
429	Ridgewood Pt. - S basin	N/A	35100	N/A	N/A	N/A	N/A	4	irregular	N/A	3	N/A	N/A	Wet	North and south basins connected.	Minimal	N/A	Turf, Tree		0	Copper sulfate algaecide applied, 2 fountains, 3 tile drains, drains to north basin.	Buffer.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
WBT	430	Simsbury Condos I	N/A	34	SW	N/A	N/A	AB 7/1/94 Warner, Cantrell & Padmos, Inc.	plans incomplete	N/A	Danbury Dr., N. of Fourteen Mile	Owner	N/A	Res.	N/A	100	N/A	N/A	N/A	4.2	N/A	N/A	20300
WBT	431	Simsbury Condos II	N/A	34	SW	N/A	N/A	AB 7/1/94 Warner, Cantrell & Padmos, Inc.	plans incomplete	N/A	Danbury Dr.	Owner	N/A	Res.	N/A	100	N/A	N/A	N/A	2	N/A	N/A	8050
WBT	432	Simsbury Condos	N/A	34	SW	N/A	N/A	AB 7/1/94 Warner, Cantrell & Padmos, Inc.	plans incomplete	N/A	N. of Simsbury Dr.	Owner	N/A	Res.	N/A	100	N/A	N/A	N/A	3.5	N/A	N/A	34300
WBT	433	Simsbury Condos	N/A	34	SW	N/A	N/A	AB 7/1/94 Warner, Cantrell & Padmos, Inc.	plans incomplete	N/A	Fourteen Mile and Farmington	Owner	N/A	Res.	N/A	100	N/A	N/A	N/A	6.2	N/A	N/A	53100
WBT	437	Stonebridge Sub.	N/A	33	NE	N/A	N/A	AB 9/24/88 Zeimet Wozniak Assoc.	plans incomplete	N/A	Maple and Farmington	Owner	N/A	Res.	N/A	100	N/A	0.35	N/A	4	N/A	N/A	258100
WBT	438	Stonebridge Sub.	N/A	33	NE	N/A	N/A	AB 9/24/88 Zeimet Wozniak Assoc.	plans incomplete	N/A	Maple and Farmington	Owner	N/A	Res.	N/A	100	N/A	0.35	N/A	1.9	N/A	N/A	33400
BLT	439	Echowood Sub.	N/A	20	NE	N/A	N/A	AB 9/18/80 Feldhauser Asscociates	Plan incomplete. No calcs.	N/A	Susans Way, near Lone Pine	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	83200
WBT	440	Tam-O-Shanter - basin A	N/A	23	SW	N/A	N/A	AB 9/2/03 Raymond Hearn Golf Designs	plans incomplete	N/A	N. of Walnut Lake, middle basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1.2	N/A	N/A	62700
WBT	441	Tam-O-Shanter - basin C	N/A	23	SW	N/A	N/A	AB 9/2/03 Raymond Hearn Golf Designs	plans incomplete	N/A	N. of Walnut Lake, SW basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	15800
WBT	442	Tam-O-Shanter - basin D	N/A	23	NE	N/A	N/A	AB 9/2/03 Raymond Hearn Golf Designs	plans incomplete	N/A	N. of Walnut Lake, NE basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1.5	N/A	N/A	16600
WBT	443	West Bloomfield Twp. Offices - SE basin	N/A	22	SW	N/A	N/A	9/26/88 Giffels-Webster	y	N/A	Walnut Lake Rd.	Owner	N/A	Com.	7.4	2x100	N/A	0.65	1.4	N/A	158730	159600	N/A
WBT	444	West Bloomfield Twp. Offices - SW basin	N/A	22	SW	N/A	N/A	2/5/88 Giffels-Webster	y	N/A	Walnut Lake Rd.	Owner	N/A	Com.	7.2	2x100	N/A	0.65	2.5	N/A	154440	157625	N/A
WBT	446	West Bloomfield Twp. Police HQ	N/A	22	SW	N/A	N/A	9/26/88 Giffels-Webster	Plan incomplete. No calcs.	N/A	4530 Walnut Lake Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	5.4	N/A	N/A	20700
WBT	447	West Bloomfield Nursing Home - N basin	N/A	33	NW	N/A	N/A	AB 1/29/88 Nowak and Fraus	Plan incomplete. No calcs.	N/A	6445 W. Maple Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	2	3.8	N/A	N/A	23700
WBT	448	West Bloomfield Nursing Home - S basin	N/A	33	NW	N/A	N/A	AB 1/29/88 Nowak and Fraus	Plan incomplete. No calcs.	N/A	6445 W. Maple Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	4	3.8	N/A	N/A	83600
WBT	449	Weisman Cleaners	N/A	34	NE	N/A	N/A	AB 11/4/04 Nowak and Fraus	Plan incomplete. No calcs.	N/A	5737 W. Maple Rd.	Owner	N/A	Com.	N/A	100	N/A	N/A	3	2.1	4950	5000	2725
WBT	450	Westfield Office Center	N/A	35	SW	N/A	N/A	AB 10/20/84 Donnolly and Associates	Plan incomplete. No calcs.	N/A	E. of Orchard Lake Rd., N. of Fourteen M	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4.8	N/A	N/A	86200
WBT	451	The Sports Club of W. Bloomfield - North	N/A	27	SW	N/A	N/A	REV 12/24/02 Gillet and Associates	Plan incomplete. No calcs.	N/A	E. of Farmington, N. of Maple - N basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	44100
WBT	452	The Sports Club of W. Bloomfield - South	N/A	27	SW	N/A	N/A	REV 12/24/02 Gillet and Associates	Plan incomplete. No calcs.	N/A	E. of Farmington, N. of Maple - S basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	2.7	N/A	N/A	15100
WBT	453	Barwick Park	N/A	33	NE	N/A	N/A	REV 12/1/87 OCDC Giffells Websters	Calcs are included on plan, but crossed out. Included them on the database, possibly incorrect.	N/A	W. of Farmington, S. of Maple	Owner	N/A	Res.	11.08	100	N/A	0.55	4.1	8	72890	80438	140300

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
430	Simsbury Condos I	N/A	4850	N/A	N/A	N/A	N/A	0.75	rectangular	N/A	2.5	175	130	Dry	four separate basins	2	Hydric	Turf	Purple L., Cattail, Algae	0	Inflow 164 not found, pondweed, 4' buffer, drain east, overflows south?	Expand buffer, no overflow.
431	Simsbury Condos II	N/A	4025	N/A	N/A	2	N/A	0.5	triangular	N/A	2	100	80	Dry	four separate basins	Some	N/A	Turf, Grass	Cattail, Purple L., Reed	0	Inflow 165 not found, turbid, algae, duckweed, 5' buffer, willows.	Dredge.
432	Simsbury Condos	N/A	9800	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry	four separate basins	2.5	Hydric	Turf Upper Half Slope	Cattail, Willows	50		Buffer, dredge.
433	Simsbury Condos	N/A	8550	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2.5	190	135	Dry	four separate basins	0.5	Hydric	Shrub, Forb	Willows, Algae	0	Flows East to drain.	
437	Stonebridge Sub.	N/A	64500	N/A	N/A	1	4	0.5	irregular	6	3	N/A	N/A	Dry	two separate basins	3	V. Poorly Drained	Turf, Shrub	Cattail, Algae, Purple L.	0		Buffer, dredge.
438	Stonebridge Sub.	N/A	17600	N/A	N/A	N/A	N/A	5	rectangular	6	3	N/A	N/A	Wet	two separate basins	2	N/A	Turf	Algae	25	Whitish discharge at Inflow 1031. Turtle trapped in Overflow.	Clean MH sump, nutrient controls.
439	Echowood Sub.	N/A	27700	N/A	N/A	N/A	N/A	N/A	irregular	N/A	4	N/A	N/A	Dry		Minimal	2-3" Topsoil Over Type B	Turf	No	0		
440	Tam-O-Shanter - basin A	N/A	52200	N/A	N/A	2	N/A	7	irregular	N/A	3	N/A	N/A	Wet	Basin A and B connected 8 in to a 12 in pipe	None Visible - No Pool Depth	N/A	Turf	Sedges	0	Fountain, blue dye, geese droppings.	Buffer.
441	Tam-O-Shanter - basin C	N/A	15800	N/A	N/A	2	N/A	9	irregular	N/A	3.5	N/A	N/A	Wet		None Visible - No Pool Depth	N/A	Turf	Lily Pad, Fine Rush	0	Blue dye, 36" riser not functioning as overflow.	Check outflow/overflow structure.
442	Tam-O-Shanter - basin D	N/A	11100	N/A	N/A	2	N/A	2	irregular	N/A	3	N/A	N/A	Wet		None Visible - No Pool Depth	Hydric	Turf	Purple L., Cattail, Algae	0	Lily, duckweed, discharges to wetland/lake, blue dye.	Outlet riser holes blocked.
443	West Bloomfield Twp. Offices - SE basin	N/A	102300	N/A	N/A	N/A	N/A	N/A	irregular	N/A	N/A	N/A	N/A	Retention	Wetland A	N/A	N/A	tree, shrub	buckthorn, phragmites, algae	0	no outlet found	
444	West Bloomfield Twp. Offices - SW basin	N/A	91450	N/A	N/A	N/A	N/A	N/A	irregular	N/A	N/A	N/A	N/A	Retention	Wetland B--no inlets on plans--looks like drainage swales	N/A	N/A	Tree, shrub, forbs	phragmites, buckthorn, ctail	0	no outlet found	
446	West Bloomfield Twp. Police HQ	N/A	3800	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	3	N/A	N/A	Dry		Yes. Basin Not Stabilized	Poorly Drained	Tree, Cattail	Cattail	0	Three 8" PVC roof drains.	Verify restrictor. Stabilize slopes and excavate sediment.
447	West Bloomfield Nursing Home - N basin	6050 est	6250	1250 est	N/A	N/A	N/A	1	triangular	N/A	5	N/A	N/A	Wet		Yes. No Pool Depth	N/A	Turf	Algae	0	Aerials for sizing - no outflow visible, expanded since original design, some inflows overgrown.	Unblock pipes, confirm outlet.
448	West Bloomfield Nursing Home - S basin	16800 est	22000	6050 est	N/A	0.4	N/A	3	rectangular	N/A	4	N/A	N/A	Wet		N/A	N/A	Forb, Grasses	Phragmites	0	Smaller basin to the west. Erosion at Inflow 183.	Stabilize W side.
449	Weisman Cleaners	3000	1300	300	N/A	N/A	N/A	N/A	irregular	N/A	2.5	N/A	N/A	Dry Extended Detention		1	Poorly Drained	Turf	Cattail	75	White residue in CB sump to Inflow 184 - maybe from concrete at Discount Tire.	Clean structures.
450	Westfield Office Center	N/A	18000	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2	N/A	N/A	Dry		<1	Poorly Drained, <0.5' Ponding	Turf, Shrub	Cattail	0	Overflows south to stream.	Clean structures.
451	The Sports Club of W. Bloomfield - North	N/A	11025	N/A	N/A	N/A	N/A	N/A	irregular	N/A	3	N/A	N/A	Dry		<1	Poorly Drained, Wetland Plants	Turf, Tree	Buckthorn, Cattail, Phrag.	0	Unrestricted, minor erosion/sediment.	Check restriction req'ts.
452	The Sports Club of W. Bloomfield - South	N/A	5600	N/A	N/A	N/A	N/A	1	irregular	N/A	4	N/A	N/A	Dry		< 1	Poorly Drained, Wetland Plants	Tree, Grass	Cattail	25	CB structure to Inflow 188 needs repair.	
453	Barwick Park	26050	17500	13430	N/A	N/A	N/A	5	irregular	N/A	2	N/A	N/A	Wet		2	N/A	Turf	Algae	25	Litter, geese, 4" sump pump IN, fountain.	Buffer, nutrient control, check for restrictor.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
WBT	454	Westwood Office Center	N/A	35	SW	N/A	N/A	12/17/86 Kaipio Survey	y	N/A	E. of Orchard Lake Rd., N. of Fourteen Mi	Owner	OCDC, Ch. 18	Com.	2.07	100	0.42	0.63	4	3.8	14626	16558	20500
WBT	455	HCR Manor Care	N/A	33	NE	18-33-200-038	N/A	REV 2/22/89 Donnolly and Associates	Mortgage Survey, no calcs, not complete	N/A	6950 Farmington Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	7	N/A	N/A	137500
WBT	456	Dunhams - Parking	N/A	35	SW	N/A	N/A	REV 4/12/76 Basney and Smith	Some calcs, plans incomplete	N/A	33086 Northwestern Hwy.	Owner	N/A	Com.	2.23	N/A	N/A	0.3	2.4	N/A	N/A	9835	N/A
WBT	457	Dunhams	N/A	35	SW	N/A	N/A	REV 9/24/83 Basney and Smith	Plans incomplete	N/A	33086 Northwestern Hwy.	Owner	N/A	Com.	4	100	N/A	0.3	N/A	N/A	39039	40024	N/A
WBT	458	Sephardic Church	N/A	22	SE	18-22-426-007	N/A	AB 12/8/03 Mickalich and Associates	y	N/A	S. of Orchard Lake Rd. & W. of Walnut La	Owner	N/A	Com.	1.44	100	N/A	0.49	3.83	3.4	8261	8308	13350
WBT	459	Lark Country Inn Restaurant	N/A	28	SE	N/A	N/A	REV 7/27/78 Alan Granader	Plans partially complete	N/A	6420-6430 Farmington Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	1.1	1.5	4665	15400	5000
WBT	460	Potomac Towne 1 - basin 1	N/A	28	SE	N/A	N/A	REV 4/9/73 Basney and Smith	Plans partially complete, bad scan	N/A	Richard Run and Potomac Cir.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	4	2.2	51502	56840	40850
WBT	461	Potomac Towne 1 - basin 2	N/A	28	SE	N/A	N/A	REV 4/9/73 Basney and Smith	Plans partially complete, bad scan	N/A	Potomac Run E. and Brett	Owner	N/A	Res.	N/A	N/A	N/A	N/A	6.5	3.7	140219	142919	67900
WBT	462	Potomac Towne 2	N/A	28	SE	N/A	N/A	REV 6/21/73 Basney and Smith	Plans partially complete, bad scan,	N/A	5231 Wright Way S.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	9.75	N/A	326272	326381	N/A
WBT	463	Potomac Village 3	N/A	28	SE	N/A	N/A	ACC 10/23/72 Basney and Smith	plans incomplete, no calcs	N/A	Cedarhurst Dr. and Kingsfield Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3.7	N/A	N/A	53300
WBT	464	Potomac Village 1	N/A	27	NW	N/A	N/A	REV 1/19/71 Basney and Smith	plans incomplete, some calcs	N/A	SW of Farmington and Patrick	Owner	N/A	Res.	312	N/A	N/A	0.25	11	N/A	714394	723107	N/A
WBT	465	Temple Israel	N/A	28	NW	N/A	7717	APP 11/27/77 TMP and Associates	plans incomplete, no calcs	N/A	5725 Walnut	Owner	N/A	Com.		N/A	N/A	N/A	N/A	2.6	N/A	N/A	185000
RHC	466	Sanctuary in the Hills - basin B	N/A	32	NE	N/A	89-114	1989: Fenn & Assoc. 2/22/02	y	N/A	3640 Winding Brook Cir.	Owner	Sanctuary of Rochester LLC, 2038 Big Beaver Rd., Suite 200, Troy, MI 48084-3410	Res.	4.9	10	N/A	0.4	5.04AB	4.8	12,578	22,167AB	19300
RHC	467	Sanctuary in the Hills - basin C	N/A	32	NE	N/A	89-114	1989: Fenn & Assoc. 2/22/02	y	N/A	Winding Brook Ct.	Owner	Sanctuary of Rochester LLC, 2038 Big Beaver Rd., Suite 200, Troy, MI 48084-3410	Res.	4.5	10	N/A	0.4	5.61AB	5.3	11,551	17,396AB	11300
RHC	468	Sanctuary in the Hills - basin D	N/A	32	SE	N/A	89-114	1989: Fenn & Assoc. 2/22/02	y	N/A	3750 Winding Brook Cir.	Owner	Sanctuary of Rochester LLC, 2038 Big Beaver Rd., Suite 200, Troy, MI 48084-3410	Res.	0.91	10	N/A	0.4	3.15AB	N/A	2,336AB	2,622AB	N/A
SOC	469	Carson Center	7 -15	7	SW	07-351-108	7-3-031	254; Zeitman Wozniak & Assoc. rev. 9/12/86	y	N/A	29333 Northwestern Hwy., E basin	Owner	N/A	Com.	4.73 Site	10	N/A	0.7	4	6.25	24,237 site	10700	17100
BLT	471	Costco	N/A	5	SE	N/A	HRC 93026	GWE rev. 2/19/93	y. No calcs	N/A	Telegraph and Square Lake Rds.	Owner	N/A	Com.	3.25	N/A	10.82	N/A	N/A	5	N/A	N/A	109600
BLT	472	Kent Ridge Sub.	N/A	27	NE	N/A	HRC 89532	Zeitmet Wozniak & Assoc. 9/7/90AB	y	N/A	Quarton Rd. & Covington	Owner	N/A	Res.	1.46	10	N/A	0.35	2.5	2.8	3156.52	3229	2940
BLT	473	Provencal	N/A	16	NE	N/A	HRC 89552	Kieft Engineering 11/12/90AB Watermain Only	No calcs. plans incomplete	N/A	Provencal Pl.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	3500
BLT	474	Bloomfield Knoll	RB-25	12	SW	N/A	HRC 96269	Nowak & Fraus 3/25/99AB	No calcs. plans incomplete	N/A	Westview and Squirrel	Owner	N/A	Res.	5.9	N/A	N/A	N/A	N/A	1.3	N/A	N/A	12700
BLT	475	Detroit Skating Club	N/A	5	SE	N/A	HRC 94006	Nowak and Fraus - REV 7/15/94	y	N/A	888 Denison	Owner	N/A	Com.	2.359	50	0.87	0.82	6.7	2.1	15209.13	15168.76	8200

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
454	Westwood Office Center	6578	5400	735	N/A	N/A	0	N/A	irregular	N/A	3	N/A	N/A	Dry Catchbasin	pipe sloped toward basin serves as outlet? Has 3 in restrictor.	<0.5	Poorly Drained	Turf	No	0	CB blocked, inflows submerged, ponding.	Clean structures.
455	HCR Manor Care	N/A	19500	N/A	N/A	N/A	0	2	irregular	N/A	6	N/A	N/A	Wet Extended Detention		Some, No Pool Depth	Poorly Drained	Turf, Willow	Cattail	0		Clean structures.
456	Dunhams - Parking	5037.5	N/A	2100	N/A	N/A	N/A	N/A	irregular	5	N/A	N/A	N/A	Parking	Basin is a series of 2 smaller basins connected by a 18 in pipe	N/A	N/A	N/A	N/A	0	MH full of water - pump does not appear to be working.	Inspect pump.
457	Dunhams	22692 est.	16300	15768 est.	N/A	N/A	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry		N/A	N/A	Tree, Cattail, Willow	Willows, Cattail	0	Overgrown, outlet no visible, fenced.	Clean out, clean CB sumps, pre-treat.
458	Sephardic Church	5427	3900	397	1	0.5	0	N/A	oval	N/A	2	N/A	N/A	Dry		Minimal	Poorly Drained	Turf	No	0	Recently stabilized, 6" roof drain.	
459	Lark Country Inn Restaurant	22440	3350	12920	N/A	N/A	0	0.5	rectangular	6	6	N/A	N/A	Wet		3	N/A	Turf, Tree	Algae	75	Sediment, pipes blocked, inflows buried, geese, litter.	Dredge, buffer.
460	Potomac Towne 1 - basin 1	N/A	18550	N/A	1.5	N/A	2	3.5	irregular	5	6	N/A	N/A	Wet		Minimal	N/A	Turf, Shrub, Re	Curly Pondweed, Algae	25	Shading dye, fountain, basin modified in shape, depth, outflow; road crossing; four 4" drains.	Buffer, fertilizer control.
461	Potomac Towne 1 - basin 2	N/A	18350	N/A	2	N/A	3	0.5	irregular	5	3	N/A	N/A	Wet	rip rap overflow from backwater pond.	2	N/A	Grass, Cattail	No	100	Sediment, some algae.	Dredging, uncover pipes; check outflow.
462	Potomac Towne 2	33475 avg	29000	N/A	1	N/A	1	5	irregular	5	3	N/A	N/A	Wet Pumped Detention	outlet pipe to pump station to swale to retention pond 2	Minimal	N/A	Turf, Small Tree	Yes	0	Curly pondweed, geese, some algae; three 4" PVC drains; pump stn.	Buffer.
463	Potomac Village 3	N/A	14500	N/A	N/A	1	N/A	N/A	rectangular		2	N/A	N/A	Dry		1	Poorly Drained	Shrub, Grass	Yes	100	Cattails, overgrown; pipes covered.	Clear cut bottom, clean outflow.
464	Potomac Village 1	N/A	13400	N/A	N/A	N/A	N/A	N/A	rectangular	5	N/A	N/A	N/A	Dry		Minimal	N/A	Turf	No	0	No longer providing detention; electrical boxes; playgrounds.	Clean CB sump.
465	Temple Israel	N/A	71000	N/A	N/A	N/A	5.8	6	irregular		1.5	N/A	N/A	Wet		None Visible - No Pool Depth	N/A	Turf	No	0	Sediment at inflows.	Clean structures, riser pipe to 12" CMP.
466	Sanctuary in the Hills - basin B	9,887AB	4025	692AB	N/A	2	N/A	N/A	triangular	6	6	est. 90 MID	est. 45 MID	Dry Extended Detention		Minimal	Poorly Drained	Turf	Purple L., Cattail	0	8" PVC at S end from wetland area.	
467	Sanctuary in the Hills - basin C	8,045AB	2100	152AB	N/A	2	N/A	N/A	semi-rectangular.	6	6	est. 105 MID	est. 50 MID	Dry Extended Detention		Minimal	Poorly Drained	Turf	Purple L., Cattail	0	Area under construction. Drains north to Lueders Drain.	Clean structures following construction.
468	Sanctuary in the Hills - basin D	1,908AB	1540	117AB	N/A	N/A	N/A	0.5	triangular	6	6	est. 50 MID	est. 30 MID	Dry		Turbid Water	Poorly Drained, Ponding	Turf	Cattail	0	Small basin with no controlled outflow visible. Inflow underwater.	
469	Carson Center	4200	5400	1100	N/A	N/A	2	4	irregular	N/A	1.5	est. 92 MID	est. 46 MID	Wet	Connected to Basin 121	Minimal	N/A	turf, groundcover	algae, pondweed	0	boulders, goose fencing, 12" weir across middle, 3ft. above lower pool	Needs nutrient control and structure cleaning
471	Costco	N/A	21900	N/A	N/A	N/A	N/A	2	N/A	N/A	6	N/A	N/A	Wet	Outlet or overflow not listed.	N/A	N/A	Shrub	Purple L., Cattail, Willow	0	Fenced, ice rink dumping paint and snow runoff into basin, overgrown.	Check illicit discharges from ice rink and fat bins.
472	Kent Ridge Sub.	1262	1050	0	0.5	N/A	2.5	N/A	irregular	6	3	40	30	Dry		Minimal	N/A	Turf	No	0	No overflow - pipe from overflow structure is restricted instead of pipe from basin.	Verify overflow.
473	Provencal	N/A	1170	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry		0.5 Ft.	very poorly dnained	turf	algae	0		
474	Bloomfield Knoll	13860	9750	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry		Basin Silt In From Constr.	N/A	Grass, Sedge	Purple L., Cattail, Arrowhd.	0	Sediment from construction.	Verify restrictor, dredge, clean structures.
475	Detroit Skating Club	9087.39	3880	N/A	1	N/A	N/A	N/A	rectangular	5	1.5	336.57	27	Dry Catchbasin	Volume required is more than volume provided. Additional storage computations listed. Assumed addition built and added to capacity (parking lot storage).	Minimal	Poorly Drained	Grass, Shrub	Willows, Phragmites	50	Upland area to the north unvegetated.	

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft³	STORE PROVD (Plan) ft³	STORE PROVD (Field) ft³
BLT	476	Lowe's	N/A	6	NE	N/A	HRC 19990587	D. P. Smith & Assoc. 12/4/00AB	plans incomplete. No calcs	N/A	Fairfax	Owner	N/A	Com.	N/A	N/A	N/A	N/A	11	7.65	N/A	N/A	180000
BLT	480	Whispering Pines	RB-30	16	SE	N/A	HRC 89463	Professional Engineering Assoc. 9/13/99	calcs and plans incomplete	N/A	Overbrook and Lahser	Owner	N/A	Res.	N/A	100	N/A	N/A	1.5	1.9	24254	45152	154700
BLT	481	Kirkway Ravines	RB-13	8	NE	N/A	HRC 880396	N/A	no plans. calcs only.	N/A	Pembury Ct., near Hickory Grove and Frar	Owner	N/A	Res.	11.94	N/A	3.45 cfs	0.3	3.94	4.1	18104	18104	28300
BLT	482	Dordan Sub.	RB-16	10	NE	N/A	HRC 94351	Milletic and Associates REV 6/12/95	y	N/A	Dordan	Owner	N/A	Res.	13.32	10	2.5 cfs	0.35	4	3.55	29326	55729	60400
BLT	486	Bloomfield Club Sub.	RB-41	27	NW	N/A	N/A	Professional Engineering assoc. 10/22/79	No plan available	N/A	Burningbush, near Lahser and Quarton	Owner	N/A	Res.	37.4	10	N/A	0.5	7.91	8.2	196,350	204,215	118100
WBT	487	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	S. of Applewood	Owner	OCDC Ch. 18	Res.	13.1	100	2.5	0.5	7	5.8	77689	77975	82900
BLT	498	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	SW corner of Cherrywood	Owner	OCDC Ch. 18	Res.	3.7	100	1.31	0.5	5.2	7.6	18600	19200	36500
BLT	499	Stonehollow	N/A	21	SW	N/A	N/A	Ziement and Wozniak AB 6/18/86	no calcs	N/A	Quarton and Telegraph Rds.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.1	N/A	N/A	14400
WBT	500	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	E of Chimney Hill Dr. - N basin	Owner	OCDC Ch. 18	Res.	24.7	10	4.94	0.5	1.2	N/A	51147	52630	N/A
WBT	501	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	some calcs missing	N/A	E of Chimney Hill Dr. - W basin	Owner	OCDC Ch. 18	Res.	N/A	N/A	N/A	0.5	3	3.7	N/A	N/A	11700
WBT	502	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	E of Chimney Hill Dr. - S basin	Owner	OCDC Ch. 18	Res.	1.767	100	12.14	0.5	3	5.1	35476	36430	46000
WBT	503	Woodcliff on the Lake	N/A	22	NW	N/A	N/A	Herman Frankel AB 8/31/90	Calcs no complete. Some of plans unreadable.	N/A	Panorama Cir., near Orchard Lake and Por	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	N/A	3	94546	95370	53000
WBT	514	Perrytown Estates	N/A	28	SE	N/A	N/A	S.J Harb & Assoc. AB 11-26-85	incomplete	N/A	Cedarhurst Dr.	Owner	OCDC, Ch. 18	Res.	4.63	N/A	N/A	0.3	N/A	N/A	8248.75	N/A	N/A
WBT	521	Village Square	N/A	33	SE	N/A	N/A	Ziement and Wozniak AB1-16-98	some	N/A	Village Square Ct.	Owner	OCDC, Ch. 18	Res.	66.58	100	N/A	N/A	N/A	3	N/A	817500	208800
WBT	523	Autumn Ridge Estates	N/A	22	SE	N/A	N/A	Giffels Webster - AB 4/18/88	No calcs	N/A	Autumn Ridge Dr.	Owner	OCDC Ch. 18	Res.	40.36	N/A	N/A	N/A	N/A	6.5	N/A	N/A	80600
SOC	524	Weatherstone N. Townhouses - S basin	7-6	7	SE	07-401-025	7-2-016	331; Warner, Cantrell & Padmos 6/10/86AB	y	N/A	29900 Franklin Rd.	Owner	N/A	Res.	1.43	10	0.286	0.6	2	1	6612	est. 7475	4375
SOC	525	Evergreen Nursing Home	11-1	11	NW	11-101-022	N/A	Nowak & Fraus 8/21/97AB	y	y	Evergreen Nursing Center	Owner	N/A	Com.	6.393	10	0.267	0.75	5	4.1	35569	36200	24500
SOC	526	GE Plastics - S basin	20-9	20	SE	20-426-030	20-2-021	269	some	N/A	25900 Telegraph Rd.	Owner	N/A	Com.	0.3	N/A	0.88	N/A	N/A	2	N/A	N/A	3200

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
476	Lowe's	31000 EST	23500	17250 EST	N/A	2	N/A	N/A	triangular	3	1.5	310	200	Dry		1'	N/A	N/A	algae	36	6' fence, side slopes not vegetated, litter	
480	Whispering Pines	59346	81400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	var	N/A	N/A	Wetland		N/A	Hydric	Tree, Shrub	Cattail	0	Area from GIS/aerial.	Verify restrictor.
481	Kirkway Ravines	19720	6900	0	N/A	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	Dry		Minimal	Clay Loam, Poorly Drained	Turf	No	0	No storm inflows, Outflow discharge east to MH. MH has 8" restrictor flowing E to Case Drain.	
482	Dordan Sub.	N/A	17000	N/A	1	N/A	N/A	N/A	irregular	1	3	N/A	N/A	Dry		Minimal	Poorly Drained	Turf, Shrub, Rushes	No	25	No restrictors - two outflows, some sub. construction.	Verify restrictors.
486	Bloomfield Club Sub.	35500	14400	15575	1	N/A	N/A	N/A	irregular	4	2	N/A	N/A	Dry		Minimal	N/A	Turf	Purple L., Cattail	0	Outlet buried, pump in SW corner may be for overflow?	Clean structures.
487	Chimney Hills Apt.	N/A	14300	N/A	0.5	N/A	N/A	N/A	irregular	5	2	N/A	N/A	Dry		N/A	N/A	Turf	No	0	Storm sewer restricted and backs up into basin. Sand dumped on E bank.	Clean structures, remove stockpile.
498	Chimney Hills Apt.	6400	4800	900	N/A	N/A	N/A	N/A	rectangular	5	2.5	80	30	Dry	basin serves as overflow for nearby catch basin.	N/A	Hydric	Wetland	Cattail, Purple L.	0	Storm sewer restricted and backs up into basin. Outlet blocked with sediment.	Verify restrictor, clean structures.
499	Stonehollow	N/A	6850	N/A	N/A	N/A	N/A	N/A	irregular	5	6	N/A	N/A	Dry Catchbasin		Minimal	N/A	Turf	Sedges	0	No inflowing storm, bottom unvegetated.	Verify restrictor, stabilize bottom.
500	Chimney Hills Apt.	N/A	15500	N/A	N/A	N/A	N/A	N/A	irregular	5	2	N/A	N/A	Dry	basin 498 also drains to outlet structure	N/A	Hydric	Turf	Purple L., Cattail, Willow	0	Storm sewer restricted and backs up into basin.	Verify restrictor, clean structures.
501	Chimney Hills Apt.	3300	3150	400	N/A	N/A	N/A	N/A	triangular	5	2	110	60	Dry	drains to basin 502 where restrictor is located.	N/A	Hydric, Type C/D	Turf	Cattail, Purple L.	0	Storm sewer restricted and backs up into basin. small basin with no overflow so depth could not be determined.	Verify restrictor.
502	Chimney Hills Apt.	N/A	9000	N/A	N/A	N/A	N/A	N/A	irregular	5	2	N/A	N/A	Dry	last basin in series. All basin connected to this basin.	N/A	Hydric	Turf	Cattail, Purple L., Willow	0	Storm sewer restricted and backs up into basin. Restrictor installed at beehive.	
503	Woodcliff on the Lake	N/A	17650	N/A	N/A	1	N/A	1	irregular	6	2.5	N/A	N/A	Dry		Erosion At Inflow 334	N/A	Wetland	Cattail, Purple L.	0	Flows bypass restrictor - not grouted in, Inflow 333 buried.	Repair end section Inflow 334, clean structures, Grout restrictor in place.
514	Perrytown Estates	N/A	21300	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	N/A	N/A	N/A	Wetland		N/A	N/A	Wetland, Grass		0	Overgrown. No outflow on plans and none found. Site inaccessible.	Clean structures. Verify storage.
521	Village Square	N/A	69600	N/A	N/A	2	N/A	3.5	irregular	N/A	3	N/A	N/A	Wet		N/A	N/A	Turf	Purple L.	0	No Outflow found. Five geese killed.	Verify Outflow. Clean structures.
523	Autumn Ridge Estates	N/A	12400	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2	N/A	N/A	Wetland		N/A	N/A	N/A		0	No outlet found. Inflows 374 and 375 not found. Area from aerial.	Verify outflow/restrictor, Repair end section Inflow 371. Clean structures.
524	Weatherstone N. Townhouses - S basin	N/A	4375	est. 3737MID	1.8	N/A	2.2	N/A	oval	4	var	78	60	Wetland		3	Hydric	Shrub	Buckthorn	50	No spillway or outlet found. Breach in berm at stream.	Dredge. Verify outlet.
525	Evergreen Nursing Home	est. 14000	5975	N/A	N/A	N/A	N/A	1	oval	N/A	3	est. 160TOP	est. 90TOP	Dry		Minimal	Hydric, Underwater	Turf	Cattail	25	Spoke with maintenance staff, no prior history of overflow.	
526	GE Plastics - S basin	N/A	1600	N/A	N/A	N/A	N/A	N/A	irregular	N/A	1	N/A	N/A	Dry	This small basin is perched on an unstable woodland slope between the rear parking lot and the Rouge River. The outlet bee hive in this basin is usually plugged with leaves and mud.	1	Hydric, ponding	Trees	Buckthorn	0	Outflow blocked, berm breached, erosion on slope. Wasps at river outfall.	Verify restrictor. Clean structures. Stabilize Overflow.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft³	STORE PROVD (Plan) ft³	STORE PROVD (Field) ft³
SOC	527	Woodvale Condos - NE basin	8-3a	8	SW	08-377-005	8-3-001	331; J. E. Hiltz & Assoc. 6/7/72	y - no calcs	y	25116 Woodvale Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	est. 2.8	2	N/A	N/A	4150
SOC	528	Woodvale Condos - S basin	8-3a	8	SW	08-377-005	8-3-001	331; J. E. Hiltz & Assoc. 6/7/72	y - no calcs	y	25116 Woodvale Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	est. 4.6	5.2	N/A	N/A	33250
SOC	529	Woodvale Condos - E basin	8-3a	8	SW	08-377-005	8-3-001	331; J. E. Hiltz & Assoc. 6/7/72	y - no calcs	y	25116 Woodvale Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	est. 3	2	N/A	N/A	11650
SOC	530	Parkwest Galleries	14-Jul	7	SW	N/A	7-3-020	Eron J. Kleckner Assoc.	incomplete	N/A	Northwestern, near Inkster	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	2	16760	17400	14150
SOC	531	Victor Center Office - Retention Area 2	16-3	16	SW	16-302-031	16-3-035	Giffels-Webster Eng. 7/30/84	incomplete	N/A	27400 Northwestern Hwy. - N parking sto	Owner	N/A	Com.	N/A	N/A	0.21	N/A	6	N/A	N/A	4300	N/A
SOC	532	Victor Center Office - Retention Area 3	16-3	16	SW	16-302-031	16-3-035	Giffels-Webster Eng. 7/30/84	incomplete	N/A	27400 Northwestern Hwy. - SE parking st	Owner	N/A	Com.	N/A	N/A	0.46	N/A	6	N/A	N/A	11500	N/A
SOC	534	Word of Faith - basin C	27-4 c	27	SE	27-426-006 & 008	N/A	Zeimet-Wozniak 3/10/99 calcs	y	N/A	2000 W. Nine Mile Rd. - W basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	5500
SOC	535	Word of Faith - basin D	27-4 d	27	SE	27-426-006 & 008	N/A	Zeimet Wozniak 3/10/99 clacs; plan 12/22/99 rev.	y	N/A	2000 W. Nine Mile Rd. - NW basin	Owner	N/A	Com.	10.75	10	2.15	0.63	est. 3	N/A	48178	54580	N/A
SOC	536	Reid Glass - Parking Storage	32-2	32	NE	32-228-017	32-1-020	N/A	y	N/A	22110 Kiefer	Owner	N/A	Com.	1.02	10	0.97	0.8	5	N/A	3034	3800	N/A
SOC	538	Country Village Plaza	15-1	15	NE	15-226-033	15-1-014	Summa Eng. 7/8/00AB	y	N/A	20097 W. Twelve Mile Rd.	Owner	N/A	Com.	0.4	10	0.08	0.61	0.4 in CB1	1	174	194	700
BLT	543	Square Lake Country Club Sub.	RB-10	6	SE	N/A	N/A	W. Morrison and Asscoiates - 9/1/93 AB	n	N/A	Klingensmith and Square Lake Rd.	Owner	N/A	Res.	1.78	N/A	1.99	0.28	2.56	3	N/A	N/A	21200
BLT	544	Mitchell Ct. Condos	RB-54	11	NE	N/A	N/A	Giffells Webster - 8/23/99	y	N/A	Sevem Lane and Eastway	Owner	N/A	Res.	6.25	100	0.31	0.32	4.3	4	24573.45	20000	12750
BLT	545	Hidden Pines Sub.	RB-24	12	SW	N/A	N/A	MCS Engineers - 5/21/76	no calcs	N/A	W. of Squirrel Rd., S. of Westview	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	7.7	N/A	N/A	18500
BLT	546	Bloomfield Crossing Sub.	RB-17	11	NW	N/A	N/A	Mason Brown - 3/11/71	n	N/A	Off Bridlepath Ct.	Owner	N/A	Res.	83.5	10	16.7	0.3	3.35	6.4	147173	148900	112300

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
527	Woodvale Condos - NE basin	N/A	2100	est. 2900MID	N/A	N/A	N/A	N/A	rectangular	N/A	var	est. 145MID	est. 20MID	Dry	4 ft cl fence. Restrictor in storm sewer?	1.5	Hydric, Sediment	Tree, Shrub	Cattail, Buckthorn	0	4' fence. 6 or 8" restrictor at SW corner of site backs up into basin. Pipes buried. Connected to basin 529-berm not found.	Clean structures. Excavate sediment.
528	Woodvale Condos - S basin	N/A	6400	est. 6250MID	N/A	N/A	N/A	N/A	triangular	N/A	var	est. 125MID	est. 100MID	Dry	4 ft cl fence. Restrictor in storm sewer? No inflow pipes	1	Hydric, Sediment	Tree, Shrub	Cattail, Buckthorn	0	4' fence. 6 or 8" restricted storm at SW corner of site backs up into basin.	Clean structures.
529	Woodvale Condos - E basin	N/A	5800	est. 8000MID	N/A	N/A	N/A	N/A	Rectangular	N/A	var	est. 265MID	est. 30MID	Dry	4 ft cl fence. Restrictor in storm sewer?	1.5	Hydric, Sediment	Tree, Shrub	Cattail, Buckthorn	0	4' fence. 6 or 8" restrictor at SW corner of site backs up into basin. Inflows buried. Connected to basin 527-berm not found.	Clean structures. Excavate sediment.
530	Parkwest Galleries	N/A	7075	N/A	N/A	N/A	N/A	3.5	triangular	N/A	4	N/A	N/A	Wet		Minimal	Hydric	Turf	Landscape	0	Has fountain, did not find outlet, did find 6" black plastic in nearby wetland leading toward pond.	Verify outlet structure.
531	Victor Center Office - Retention Area 2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	N/A	N/A	N/A	Parking	Parking lot storage	1	N/A	N/A		0	Several pipes flowing into CB 14 and discharging out through approx. 4" corrugated plastic pipe to river.	
532	Victor Center Office - Retention Area 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	N/A	N/A	N/A	Parking	Parking lot storage	N/A	N/A	N/A		0	Two four-hole restricted CB covers provide parking lot surface storage.	
534	Word of Faith - basin C	N/A	5500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	Dry		Some - Non-uniform	Type B/C	Turf, Tree, Shrub	Cattail, Poison Ivy	100	Inflow not found.	Verify restrictor. Clean structures. Uncover Inflow.
535	Word of Faith - basin D	32600	21000	est. 20500MID	1	N/A	N/A	N/A	irregular	N/A	var	est. 340MID	est. 90MID	Dry	NW basin	Some - Non-uniform	Hydric	Turf, Forb, Sedge	Cattail, Phragmites	100	Outflow and overflow not found. 15" Inflow from MH to the south not found.	Verify outflow. Clean structures. Stabilize east side from parking lot runoff.
536	Reid Glass - Parking Storage	N/A	N/A	N/A	N/A	N/A	0	N/A	irregular	N/A	N/A	N/A	N/A	Parking	parking lot storage, basin 1. Connection to basin 2, basin serves as a back up to basin 2 for overflow events.	N/A	N/A	N/A	N/A	0	Parking lot storage, outlet does have restriction, but need to be cleaned.	Clean out restrictor pipe in CB.
538	Country Village Plaza	463 at CB1	700	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	Dry Catchbasin	Small basin on Evergreen frontage in lawn area. Storage due north in entry drive.	No	Clay Loam	Turf	No	0		
543	Square Lake Country Club Sub.	N/A	7050	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Dry Extended Detention		Minimal	silty clay	trees, forbs	cottonwood, sedges	25	Inflow not found, densely vegetated	Verify Inflow.
544	Mitchell Ct. Condos	7980	3200	1020	N/A	N/A	N/A	N/A	triangular	N/A	3	120	130	Dry Extended Detention		minimal at SE inlet	silty clay, inundated	forbs, trees	cattails, willows	25	Cable piled by inlets, attached to power pole	
545	Hidden Pines Sub.	7650 EST	2400	3000 EST	N/A	N/A	0	N/A	triangular	3	3	170	90	Dry		Minimal	Poorly Drained, Some Ponding	Turf, Shrub, Tree	Buckthorn, Cattail, Willow	0	Basin flows through perf. MH to unrestricted pipe and backs up into basin - no restrictor unless located downstream.	Verify restrictor.
546	Bloomfield Crossing Sub.	56500	17550	33375	N/A	3	0	1	irregular	4	2	N/A	N/A	Dry	Outlet structure is a dam	N/A	Hydric	Forb, Tree	Purple L., Rush, cattail	0	Adjacent house discharging water from underground source on bank/ inlet 524 has separated end section.	Investigate source of leaking water.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft³	STORE PROVD (Plan) ft³	STORE PROVD (Field) ft³
RHC	547	Chope Union	30-302-012-0001	30	SW	N/A	N/A	Stenrose Assoc.	y	y	2737 Adams	N/A	N/A	Com./ Ind.	16.04	2 - 100 yr	N/A	0.7	8	8	370524	509890	587900
BLT	548	Knollwood Pointe	N/A	30	SW	N/A	N/A	N/A	n	N/A	Inkster and Maple	Owner	N/A	Res.	6.54	10	0.29	0.2	4	5.3	32000	36000	52900
BLT	549	Franklin Ravines Sub.	N/A	31	NE	N/A	N/A	N/A	no. Calcs incomplete	N/A	Pickering, off Franklin, N. of Fourteen Mi	Owner	N/A	Res.	39	10	0.667	0.3	3	2.5	N/A	68739	45700
BLT	550	Knollwood Office Plaza	RB-47	30	SW	N/A	N/A	N/A	No plan. Used latest calcs. (incomplete)	N/A	Inkster and Maple	Owner	N/A	Com.	2.07	100	5.71	N/A	7.3	9.2	N/A	35122	48300
BLT	551	Clarendon Crest	N/A	19	SE	N/A	N/A	N/A	n	N/A	Clarendon Crest Circle	Owner	N/A	Res.	N/A	N/A	N/A	N/A	1.5-2.5	1.9	N/A	N/A	7400
SOC	552	Blue Cross Blue Shield	18-14	18	SW	18-351-014	N/A	PT&P 5/25/88 rev.; calcs from Nowak and Fraus	no storm or details. Calcs may be for another site - do not seem to match basins.	N/A	27000 Eleven Mile Rd.	Owner	N/A	Com.	5.967 site	10	1.19	0.8	5	4.8	35848 site	36446 site	5500
SOC	553	Gordon Food Service	29-3	29	NE	29-276-054	N/A	omm egineering 4/20/98 rev.	no details or orifice calcs	N/A	24489 Telegraph Rd.	Owner	N/A	Com.	2.43 site	100	N/A	0.769	2.5	3.5	23161site	24857 site (12349 parking, 7105 SE basin, 4760 SW basin, and 643 pipe)	9450
BLT	600	Crofton Sub.	R.B-21	11	NE	N/A	N/A	N/A	n	N/A	Crofton Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	6.3	N/A	N/A	63400
BLT	602	Quarton Ridge	RB-38	27	NW	N/A	N/A	N/A	n	N/A	Quarton Ridge Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3.9	N/A	N/A	12800
BLT	604	Indianmound Sub.	RB-37	27	SE	N/A	N/A	N/A	n	N/A	Indianwood Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	4.8	N/A	N/A	136550
BLT	606	Gilbert Lake Estates	RB-42	28	NW	N/A	N/A	N/A	n	N/A	Quarton Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	0.1	N/A	N/A	400
BLT	608	Sandlewood Condos	RB-43	28	NW	N/A	N/A	N/A	n	N/A	Quarton Rd. and Telegraph Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	7.5	N/A	N/A	88400
BLT	630	Hammond Lake Estates	N/A	6	NW	N/A	N/A	N/A	n	N/A	Kemp St.			Res.						4			44200
BLT	631	Golling Chrysler	N/A	5	NW	N/A	N/A	N/A	n	N/A	Hood and Telegraph Rd.			Com.						3.2			18600
BLT	632	Oakhills Condos	N/A	12	SE	N/A	N/A	N/A	n	N/A	Auburn Ct., near Long Lake and Adams			Res.						2.6			7000
BLT	633	Willoway Place	N/A	16	SW	N/A	N/A	N/A	n	N/A	Willowway Place			Res.						3.3			25750
BLT	634	Adams Ct.	N/A	25	NE	N/A	N/A	N/A	n	N/A	End of Adams Ct.			Res.						3.7			8800
BLT	635	Covington School	N/A	27	NE	N/A	N/A	N/A	n	N/A	Covington and Quarton			Inst.						1			23050

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
547	Chope Union	65060	73500	32760	N/A	N/A	N/A	N/A	L-shaped	N/A	1	N/A	N/A	Retention	No overflow. Inspection and corresponance records.	Minimal	Sandy, Oxidized-north Side	Grass, Forb	Buckthorn	0	6' fence.	
548	Knollwood Pointe	19200	10000	0	N/A	N/A	N/A	N/A	N/A	N/A	2.5	N/A	N/A	Dry		Some At Outflow	Sandy	Turf, Tree	Lawn, Willows, Pines	0	Some erosion DS of inlet 1100, sediment blocking outflow.	Clean outflow pipe.
549	Franklin Ravines Sub.	22500 EST	18300	N/A	N/A	N/A	N/A	4	N/A	N/A	3	150	150	Wet		None	Hydric	Shrub, Tree, Turf	Buckthorn, Willow, Dogwood	0	Manhole structure near inlet is exposed, slumping into basin, has fountain.	Repair manhole.
550	Knollwood Office Plaza	6435	5250	2925	N/A	N/A	N/A	N/A	N/A	N/A	1.5	N/A	N/A	Dry		Deposits From Inlet 1106	Sandy	Shrub, Tree	Buckthorn, Willow	0	Severe erosion at inlet 1106.	Stabilize area around inlet 1106, parking lot my be at risk.
551	Clarendon Crest	N/A	3900	N/A	N/A	N/A	N/A	1	N/A	5	2.5	N/A	N/A	Dry		None	Hydric	Turf, Bare, Tree	Grass	50	No inlets or outlets seen, swale enters from road.	
552	Blue Cross Blue Shield	11040	1150	4100	N/A	N/A	N/A	N/A	triangular	N/A	2.5	est. 140MID	est. 80MID	Dry Catchbasin	Storm sewer drains to a restricted outlet and CB back up into basins for storage.	Some W. Side	N/A	Turf	No	0	Construction nearby - CB surrounded by straw bales with geotex. filter. 6" roof drain.	Verify restrictor after construction. Stabilize W side.
553	Gordon Food Service	N/A	2700	N/A	N/A	N/A	N/A	N/A	triangular	N/A	2.5	N/A	N/A	Dry	Two connected dry basins with parking/pipe storage. Appears to have a restrictor in the storm where it leave the site. No inflows to the basins. No overflow.	Minimal	Silty	Forb, Turf	Cattail	0		Outlet needs cleaning, verify restrictor.
600	Crofton Sub.	N/A	10050	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.5	N/A	N/A	Dry		None	Sandy	Turf	Lawn	0	Gully on west side. Inlet also serves as outlet, may be restrictor in storm sewer.	Verify restrictor. Remove material in front of inlet.
602	Quarton Ridge	N/A	3275	N/A	N/A	1	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry		Minimal	Silty	Turf	Lawn	0	Spoke with resident, no prior history of overflow.	Verify restrictor, inlet needs cleaning.
604	Indianmound Sub.	N/A	28450	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	Dry		No	Silty	Turf	Buckthorn	0	Concrete low flow channel.	Verify restrictor.
606	Gilbert Lake Estates	N/A	3550	N/A	N/A	1	N/A	N/A	N/A	N/A	6	N/A	N/A	Dry		No	N/A	Turf	No	50	Outflow not found - overgrown to west.	Clean structures, verify restrictor.
608	Sandlewood Condos	N/A	11800	N/A	N/A	1	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry		No	Silty Clay, Saturated Near Inflows	Turf	No	0		Verify restrictor.
630	Hammond Lake Estates		11050			1.1		N/A			2			Dry		At Structures	Saturated, Hydric	Forb, Shrub	Willow, Phragmites	0	Outlet blocked.	Inlet and outlet need cleaning.
631	Golling Chrysler		5775			N/A		N/A			2			Dry		Minimal	Inundated, Hydric	Forb	Cattail, Rushes	0	No outlet found, buried?	Verify outlet location.
632	Oakhills Condos		2700			0.5		N/A			3			Dry		0.45 At Inlet	Hydric	Forb	Cattail	0		Inlet will need maintenance, verify restrictor.
633	Willoway Place		7800			1.5		N/A			2			Dry		Minimal	Hydric	Forb	Cattail	0		Clean out inlet.
634	Adams Ct.		2380			N/A		N/A			2			Dry		Minimal	Silty	Turf		0	Paved low flow channel, spoke with resident, no prior history of overflowing.	Verify restrictor.
635	Covington School		23050			N/A		N/A			3			Dry		Minimal	loamy clay	Turf		0	no inlet structures, receives drainage from adjacent soccer fields, CB and Beehive in the center	

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft³	STORE PROVD (Plan) ft³	STORE PROVD (Field) ft³
BLT	636	Meadowlake Farms	N/A	31	SW	N/A	N/A	N/A	n	N/A	7501 Hiddenbrooke Ct.			Res						1.6			11900
BLT	637	Pinehurst Sub.	N/A	33	SE	N/A	N/A	N/A	n	N/A	Lahser/14 Mile			Res.						1.7			800
BLT	638	Shaker Heights	N/A	2	NE	N/A	N/A	N/A	n	N/A	Shaker Heights Drive			Res.						5.1			89950
TRC	660	Cresent Ridge Sub.	321	5	SW	N/A	N/A	MCS 12/13/79AB	no calcs	N/A	Square Lake and Crooks Rds.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	2.25 (8.8 to secondary overflow)	7	351180	408000 to secondary overflow elev.	585200
TRC	661	Estates of Cambridge	N/A	18	SE	N/A	N/A	Fenn & Assoc. 12/2/02	no outlet details	N/A	Ravenwood Ct./Beach and Wattles	Owner	N/A	Res.	5.47	1.5 yr, 25 yr, 100 yr	1.09	0.32	4.25 ft - 1.5 yr, 5 ft - 25 yr, 5.6 ft - 100 yr	5.9	9032 - 1.5 yr, 13734 - 25 yr, 18733 100 yr	9831 - 1.5 yr, 14342 - 25 yr, 18908 - 100 yr	50150
TRC	662	Amhurst on the River	N/A	18	SW	N/A	N/A	Nowak & Fraus 1/16/03	n	N/A	Amhurst Street	Owner	N/A	Res.	2.01	1.5 yr, 25 yr	0.3012	0.35	2.51 ft - 1.5 yr, 3 ft - 10 yr	3	3630 - 1.5 yr; 4342 - 10 yr; 6068 - 25 yr; 8168 - 100 yr	3633 - 1.5 yr; 6300 - 10 yr	9850
TRC	663	Sussex Place	N/A	7	NW	N/A	N/A	N/A	n	N/A	Rabben Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.5	N/A	N/A	14375
WBT	664	Lone Pine Estates	N/A	14	SE	N/A	N/A	N/A	n	N/A	Barcroft Street, near Orchard Lake and Lo	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	6.8	N/A	N/A	140350
WBT	666	Bloomfield on the Lake Park	N/A	23	NE	N/A	N/A	N/A	n	N/A	Bloomfield Shore Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	47600
WBT	668	Franklin Oaks 1	N/A	36	SE	N/A	N/A	N/A	n	N/A	7040 Tenhill	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	0.5	N/A	N/A	12500
WBT	670	Franklin Colony Club	N/A	36	SE	N/A	N/A	N/A	n	N/A	Colony Dr.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	2.2	N/A	N/A	73700
BLT	682	Westview Basin	N/A	12	SE	N/A	N/A	N/A	n	N/A	Thedford and Westview	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3.6	N/A	N/A	114700
BLT	684	Bloomfield Place Apt.	N/A	5	SW	N/A	N/A	N/A	n	N/A	1655 Bloomfield Place Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BLT	686	MDOT Regional	N/A	2	NE	N/A	N/A	N/A	n	N/A	I-75 and Square Lake Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	22	N/A	N/A	N/A
WBT	691	Compuware	N/A	34	SW	N/A	N/A	N/A	n	N/A	33200 Maple Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	3.5	N/A	N/A	100100
WBT	692	Hidden Creek	N/A	33	SE	N/A	N/A	N/A	n	N/A	W. of Farmington Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3.4	N/A	N/A	9200
WBT	693	Brookfield Academy	N/A	25	NW	N/A	N/A	N/A	n	N/A	SE of Middlebelt and Walnut Lake	Owner	N/A	Inst.	N/A	N/A	N/A	N/A	N/A	3.75	N/A	N/A	11250
WBT	694	Middlebelt Estates - E basin	N/A	13	SW	N/A	N/A	N/A	n	N/A	W. of Middlebelt, N. of Stoddard	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	1.4	N/A	N/A	297200

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
636	Meadowlake Farms		7400			0.5		N/A			2			Dry		Minimal	silt	Turf		0	2 inlets coming into structure, with outlet	Verify restrictor
637	Pinehurst Sub.		475			N/A		N/A			2			Dry		Minimal	silt loam	Turf		0	surcharges through beehive	
638	Shaker Heights		17600			2		N/A			3			Dry		at structures, approximated	silty	Trees, shrubs, forbs	cattail, Purple L.,buckthorn	0	headwall at inlet in good shape	Grate inlet needs to be completely bolted (bolted only at top) found outlets structure in manhole nearby, did not find in basin
660	Cresent Ridge Sub.	calc. MID46364 (V/D)	83600	N/A	1	0.5	N/A	N/A	rectangular	6	3	N/A	N/A	Dry		Minimal	N/A	Turf		0	Algae at inlet, did not find outlet, could be buried under pea gravel where water seeps into ground.	Find outlets structure and clean if necessary.
661	Estates of Cambridge	5197 - 1.5 yr, 6679 - 25 yr, 8050 - 100 yr	8500	365	N/A	N/A	N/A	1	rectangular	N/A	4	N/A	N/A	Dry Extended Detention		Coming From Construction	Hydric, Underwater	Turf		0	Sediment coming from nearby construction site.	
662	Amhurst on the River	MID1447 - 1.5 yr	3300	MID2100 - 10yr	1	N/A	N/A	N/A	irregular	6	3	N/A	N/A	Dry Extended Detention	Calculation for 3 in restrictor at 10 yr elevation, but detail shows it below 1.5 yr elev. In outlet from standpipe. Calculations for 25-yr and 100-yr storms but storage volume provided for 10-yr storm only.	Minimal	N/A	Turf		25	Recently sodded, site under construction, no 3" restrictor at riser.	Verify restrictor.
663	Sussex Place	N/A	5750	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	Dry		Minimal	N/A	Turf		0		
664	Lone Pine Estates		20650			N/A		N/A			3			Dry		Some At Outflow	Underwater, Hydric	Turf, Tree, Forb	Cattail, Willows	0	Outlet structure has settled, completely obstructed by debris, ES separated, no restriction, erosion around outlet, pond aerated	Verify restrictor, rebuild outlet.
666	Bloomfield on the Lake Park		47600			1		N/A			2			Wet		N/A	Underwater, Hydric	Turf, Tree	Algae	0	Stream downstream of weir is badly eroded.	Fix west side inlet, receiving stream will need stabilization treatment.
668	Franklin Oaks 1		25000			N/A		3			4			Wet		N/A	N/A	Turf, Shrub, Tree		0	Fountain. No inflows, outlet weir needs repair.	Repair outlet weir. Verify that there are no inflow pipes - if so, unbury.
670	Franklin Colony Club		33500			1		5			5			Wet		Some at structures	N/A	Turf	no	0	Fountain.	Verify restrictor. Clean structures.
682	Westview Basin		31850			N/A		N/A			18			Dry		N/A	Hydric, Some Clay	Turf		0	Evidence of previous standing water. Fenced - gate needs repair.	Verify restrictor. Repair fence gate.
684	Bloomfield Place Apt.		132900			N/A		3			var			Wet		Minimal	N/A	Forb, Shrub	Algae, Buckthorn, Pondweed	0	No restrictor visible.	Verify restrictor. Nutrient control.
686	MDOT Regional		N/A			N/A		1			4			Wet		Yes. No pool depth	N/A	Tree, Shrub, Forb	Algae, Cattail, Duckweed	75	Strong smell of decayed organics. Excessive algae.	Verify Outflow design. Nutrient control.
691	Compuware		28600			N/A		N/A			var			Dry		Est. 0.5	Poorly Drained	Turf	Cattail, Phragmites	0	Strong odor of decay organics and oil sheen at Inflow 1289 from Kroger grease bin. Litter.	Investigate illicit discharge.
692	Hidden Creek		2700			N/A		N/A			var			Dry Extended Detention		N/A	Some Sand - Type B	Hydroseed	No	0	Recently constructed - hydroseeded.	
693	Brookfield Academy		3000			N/A		N/A			var			Dry		Minimal	Poorly Drained, Ponding	Turf, Tree	Cattail	100	W. side unvegetated but seeded.	
694	Middlebelt Estates - E basin		212250			N/A		3			var			Wet		3	N/A	Turf, Tree, Forb	Cattail	0	Natural pond. Rectangular weir Outflow to drop box structure.	Clean structures.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
WBT	695	Middlebelt Estates - NW basin	N/A	13	SW	N/A	N/A	N/A	n	N/A	N. of Brentwood Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	0.5	N/A	N/A	94150
WBT	696	Middlebelt Estates - S basin	N/A	13	SW	N/A	N/A	N/A	n	N/A	S. of Stoddard, W. of Middlebelt	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	273000
WBT	697	Orchard Crest Sub.	N/A	27	NE	N/A	N/A	N/A	n	N/A	NW of Orchard Lake Rd. and Orchard Cre	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	5	N/A	N/A	112100
WBT	698	West Bloomfield Twp. Public Library	N/A	22	SW	N/A	N/A	N/A	n	N/A	Farmington/Walnut Lake Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	3.5	N/A	N/A	15250
SOC	699	Franklin Racquet Club - underground	N/A	7	SW	N/A	N/A	N/A	n	N/A	29350 Northwestern Hwy.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBT	701	Exclusive Fitness	N/A	35	SW	N/A	N/A	N/A	n	N/A	33010 Northwestern Hwy.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	3.2	N/A	N/A	5100
WBT	703	Pizza Hut	N/A	35	SW	N/A	N/A	N/A	n	N/A	33000 Northwestern Hwy.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	2.1	N/A	N/A	1300
RHC	705	Dana Automotive	N/A	30	SE	N/A	N/A	N/A	n	N/A	2910 Waterview Dr.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4.7	N/A	N/A	35700
WBT	901	Ridgewood Pt. - N basin	N/A	28	NW	N/A	N/A	Record Drawings 12/6/79 Giffels-Webster	plans incomplete. no calcs	N/A	Pinetree Dr. - N pond	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.6	N/A	N/A	26200
WBT	902	Brynmawr Condo	N/A	34	SE	N/A	N/A	N/A	n	N/A	Fourteen Mile and Orchard	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	4.9	N/A	N/A	72000
WBT	903	Maple Place - E basin	N/A	32	NE	N/A	N/A	N/A	Plan incomplete. No calcs.	N/A	Maple Lakes	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	N/A	3.8	N/A	N/A	120900
BFV	904	Arden Courts	N/A	8	NE	N/A	N/A	N/A	n	N/A	24005 13 Mile Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	5.8	N/A	N/A	22800
BFV	905	Bingham Office Park	N/A	8	NE	N/A	N/A	N/A	n	N/A	30100 13 Mile Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BFV	907	Danka - South	N/A	5	NE	N/A	N/A	N/A	n	N/A	32500 Telegraph Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	0.85	N/A	N/A	460
BFV	908	Danka - North	N/A	5	NE	N/A	N/A	N/A	n	N/A	32500 Telegraph	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1.5	N/A	N/A	2250
WBT	909	Tam-O-Shanter - basin B	N/A	23	SW	N/A	N/A	N/A	n	N/A	N. of Walnut Lake, SE basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	13700
BLT	910	Maple Village	N/A	28	SW	N/A	N/A	N/A	n	N/A	Maple and Telegraph Rds.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	29800
BLT	912	Maple Village	N/A	28	SW	N/A	N/A	N/A	n	N/A	Maple and Telegraph Rds.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	6.8	N/A	N/A	3450
SOC	914	Burger King	N/A	11	NE	N/A	N/A	N/A	n	N/A	Southfield and Thirteen Mile Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	3.6	N/A	N/A	12400

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3A: Detention Basin (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
695	Middlebelt Estates - NW basin		188300			N/A		0.5			var			Wetland		Yes	N/A	Turf, Tree	Cattail, Phragmites	0	Natural wetland.	Clean structures.
696	Middlebelt Estates - S basin		136500			N/A		3			var			Wet		No Pool Depth	N/A	Turf, Shrub	Phragmites	0	Opening at bottom of drop box structure acts as restrictor.	
697	Orchard Crest Sub.		22400			N/A		3			var			Wet		No Pool Depth	N/A	Turf, Tree	Algae, Cattail	0	Fountain. 4' fence.	Verify restrictor. Add vegetative buffer.
698	West Bloomfield Twp. Public Library		4350			0.9		2			var			Wet Extended Detention		Est. 0.5'	N/A	Sedge, forbs, turf	canary grass, cattail, algae	0	Algae.	Verify restrictor.
699	Franklin Racquet Club - underground		N/A			N/A		N/A			N/A			Parking		No	N/A	N/A	N/A	0	Underground storage to restricted pipe.	
701	Exclusive Fitness		1600			N/A		N/A			var			Dry		1	Poorly Drained	Turf		0		Clean structures.
703	Pizza Hut		620			1		N/A			var			Dry		0.5	Type B/C	Turf	No	0	No restrictor. No plans/calcs.	Verify restrictor.
705	Dana Automotive		7600			N/A		N/A			2.5			Dry		no	Silty clay	Turf, Forbs	Some Cattails	0	Seepage around 4" PVC pipe at S end.	Inspect 4" PVC for erosion or separation.
901	Ridgewood Pt. - N basin	N/A	10100	N/A	N/A	N/A	N/A	3	irregular	N/A	5	N/A	N/A	Wet	North and south basins connected.	Minimal	N/A	Turf		25	Copper sulfate algaecide applied, 8" board in outflow, permit for new stone shoreline and day lilies.	Buffer.
902	Brynmawr Condo		14700			1.2		2			2			Wet		N/A	N/A	Turf	Algae, Excessive Aquatics	0	Fountain.	Verify restrictor, buffer.
903	Maple Place - E basin	N/A	31800	N/A	N/A	N/A	N/A	8	irregular	5	2.3	N/A	N/A	Wet		N/A	N/A	Turf	Some Algae	0	Algaecide applied; fountain; connected unrestricted to basin 419. Goose droppings.	Veg. buffer. Goose and nutrient control.
904	Arden Courts		3930			1.2		N/A			3			Dry		Minimal	Type C, Clayey Loam	Turf	No	0	Fertilized parking lot.	Nutrient control.
905	Bingham Office Park		3400			N/A		3			3			Wet		Minimal	N/A	Landscape, Mulch	No	100	Water feature, waterfall, fountain, no in/outflow visible.	Verify detention.
907	Danka - South		540			1.25		N/A			2			Dry		0.5 Organic	Poorly Drained	Tree, Shrub	No	100	Wooded small basin.	Enlarge.
908	Danka - North		1500			N/A		2			4			Dry		Minimal	poorly drained	trees		0	Drains SW to storm	Verify restrictor
909	Tam-O-Shanter - basin B		13700			1		7			3			Wet		None Visible	N/A	Turf	No	0	Blue dye.	Buffer.
910	Maple Village	N/A	7450	N/A	N/A	N/A	N/A	2	irregular	N/A	3	N/A	N/A	Wet	suspected to be 477, misdrawn on map	N/A	N/A	Landscape Plants	No	0	Lava rock edging, fountain, treated for algae.	Verify restrictor.
912	Maple Village	N/A	500	N/A	N/A	N/A	N/A	N/A	irregular	N/A	5	N/A	N/A	Dry Extended Detention	suspected to be 478, misdrawn on map	N/A	N/A	Wetland	Cattail, Poplar	0		
914	Burger King		3400			N/A		N/A			2			Dry		N/A	Hydric	Cattail, Shrub		0	Fenced, overgrown, structures buried.	Verify outlet. Maintain vegetation, Clean structures. May need to dredge.

If all of the plan review information for the basin is blank, then there was no plan information available.

Table 7.3B: Detention Basin Inflow Data

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BHV	101	1	Storm.	N/A	N end	15	27	Concrete	Concrete	669.00	Underwater, 50% blocked sediment.
BHV	102	2		N from street		12		Concrete		706.00	
BHV	102	3	Storm.	E side	E side	12	18	Concrete	Concrete	706.00	OK.
SOC	103	236	Storm.	NW corner	NW corner	12	12	Concrete	Concrete	721.3	2" sediment.
SOC	103	237	Storm.	N side	N side	15	15	Concrete	Concrete	721	2" sediment.
SOC	103	238	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	721.37	2" sediment.
SOC	103	239	Storm.	SE corner	SE corner	12	12	Concrete	Concrete	720	2" sediment.
SOC	104	240	Storm.	SW corner	SW corner	12	12	Concrete	Concrete	722.87	5" sediment.
SOC	104	241	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	723.14	OK.
SOC	104	242	Storm.	E side	E side	12	12	Concrete	Concrete	723.92	OK.
SOC	105	243	Storm.	N side	N side to CB	8	8	N/A	N/A	717	OK.
SOC	106	244	Storm to sump.	NE corner	NE corner	18	18	Concrete	Concrete	722	Sump full.
SOC	106	245	Storm to sump.	W side	W side	18	N/A	Concrete	Concrete	722	Underwater, buried.
SOC	107	254	Storm to sump.	SW corner	SW corner	18	18	Concrete	Concrete	730.3AB	Sump full.
SOC	107	255	Storm to sump.	NE corner	NE corner	12	12	Concrete	Concrete	730.55AB	Sump full.
SOC	108	256	Storm.	SW corner	SW corner	12	12	Concrete	Concrete	738.85AB	Underwater.
SOC	108	257	Storm.	NW corner	NW corner	12	12	Concrete	Concrete	737.63AB	Underwater.
SOC	109	378	Poorly defined swale.	S side	S side	180	180	swale	Earthen	est.744	Overgrown.
SOC	110	258	Grass swale to broken concrete	NW corner	NW corner	N/A	N/A	open drain	Turf	est. 740.5	OK.
SOC	110	259		E side to headwall to conc. spillway		12		N/A		headwall INV 745.00AB	
SOC	111	260	Storm from gas pumps.	NW corner	NW corner	4	5	PVC	PVC	INV 737.5	Odor, oil sheen, buried.
SOC	111	261	Storm - Y end-section.	SW corner	SW corner	6	6	Concrete	PVC	INV 736.5	OK.
SOC	111	1075	Storm.		SW corner		6		PVC		OK.
SOC	112	262	Storm.	SW corner	SW corner	12	12	Concrete	RCP	INV 751.00	
SOC	112	263	Storm.	SE corner	SE corner	12	12	Concrete	RCP	INV 751.00	Buried.
SOC	114	264	Storm.	W side	W side	12	12	Concrete	Concrete	INV 772.95	2" sediment.
SOC	114	1077	N/A.		SE corner		8		PVC		Unvegetated around pipe.
SOC	115	265	Storm.	NW corner	NW corner	12	12	Concrete	Concrete	INV 778.30	6" sediment in front of pipe.
SOC	116	277		SW corner		18		N/A		INV 753.50	
SOC	116	278		W side		30		N/A		INV 752.8	
SOC	116	279	Storm.	NW corner	NW corner	24	24	N/A	Concrete	INV 754.10	6" sediment, milky water.
SOC	116	1259	Storm.		W half of N side		12		Concrete		4" sediment in front.
SOC	121	266	Storm.	SW side	S side	18	18	N/A	Concrete	INV 743.75	Underwater.
SOC	121	267	Storm.	NE side	NE corner	18	18	N/A	Concrete	INV 743.98	Underwater.
SOC	121	1079	N/A.		N side		6		PVC		Underwater.
SOC	122	269	Storm.	NE corner	NE corner	15	15	Concrete	Concrete	INV 736.50	Buried.

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– If all of the plan review information for an Inflow is blank, then there was no plan information available.
– If all of the field assessment information for an Inflow is blank, then it was not found in the field.

Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	122	270	N/A.	NW corner	NW corner	N/A	6	swale	Plastic	736.8	2" algae.
SOC	125	271	Storm.	NW corner	NW corner	12	12	Concrete	RCP	INV 737.89AB	Underwater covered with riprap.
SOC	125	272	Storm.	SW corner	SW corner	12	12	Concrete	RCP	INV 737.78AB	Underwater.
SOC	126	273	Storm.	NW corner	NW corner	15	15	Concrete	Concrete	INV 745est.	OK.
SOC	126	275	Storm.	SW corner	SW corner	21	21	Concrete	Concrete	INV 746est.	OK.
SOC	127	276	Storm.	E side	E side	24	24	Concrete	Concrete	INV 716.32	6" sediment.
SOC	128	1312	Storm.		SW		18		CMP		OK.
SOC	130	1313	Storm to sump.		N side		12		Concrete		Sump full of sediment.
SOC	132	407		NE corner		24		N/A		N/A	
SOC	132	408		NW corner		24		N/A		N/A	
SOC	132	1070	Storm.		N end		156		Stream		OK.
SOC	133	291		E side		18		Concrete		INV 708.3	
SOC	133	292	Storm.	NE corner	NE corner	12	12	N/A	Concrete	INV 708.62	Underwater.
SOC	134	290	Storm.	NW corner	NE corner	18	18	N/A	N/A	INV 708.5	Underwater.
SOC	135	289	Storm.	NW corner	NW corner	18	18	Concrete	Concrete	N/A	OK.
SOC	136	509		NW corner		12		N/A		710.6	
SOC	139	380	Storm.	N side	N side	30	30	N/A to gabion mattress	CMP	est. 662	50% underwater.
SOC	140	381	Storm.	from N to CB	N to CB	12	12	Concrete	Concrete	711.08AB	OK.
SOC	141	384	Storm.	NE corner	NE	30	30	Concrete	Concrete	714	OK.
SOC	141	385	Storm.	NW corner	NW	24	24	Concrete	Concrete	713.75	0.6' sediment.
SOC	144	387	Storm.	NE corner	N side	12	12	Concrete	Concrete	621	Underwater - 50% blocked.
SOC	145	388	Storm.	N side	NW form CB	12	12	Concrete	Concrete	722.5	Underwater - blocked.
SOC	146	389	Storm.	NW to CB	from NW to CB	12	12	Concrete	Concrete	N/A	
SOC	146	390	Storm.	W side to CB	from W side to CB	12	12	Concrete	Concrete	N/A	
SOC	151	462		W from CB		27		Concrete		687.64	
SOC	153	411	Storm.	SW corner	SW corner	12	12	Concrete	RCP	665.43	Oil, 12" sediment.
SOC	153	412	Storm.	NW corner	NW corner	15	15	Concrete	RCP	664.3	Oil, underwater, blocked with sediment.
SOC	154	463	Storm.	NE side	NE side	18	18	Concrete	Concrete	86	OK.
SOC	154	464	Storm.	W corner	W corner	21	21	Concrete	Concrete	84	Cut brush dumped.
SOC	154	465	Storm.	S corner	S corner	21	21	Concrete	Concrete	82.96	Odors, toilet paper.
SOC	158	466	Storm.	W side	W side	36	36	N/A	Concrete	64	May be separated above.
SOC	158	467	Storm.	NE corner	NE corner	12	12	N/A	N/A	63	Buried.
SOC	159	468	Storm.	NW corner	NW corner	24	24	N/A	Concrete	76	OK.
SOC	159	469		SE corner		15		N/A		N/A	
SOC	160	513	Storm.	E half of N side	E half of N side	18	18	Concrete	Concrete	691	OK.
SOC	160	514	Storm.	S half of E side	S half of E side	27	27	Concrete	Concrete	690.3	OK.
SOC	160	515	Asphalt spillway.	SE corner	E side	60	60	asphalt spillway	Asphalt	N/A	Not grade properly. Parking lot flows go around.

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– If all of the field assessment information for an Inflow is blank, then it was not found in the field.

Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	160	516		W half of S side		15		Concrete		690.33	
SOC	161	1073	Storm.		NE end		48		Concrete		End-section separated.
SOC	163	517		NW end		42		Concrete		697.5	
SOC	163	518	Culvert from Pernick Drain.	N side from NW basin	N side	77 x 52	77 x 52	asphalt lined galvanized steel	N/A	697	OK.
SOC	163	519	Storm.	NE corner	NE corner	24	24	Concrete	Concrete	697	End-section separated.
SOC	164	542	Storm.	NE corner	NE	18	18	Concrete	Concrete	INV 694.50	OK.
SOC	164	543	Storm.	E side	E	54	54	Concrete	Concrete	692.8	OK.
SOC	164	544	Storm.	S half of E side	E	15	15	Concrete	Concrete	694.5	OK.
SOC	166	545	Storm.	N end from underground storage at Homestead	N end	18	18	Concrete	Concrete	700.75	50% underwater.
SOC	166	546	Storm.	SW corner from Homestead	SW corner	15	15	Concrete	RCP	702	OK.
SOC	166	547	Parking lot swale.	E side from Lexus	E side	24	24	Concrete swale	Concrete	701.2	50% blocked - sediment/veg.
SOC	166	548	Parking lot swale.	SE corner from Lexus	SE corner	24	24	Concrete swale	Concrete	702.8	75% blocked - sediment/veg.
SOC	166	1318	Storm.	SW corner of N basin	SW corner	18	18	Concrete	Concrete	701.8	OK.
SOC	169	549	Storm.	W side	W side	36	36	CMP	CMP	693	1" sediment.
SOC	171	550	Storm.	S end	south end	15	15	Concrete	RCP	685.67	Falling apart.
SOC	171	551	Storm.	NE end	NW end	15	15	Concrete	RCP	686	Flows into concrete channel.
SOC	173	416	18" concrete entering beehive.	North End	N end	N/A	18	N/A	Concrete	N/A	
SOC	173	417	Two 15" concrete Entering CB to outflow.	East end	E end	N/A	15	N/A	Concrete	N/A	
SOC	174	575	Storm.	NW	NW corner	36	24	Concrete	CMP	686.5	OK.
SOC	174	1251	Storm.		NW corner		18		CMP		OK.
SOC	175	460	Restricted storm from N to CB4.	N from CB4	from N to CB	12	12 to 6	Concrete	Concrete	703.1	OK.
SOC	178	1116	Storm.		NW corner		24		Concrete		Sediment and vegetation 30% blocking.
SOC	179	418	Storm.	N side	N side	12	12	N/A	Concrete	703.32	OK.
SOC	179	419	Unknown.	NE corner	NE corner	8	8	N/A	PVC	N/A	End-section damaged.
SOC	179	420	Unknown.	E side	E side	8	8	N/A	PVC	703.16	50% buried.
SOC	179	421	Unknown.	E side	E side	8	8	N/A	PVC	N/A	OK.
SOC	179	1060	From overflow 1050.		SW end		12		Concrete		OK.
SOC	180	552	Storm.	W end	W end	18	36	Two concrete culverts	Concrete	701.08	End-section separated, 1' sediment.
SOC	180	553	Storm.	SE corner	SE corner	12	12	CMP	CMP	700.3	Almost buried.
SOC	182	422	Storm.	NW corner	NW corner	N/A	18	N/A	Concrete	N/A	6" sediment.
SOC	183	423	Storm.	N side	NE end	N/A	12	N/A	Concrete	N/A	2" sediment.
SOC	183	424	Storm.	W side	W side	N/A	15	N/A	Concrete	N/A	OK.
SOC	184	425	Storm.	N side	N side	18	15	Concrete	Concrete	715.94	1" sediment.
SOC	185	427	Storm.	N side	N side	30	30	Concrete	Concrete	706.99	4" sediment.
SOC	185	428	Storm.	SW corner	SW corner	18	18	Concrete	Concrete	706.9	4" sediment.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	186	430	Storm.	NW corner	NW corner	12	12	Concrete	Concrete	721.84	1" sediment.
SOC	186	431	Storm.	S side	S end	12	12	Concrete	Concrete	721.08	Blocked by vegetation.
SOC	187	554		SW corner		12		N/A		est. 13	
SOC	187	555	Storm.	NW corner	NW corner	12	12	N/A	N/A	est. 13	1" sediment.
SOC	187	556	Storm.	NE corner	NE corner	21	21	N/A	N/A	est. 13	End-section separated, missing bar grate.
SOC	187	557	Storm.	E side	E side	12	12	N/A	N/A	est. 13	2" sediment.
SOC	187	558		SE corner		N/A		N/A		est. 13	
SOC	187	1108	Storm.		SW corner		42		Concrete		End section separated.
SOC	188	574	Storm.	from NNW to CB	from NNW to structure	18	18	Concrete	Concrete	725.96	OK.
SOC	190	434	Storm.	N side	N side	N/A	12	N/A	PVC	712	50% blocked with sediment.
SOC	191	559	Roof drain to CB.	W side to CB	W to middle CB	10	10	PVC	PVC	N/A	OK.
SOC	191	560	Roof drain to CB.	S side to CB	S to middle CB	10	10	PVC	PVC	N/A	OK.
SOC	192	576		W side		est. 12		N/A		N/A	
SOC	192	577	Storm to sump.	NW corner	NW corner	54	54	N/A	Concrete	N/A	1' sediment.
SOC	192	578	Storm to sump.	NE corner	NE corner	N/A	36	N/A	Concrete	N/A	1' sediment.
SOC	200	502	Storm.	NW corner	NW corner	24	24	Concrete	Concrete	701.2	OK.
SOC	200	503	Storm.	N side	N side	12	12	Concrete	Concrete	N/A	OK.
SOC	200	504	Storm.	NE corner	NE corner	18	18	Concrete	Concrete	N/A	Blocked.
SOC	201	505	Storm.	NE corner	NE corner	24	24	Concrete	Concrete	680.53	Underwater.
SOC	202	507	Storm.	N side	N side	24	24	Concrete	Concrete	685	Blocked by 4" sediment and vegetation.
SOC	202	508	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	685	Overgrown with vegetation.
SOC	205	563	Storm.	NW corner	NW corner	12	N/A	N/A	N/A	672.7	Buried.
SOC	205	564	Storm.	SW corner	SW corner	15	15	N/A	Concrete	672.7	50% blocked with sediment.
SOC	209	395	Storm.	N side	N side	12	12	Concrete	Concrete	670	OK.
SOC	209	396	Storm.	SW corner	SW corner	15	15	Concrete	Concrete	670	OK.
SOC	210	397	Storm.	NE corner	NE corner	10	12	Concrete	Concrete	646	OK.
SOC	210	398		N side		10		Concrete		642	
SOC	210	399		NW corner		8		N/A		642	
SOC	210	400	Storm.	W side	W side	21	21	Concrete	Concrete	641.8	Grate off.
SOC	210	1069	Storm.		NE corner		12		Concrete		OK.
SOC	211	401	Storm.	N side	N side	30	30	Concrete	Concrete	668	4" sediment, silt fence.
SOC	212	579	Storm.	NW corner from north	NW corner from N	24	24	Concrete	Concrete	671.18	2" sediment, 50% underwater.
SOC	212	580	Storm.	NW corner from west	NW corner from W	21	21	Concrete	Concrete	671.51	50% blocked with sediment.
SOC	213	402	Storm.	SW corner	S end	15	15	Concrete	Concrete	669.41	OK.
SOC	214	404	Roof drain.	NW corner	NE corner	8	6	N/A	PVC	655.5	OK.
SOC	215	403	Storm.	E side	E side	21	24	Concrete	Concrete	662	75% underwater.
SOC	216	573	Storm.	NE corner	NE corner	48	36	Concrete	Concrete	679	OK

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	217	1071	Storm.		NE corner		144 spillway		Concrete		OK.
SOC	218	1065	Storm.		N side to middle CB		18		Concrete		OK.
SOC	219	1066	Storm.		NE to middle CB		12		Concrete		OK.
SOC	221	449	Storm.	W side	W side	48	48	N/A	Concrete	684.99	OK.
SOC	221	450	Storm.	N corner	NE corner	36	36	N/A	Concrete	685	OK.
SOC	222	520	Storm.	NE corner	NE corner	42	42	Concrete	Concrete	683.39	OK.
SOC	224	521		N end		12		Concrete		681	
SOC	224	522		S end		18		Concrete		680.25	
SOC	225	506	Storm.	NE corner	NE corner	15	15	Concrete with bar grate	RCP	679.15	Covered in vegetation.
SOC	226	585		SE corner		15		Concrete		N/A	
SOC	226	586		E side		12		Concrete		INV 674.7	
SOC	226	1255	Storm.		N end		21		Concrete		2 ft above bottom to 4' deep pool.
SOC	228	453	Storm.		W side		12		Concrete		2" sediment.
SOC	228	454	Curb cut to riprap.		W side		N/A		Riprap		OK.
SOC	228	455	Curb cut to riprap.		SW corner		N/A		Riprap		OK.
SOC	228	1067	Rearyard ditch to 12" CMP.		E side		12		CMP		Pipe separated.
SOC	229	452	Curb cut to riprap.	SE corner	SE corner	75 sft	N/A	riprap spillway	Riprap	est. 668	1" sediment.
SOC	230	438	Storm.	SE corner	SE corner	36	36	Concrete	Concrete	666.07	4" sediment.
SOC	231	439	Storm.	N corner	N side	36	36	Concrete	Concrete	666.02	6" sediment.
SOC	231	440	From basin 230.	SE corner	SE corner	12	12	Concrete	Concrete	666.09	OK.
SOC	232	441	Storm.	E corner	NE corner	30	30	Concrete	Concrete	663.66	OK.
SOC	232	442	Storm.	N corner	N corner	36	36	Concrete	Concrete	666.05	Algae.
SOC	232	443	Storm.	W corner	NW corner	12	12	Concrete	Concrete	668	OK.
SOC	233	565	Storm to riprap sump.	SW corner	SW corner	36	36	Concrete	Concrete	664.71	End-section partially separated, bar grate off.
SOC	233	566	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	668.42	Algae.
SOC	235	444	Storm.	W corner	NW corner	18	18	Concrete	Concrete	670.63	50% underwater.
SOC	235	445		N side		60		stone		N/A	
SOC	236	446	Storm.	NW corner	NW corner	N/A	12	swale	Concrete	N/A	OK.
SOC	237	429		NW corner		15		N/A		N/A	
SOC	238	426	Storm.	W side	N side	12	32	N/A	Concrete	665.86	3" sediment.
SOC	239	1322	Storm.		S side		24		Concrete		
SOC	240	1063	Storm.	NE corner	NE corner	24	21	Concrete	Concrete	652	4" sediment.
SOC	242	456	Storm.	N side to CB	N to middle CB	18	18	Concrete	Concrete	672.48	OK.
SOC	242	457	Storm.	NE corner to CB	NE to middle CB	15	15	Concrete	Concrete	672.48	OK.
SOC	246	484	Storm.	N corner	N corner	30	30	Concrete	Concrete	663.08	OK.
SOC	246	485	Storm.	W corner	W corner	18	18	Concrete	Concrete	663.08	1" sediment.
SOC	247	536	Storm.	NW corner	NW corner	12	12	PVC	PVC	667.02	Buried, underwater.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	247	537		NE corner		12		PVC		667.03	
SOC	247	538	Storm.	SE corner	SE corner	12	12	PVC	PVC	668.16	OK.
SOC	250	1110	Storm.		N side		12		CMP		OK.
SOC	250	1112	Storm.		NE corner		4		PVC		OK.
SOC	250	1114	Storm.		E side		6		PVC		Eroded downstream of discharge.
SOC	257	535	Storm.	N side in swale	N side, in swale	12	12	Concrete	Concrete	660.12	OK.
SOC	260	569	Storm.	SW corner	SW corner	24	24	Concrete	RCP	657.94	OK.
SOC	260	570	Storm.	SE corner	SE corner	N/A	12	ditch	CMP	658.3	25% blocked with sediment/veg.
SOC	261	568		E side		18		Concrete		662.8	
SOC	262	498	Storm.	E side	E side	N/A	24	N/A	Concrete	644.25	Blocked with vegetation.
SOC	266	494	Storm.	E side	E side	18	18	N/A	Concrete	672.62	OK.
SOC	266	495	Storm.	NE corner	NE corner	12	12	N/A	Concrete	668.92	2" sediment.
SOC	269	493		E corner		24		Concrete		636.13	
SOC	273	496		S side		12		N/A		666	
SOC	274	499		NW corner		6		perforated PVC		664.76	
SOC	274	500	Storm.	NE corner	NE corner	18	18	Concrete	Concrete	663	Part of end-section missing.
SOC	274	501	Pipe from basin 275.	E side	E side	12	12	Concrete	Concrete	665.51	1" sediment.
SOC	278	532	Storm.	W side	W side	10	12	PVC	Concrete	661.04	90% buried, unable to verify size.
SOC	278	533		S side		15		Concrete		660.3	
SOC	279	447	Storm.	N end	N end	12	12	N/A	N/A	665.95	OK.
SOC	281	448	Storm.	NE corner	NE corner	15	15	Concrete	Concrete	629.42	6" underwater.
SOC	285	567	Storm.	NW corner	NW corner	15	15	Concrete	Concrete	640.06	OK.
SOC	285	1252	Storm.		SW corner		24		Concrete		OK.
SOC	286	470	Storm.	SW corner	SW corner	N/A	10	N/A	Concrete	665.5	OK.
SOC	287	471	Storm with bar grate.	NE corner	NE corner	18	18	N/A	Concrete	659.5	3" sediment.
SOC	287	472	Storm with bar grate.	W side	E side	18	18	N/A	Concrete	659.5	2" sediment.
SOC	288	477	Storm.	N side	N side	36	48	Concrete	Concrete	630	OK.
SOC	288	478		SE corner		18		Concrete		638.5	
SOC	288	479	N/A.	S side	S side	8	8	PVC	PVC	638.5	N/A.
SOC	288	480	Storm.	S side	S side	21	21	Concrete	Plastic	636.5	Sewage odor.
SOC	288	481	Storm.	S side	S side	36	36	Concrete	Plastic	635.06	OK.
SOC	288	482		S side		12		Concrete		634.9	
SOC	288	483	Storm.	NE corner	NE corner	N/A	12	N/A	Concrete	632	OK.
SOC	293	473	Storm.	NE corner	NE corner	8	8	PVC	PVC	655	OK.
SOC	294	474	Storm.	SE corner	NW corner	N/A	12	N/A	CMP	653	75% blocked.
SOC	294	475	Storm.	E side	E side	8	8	PVC	PVC	653	1" sediment.
SOC	295	476	Storm.	S side	SE corner	N/A	12	N/A	Concrete	655	25% blocked with leaves and sediment.
SOC	296	534	Storm.	E side	E side	12	12	N/A	N/A	640.09	OK.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
RHC	303	73	Storm.	from NE to middle CB	middle CB from NE	12	12	Concrete	Concrete	est. 808.3	OK.
RHC	303	74	Storm.	from SE to middle CB	middle CB from SE	12	12	Concrete	Concrete	est. 808.3	OK.
RHC	305	71	Storm.	S side	S side	18	18	Concrete	Concrete	805.95	75% blocked sediment.
RHC	307	1056	Grass swale.		S end		36		Grass		OK.
RHC	309	39	Storm.	W side	SW corner	36	36	Concrete	Concrete	INV 795.40AB	Underwater.
RHC	311	1057	Storm.		NW corner		6		Plastic		Black residue.
RHC	312	1310	Storm.	NE corner	NE	42	36	Concrete	Concrete	N/A	Gabion stabilized, debris on grate.
RHC	312	1311	Storm.	NW corner	NW corner	18	15	Concrete	Concrete	N/A	No grate, OK.
RHC	313	94	Storm.	NE corner	NE corner	12	18	Concrete	Concrete	816.46AB	Broken bar grate made of rebar.
RHC	314	117	Storm.	Colonial MS - NE corner from existing MH	NE corner	36	36	Concrete	Concrete	INV 807.88 at MH	OK.
RHC	315	111	Storm.	Red Roof - NW corner; ES#1	SW corner	18	18	Concrete	Concrete	810	Bar grate off.
RHC	315	112		Red Roof - W side; ES#3		12		Concrete		810	
RHC	315	113		Red Roof - SW corner; ES#2		18		Concrete		809.6	
RHC	318	98		N side		24		Concrete		est. 809.5	
RHC	319	101	Storm.	E side	E side	15	15	N/A	Concrete	3.78	OK.
RHC	320	95	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	807.35AB	2" sediment.
RHC	320	96	Storm.	E side	E side	15	15	Concrete	Concrete	806.56AB	13" sediment.
RHC	320	97		SE corner		12		Concrete		807AB	
RHC	321	108	Storm.	N side	N side	16	18	Concrete	Concrete	N/A	OK.
RHC	322	107		NW corner		24		Concrete		842.18	
RHC	323	102	Storm.	SE corner	SE corner	12	12	Concrete	Concrete	50.1	OK.
RHC	323	1061	Storm.		S end		12		CMP		OK.
RHC	325	1059	Parking lot spillway.		SE corner		8		Concrete		OK.
RHC	326	109	Spillway.	E side	W side	N/A	36	N/A	Concrete	N/A	OK.
RHC	327	110	Storm.	N side	N side	12	12	Concrete	Concrete	850.77AB	OK.
RHC	328	105		SW corner		N/A		N/A		30.25	
RHC	328	106	Storm.	NW corner	NW corner	N/A	42	N/A	Concrete	31.6	OK.
RHC	329	124	Storm.	N side	N side	36	36	Concrete	Concrete	848041	18" sediment.
RHC	329	125	Storm.	NE corner	NE corner	18	18	Concrete	CMP	849.2	90% blocked sediment, cattail.
RHC	330	133		E side		N/A		swale		839.71AB	
RHC	331	123	Open drain to 72" CMP.	N end	N end	72	72	Concrete	CMP	812.81AB	Pipe separated N of berm. Sediment bar from open channel.
RHC	331	1314	Concrete pipe with bar grate.		NE corner		72		Concrete		Sediment and algae in front.
RHC	331	1315	Storm.		W side		48		Concrete		Algae, sediment, aquatic veg. in front.
RHC	331	1316	Storm.		S half of W side		12		Concrete		OK.
RHC	332	128	Storm.	NW corner	NW corner	N/A	36	swale	Concrete	N/A	6" sediment.
RHC	333	129	Swale.	SW corner	SW corner	24	24	swale	Grass	N/A	OK.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
RHC	334	126	Storm.	N end	N side	24	24	CMP	CMP	860.98	Bottom rusted, erosion, sediment.
RHC	334	127	Storm.	SW corner	SW corner	18	18	Concrete	Concrete	858.52	2" sediment.
RHC	335	121		SE corner		8		N/A		860.2	
RHC	336	118		SE corner		30		Concrete		N/A	
RHC	336	119		SW corner		8		N/A		847.98	
RHC	336	120		NW corner		15		N/A		N/A	
RHC	338	1081	Storm.		SE corner		8		PVC		OK.
RHC	338	1083	Storm.		W Side		N/A		N/A		End-section separated, underwater.
RHC	339	221	Storm.	W side	W side	27	27	N/A	Concrete	820	OK.
RHC	340	216	Storm.	SW corner	SW corner	15	15	N/A	Concrete	806.8	12" sediment.
RHC	340	217	Storm.	NW corner	NW corner	15	15	N/A	Concrete	806.3	OK.
RHC	341	231	Storm.	SW corner	SW corner	21	24	Concrete	Concrete	817.71AB	Discharges to gully filled with riprap.
RHC	342	218		NW corner		18		N/A		797.72	
RHC	342	219		NE corner		18		N/A		797.5	
RHC	342	220		SE corner		12		Concrete		798.5	
RHC	343	232	Storm.	NE corner	NE corner	18	15	Concrete	Concrete	800.48AB	Phragmites.
RHC	343	233	Storm.	N side	N side	12	12	Concrete	Concrete	801.71AB	OK.
RHC	344	1085	Open channel.		NW corner		216 TOP, 144 BOT, 36		Earthen		OK.
RHC	345	222	Storm to swale.	N end	N end	N/A	36	sewer to swale	Concrete	N/A	2" sediment.
RHC	345	223		N half of W side		36		CMP		N/A	
RHC	345	224	Storm.	N half of W side	N half of W side	36	36	CMP	Concrete	N/A	OK.
RHC	345	225	Swale - storm inflow not found.	S half of W side	S half of W side	N/A	36	sewer to swale	Veg.	N/A	Yard waste.
RHC	345	226		SW corner		N/A		swale		N/A	
RHC	347	228		SE corner		71 x 47		arch CMP		793.5	
RHC	347	229	Outflow from basin 346.	N side from basin 346	N side	18	18	CMP	CMP	795.47	OK.
RHC	347	230		S side		30		Clay		est. 796	
RHC	348	246		NW corner		12		Concrete		794.59	
RHC	348	247		S side		12		Concrete		794.78	
RHC	349	234	Storm.	N side	N side	12	15	Concrete	Concrete	804.7	50% sediment.
RHC	349	235	Storm.	SW corner	SW corner	21	21	Concrete	Concrete	804.4	OK.
RHC	352	122	Storm.	NE corner	NE corner	30	30	Concrete	Concrete	797.96AB	OK.
RHC	353	134	Storm.	NW corner	NW corner	N/A	30	N/A	Concrete	809.27	4" sediment.
RHC	354	1309	Storm.		E side		24		Concrete		Algae.
RHC	355	248	Storm.	SW corner	SW corner	30	30	Concrete	RCP	823	Cattails.
RHC	355	249	Storm.	SW corner	SW corner	15	15	Concrete	RCP	823	Cattails.
RHC	356	227	Storm.	NW Corner	NW corner	36	36	Concrete	RCP	823.8	OK.
RHC	357	215	Storm.	E side	E side	18	18	Concrete	Concrete	824.8	OK.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BFV	358	4	Storm.	N/A	SW corner	18	18	Concrete	Concrete	713.65	2" sediment.
BFV	358	5	Storm.	N/A	N side	12	12	Concrete	Concrete	716.01	OK.
BFV	359	6		N/A		N/A		N/A		761.8; RIM 765.8	
BFV	360	7	Storm.	N/A	N side	42	27	Concrete	Concrete	712.50	OK.
TRC	361	8	Storm.	N/A	E side	N/A	27	swale with 6" PVC underdrain	Concrete	N/A	OK.
TRC	362	9	Storm.	N/A	S end	21	24	Concrete	Concrete	836.00	12" sediment.
TRC	363	1044	Storm.		SE corner		36		Concrete		2" sediment.
TRC	364	10	Storm to swale.	to open swale in NW corner	NW corner	24	24	Concrete	Concrete	N/A	OK.
TRC	364	11	Storm.	E side	E side	27	30	Concrete	Concrete	826.02	OK.
TRC	364	12		to manhole SW corner		18		Concrete		818.2	
TRC	365	13	Storm.	E side	E side	12	12	N/A	Concrete	784	Algae.
TRC	365	14	Storm.	S side	S side	N/A	12	N/A	Concrete	784	1" sediment.
TRC	366	15	Storm.	SW corner	SW corner	30	30	Concrete	Concrete	791.3	OK.
TRC	367	16	Storm.	N	N side	12	15	N/A	Concrete	823.2	2" sediment.
TRC	367	17	Storm.	E	E side	18	18	N/A	Concrete	823	3" sediment.
TRC	367	18	Storm.	S	S side	12	12	N/A	Concrete	823.2	OK.
TRC	369	20	Storm.	SE corner	SE corner	21	21	Concrete	Concrete	800.4	OK.
TRC	370	21		E side		42		Concrete		794.7	
TRC	370	1051	Commercial storm.		from N. strip mall		8		PVC		OK.
TRC	371	22	Storm.	S side	SE corner	12	24	Concrete	Concrete	860.28	OK - minor erosion.
TRC	371	1049	Storm.		NE corner		6		PVC		OK.
TRC	372	23	Storm.	N side	N end	18	18	N/A	Concrete	N/A	OK.
TRC	372	24	Storm to 6" underdrain.	S side	S side	24	24	N/A	Concrete	N/A	OK.
TRC	372	25	Storm to 6" underdrain.	W side	W side	18	18	N/A	Concrete	N/A	OK.
TRC	372	26	Storm.	NW corner	NW corner	15	15	N/A	Concrete	N/A	2" sediment, bar grate separated.
TRC	373	27	Storm.	N side	N side	66	66	Concrete	Concrete	806.57 (approx. can't read)	Underwater.
TRC	374	28	From basin 369.	N side	N side	12	12	Concrete	Concrete	798.5	OK.
TRC	374	29		NE corner		30		N/A		N/A	
TRC	374	30	Storm.	S side	S side	12	15	Concrete	Concrete	798.5	OK.
TRC	374	1047	Storm.	SW corner	SW corner	24	24	Concrete	Concrete	796.81	OK.
TRC	375	31	Storm.	N end	N end	12	12	Concrete	Concrete	797.45	Buried - not found, seen from CB.
TRC	375	32	Storm.	SE corner from rear CBs	SE corner	N/A	24	N/A	Concrete	N/A	OK.
BLT	376	40	Storm.	NW corner	NW corner	21	21	Concrete	Concrete	850	6" sediment.
BLT	376	41	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	850	8" sediment.
BLT	377	42	Storm.	S side	S side	36	36	N/A	Concrete	N/A	Underwater.
BLT	379	43	Storm.	NE corner	NE side	48	48	Concrete	Concrete	859.05	OK.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BLT	380	1038	Storm.		NE corner		N/A		N/A		Underwater.
BLT	380	1039	Storm.		SE corner		N/A		N/A		Underwater.
BLT	382	44	Storm.	NE corner	NE corner	24	24	CMP	CMP	758	Underwater.
BLT	384	45	Storm.	W side	SW corner	36	36	Concrete	Concrete	798.3	Overgrown.
BLT	384	46	Storm.	NW corner	NW corner	18	18	Concrete	Plastic	797.6	OK.
BLT	385	47	Storm.	SW corner	SW corner	12	12	Concrete	Concrete	824.51	75% blocked.
BLT	385	48	Storm.	SE corner	SE corner	18	18	Concrete	Concrete	825.25	4" sediment.
BLT	387	50	Storm to CB.	N/A	middle - from N	N/A	18	N/A	Concrete	904.99	OK.
BLT	388	51	Storm to stone channel.	N/A	SW corner	N/A	12	N/A	Concrete	894.97	Pipe may be separated, 2" sediment.
BLT	389	52	Storm.	E side	E side	18	18	Concrete	Concrete	745.5	3" sediment.
BLT	390	53	Storm.	NE corner	NE corner	21	21	Concrete	Concrete	917	6" sediment.
BLT	391	54	Storm.	NE corner	NE corner	15	15	Concrete	Concrete	839.33	OK.
BLT	391	55	Storm.	NW	NW corner	24	24	Concrete	Concrete	839.3	2" sediment.
WBT	393	58	High water elev.	SW corner	SW corner	24	6	Concrete	Concrete	968	24" conc. not visible.
WBT	393	59		SE corner		24		Concrete		967.5	
WBT	393	60	High water elev.	NE corner	NE corner	18	N/A	Concrete	Concrete	968.6	Under water.
WBT	393	61		W side		15		Concrete		967.5	
WBT	394	62	Storm.	NW corner	NW corner	N/A	N/A	N/A	Concrete	N/A	Sediment.
WBT	394	63	Storm.	NE corner	NE corner	N/A	48	N/A	Concrete	N/A	Sediment.
WBT	395	65	Storm.	SW corner	SW corner	12	12	N/A	CMP	942.35	Good structurally, litter, sediment.
WBT	395	1004	N/A		NW corner		6		PVC		Good.
WBT	396	67	Storm.	N side	N side	N/A	27	Concrete	Concrete	896.86	OK.
WBT	397	68	Storm.	N side	N side	N/A	12	Concrete	Concrete	901.08	OK.
WBT	397	69	Storm.	S side	S side	N/A	15	Concrete	Concrete	900.54	2" sediment.
WBT	397	70	Storm.	NW corner	NW side	N/A	12	ductile iron? (roof drain)	Concrete	901.85	OK.
WBT	399	72	Storm.	East	E side	24	24	Concrete	Concrete	886.55	OK.
WBT	399	1025	Storm.		E part of S. side		6		PVC		Erosion, residue, drains car repair/wash.
WBT	400	77	Unrestricted pipe from basin 401.	N end	N side	12	12	Concrete	CMP	890.1	OK.
WBT	400	1022	Stone swale.		SW corner		N/A		Stone		Black residue from asphalt sealant.
WBT	400	1023	Storm.		SE corner		8		RCP		OK.
WBT	401	78		NW corner		12		Concrete		891	
WBT	402	79		NW corner		N/A		N/A		886.05	
WBT	402	80	Storm.	East	NE corner	N/A	18	N/A	Concrete	886.5	8" sediment.
WBT	402	81	Storm.	NE corner	NE corner	N/A	18	N/A	Concrete	886.77	OK.
WBT	402	82	Storm.	NW corner	N end	27	27	N/A	Concrete	885.7	1' sediment.
WBT	402	1029	Riprap spillway.		SW corner		96 wide		Riprap		OK.
WBT	402	1030	Storm.		SW corner		21		Concrete		4" sediment.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	403	83	Storm.	N end	N side	N/A	36	N/A	Concrete	881.81	OK.
WBT	403	84	Storm from wetland.	SW corner	SW corner	N/A	15	N/A	Concrete	883.59	OK.
WBT	404	1028	Storm.		SW corner		24		Concrete		50% underwater.
WBT	405	85		NW corner		30		N/A		N/A	
WBT	405	1012	Swale.		SW corner		60 wide		Grass		OK.
WBT	406	86		NW corner		15		N/A		967.68	
WBT	406	1011	Swale.		SW corner		60 wide		Grass		OK.
WBT	407	87	Storm.	NW corner	SW corner	12	12	Concrete	Concrete	932.03	OK.
WBT	407	88	Storm.	SW corner	SE corner	12	12	Concrete	Concrete	931.87	6" sediment, veg.
WBT	407	89	Storm.	NE corner	N side	12	12	Concrete	Concrete	931.65	OK.
WBT	408	90	Storm.	NE corner	N side	15	15	Concrete	Concrete	880.5	Half submerged.
WBT	408	91		SE corner		12		Concrete		881	
WBT	409	92	Storm.	W side	SW corner	24	24	Concrete	Concrete	922.04	OK.
WBT	409	93	Storm.	S side	W side	21	21	Concrete	Concrete	919.69	OK.
WBT	412	99	Storm to CB.	from NW corner	from NW to middle	15	N/A	N/A	Concrete	945.5	OK.
WBT	412	100	Storm to CB.	from NE corner	from SW to middle	12	12	N/A	Concrete	945.5	2" sediment.
WBT	413	104	Storm.	NW corner	NW corner	12	12	Concrete	Concrete	896.71	OK.
WBT	413	1027	Storm.		E side		12		Concrete		1" x 3" stone eroded.
WBT	414	114	Storm.	E side (e6)	E side	12	12	Concrete	Concrete	911.5	OK.
WBT	414	115	Storm.	E in sediment basin upstream (es14)	S of sediment trap	27	18	Concrete	Concrete	917.75	OK.
WBT	414	116	Storm.	N end of the sediment basin upstream (es3)	N side of sediment trap	18	18	Concrete	Concrete	919	OK.
WBT	415	130	Storm.	NW corner (es6)	NW corner	12	12	Concrete	Concrete	919.97	Blocked.
WBT	415	131	Storm.	W side (es7)	W side	21	21	Concrete	Concrete	918.02	4" sediment.
WBT	415	132	Storm.	N end of basin (es5)	N side	N/A	18	N/A	Concrete	920.1	6" sediment.
WBT	416	135	Storm.	SW corner (es3)	SW corner	18	18	Concrete	Concrete	924.9	OK.
WBT	416	136	Storm.	W side (es2)	W side	18	18	Concrete	Concrete	925.1	OK.
WBT	417	137	Storm.	SW corner	SW corner	24	24	N/A	Concrete	894.63	OK.
WBT	417	138	Storm.	NW corner	NW corner	15	15	N/A	Concrete	894.61	OK.
WBT	418	139		NW corner		15		N/A		N/A	
WBT	418	140		S side		12		N/A		902	
WBT	419	143	Storm.	S end, N pond	SW corner	15	N/A	N/A	N/A	N/A	Underwater.
WBT	419	144		W end, N pond		24		N/A		N/A	
WBT	420	145	Storm.	W end	W side	24	24	N/A	Concrete	895.68	2" sediment.
WBT	420	146	Storm.	E end	E side	12	12	N/A	N/A	895.42	5" sediment/cattails.
BLT	421	147	Storm.	NE corner	NE corner	15	18	Concrete	Concrete	914.12	50% underwater.
BLT	421	148	Storm.	NW corner	NW corner	15	15	Concrete	Concrete	910.9	OK.
BLT	421	149	Storm.	SW corner	SW corner	12	12	Concrete	Concrete	910.68	OK.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BLT	421	150	Crimped rubber end-section.	SE corner	SE corner	15	15	Concrete	N/A	909.96	Unknown.
WBT	422	151	Pipe to West beehive.	NW corner	NW corner	18	18	Concrete	Concrete	RIM 48.47	OK.
WBT	422	1013	Pipe to East beehive.	NE corner	NE corner	12	12	Concrete	Concrete	RIM 45.8	OK.
WBT	424	154	N/A	S side	NE corner	18	18	CMP	CMP	882.5	Rusty deposits - groundwater?
WBT	424	1018	N/A		SE corner		12		Concrete		Buried.
WBT	424	1019	N/A		SW corner		12		Concrete		Overgrown.
WBT	425	157		SW corner				swale		N/A	
WBT	426	155		NE corner		8		PVC		890.66	
WBT	426	156	Storm.	SE Corner	SE corner	12	12	Concrete	Concrete	890.77	Half buried.
WBT	427	158		S side		48		N/A		N/A	
WBT	427	1009	Swale from basin 462.		NW corner		96 wide		Stone		
WBT	428	1035	Storm.		NW side		27		Concrete		6" sediment, whitish discharge.
WBT	429	159		N side		18		N/A		977.5	
WBT	429	160	Pipe.	E side	E side	12	12	N/A	Concrete	978	OK.
WBT	430	162	Storm.	N side	N side	12	12	N/A	Concrete	904.66	OK.
WBT	430	163	Storm.	W side	NW corner	18	24	N/A	Concrete	905.12	OK.
WBT	430	164		SW corner		N/A		N/A		905.37	
WBT	431	165		SW corner		12		N/A		910.89	
WBT	431	166	Storm.	NW corner	NW corner	12	15	N/A	Concrete	911.23	5" sediment.
WBT	432	167	Storm.	S end	S side	N/A	21	N/A	Concrete	907.28	10" sediment.
WBT	432	168		N end		12		N/A		907.83	
WBT	433	169	Storm.	NW end	NW side	12	12	N/A	Concrete	904	Some algae.
WBT	433	170	Storm.	SW end	SW side	12	12	N/A	Concrete	904.1	OK.
WBT	433	171	Storm.	E end	E side	N/A	21	N/A	Concrete	902.32	OK.
WBT	437	172	Storm.	N side	N side	42	42	N/A	Concrete	925.45	6" sediment.
WBT	437	173	Storm.	W side	W side	24	24	Concrete	Concrete	INV 926.35	Underwater.
WBT	438	1031	Storm.	W side	W side	24	N/A	Concrete	N/A	INV 924.4	Underwater.
BLT	439	174		NE corner		240		swale		921.24	
BLT	439	175	Storm.	N side	N side	12	12	Concrete	Concrete	920.67	OK.
BLT	439	176	Storm.	W corner	W corner	15	15	Concrete	Concrete	921	OK.
WBT	440	1055	Not on plan.		NE corner		8		HDPE		OK.
WBT	441	177	Storm.	N side	N side	24	24	N/A	HDPE	894.89	OK.
WBT	442	178	Storm.	W side	W side	12	12	N/A	Concrete	878.15	OK.
WBT	442	179	Storm.	SW corner	SW corner	30	30	N/A	HDPE	878.16	OK.
WBT	443	283		SW corner		12		N/A		959.89	

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	443	284		NW corner		15		N/A		960.09	
WBT	443	288		Northern NW corner		15		N/A		959.45	
WBT	443	1269	Storm.		SW side		12		CMP		OK
WBT	443	1271	Storm.		W side		60		Concrete		some curb out, erosion
WBT	444	1263	Storm.		N side		15		Concrete		Underwater - vegetation blocking
WBT	444	1265	Storm.		N Side		6		Plastic		OK
WBT	444	1267	Storm.		SE Side		12		CMP		erosion above and at bottom
WBT	446	286	Storm.	SW corner	NW corner	12	15	N/A	Concrete	963.08	Half buried.
WBT	447	180		NW corner				swale		N/A	
WBT	447	181	Storm.	SW corner	SW corner	15	N/A	Concrete	N/A	945.5	Underwater.
WBT	448	182		NW corner		15		Concrete		947.45	
WBT	448	183	Pipe from small basin to the west.	E side	W side	15	36	Concrete	Concrete	947.82	Separated end-section due to slope erosion.
WBT	449	184	Storm.	N side	N side	12	12	Concrete	Concrete	902.76	8" sediment.
WBT	450	185	Storm.	W side	SW corner	15	15	Concrete	Concrete	883	25% blocked.
WBT	450	186	Storm.	E Side	E side	21	21	Concrete	Concrete	883.3	4" sediment.
WBT	451	187		NW corner		6		N/A		N/A	
WBT	451	1015	Short swale from parking lot.		E side		24		Gravel		Minor erosion.
WBT	451	1017	Inflow.		W half of S side		30		Concrete		12" sediment.
WBT	452	188	Pipe to headwall.	SW corner	SE corner	12	12	Concrete	Concrete	946.06	6" sediment.
WBT	452	189	Pipe to headwall.	SW Corner	SE corner	12	12	Concrete	Concrete	946.21	2" sediment.
WBT	452	1014	N/A		NE corner		12		Concrete		OK.
WBT	453	190	Storm.	NW corner (es1)	NW corner	15	12	Concrete	CMP	928.9	Bottom rusted.
WBT	453	191	Storm.	NE corner (es2)	NE corner	12	N/A	Concrete	N/A	928.7	Underwater.
WBT	453	192	Storm.	SW corner (es3)	SW corner	15	N/A	Concrete	N/A	929.45	Underwater.
WBT	454	193		E corner		12		Concrete		884.4	
WBT	454	194		NW corner		12		Concrete		884.5	
WBT	455	195	Storm.	N. Corner	N side	15	N/A	Concrete	N/A	917.4	Buried.
WBT	455	196	Storm.	E corner	E side	12	24	Concrete	Concrete	916.58	7" sediment.
WBT	457	197	Storm.	W side	W side	18	18	Concrete	CMP	887.5	OK.
WBT	458	198	Storm.	SW corner	SW corner	12	12	Concrete	Concrete	926.43	OK.
WBT	459	199		E side		15		Concrete		947.22	
WBT	459	200		NW corner		12		Concrete		947.5	
WBT	459	1010	Buried.		S side		12		CMP		Sediment covered.
WBT	460	201		NE corner		12		Concrete		948.27	
WBT	460	202	Smaller pipe than design from 1 CB.	NE side	NE side	15	4	Concrete	PVC	949.03	15" outfall not visible.
WBT	460	203		SE side		12		Concrete		949.07	
WBT	460	1005	Spillway.		N side		96 wide		Asphalt		Minor erosion.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	460	1006	Spillway.		NE side		96 wide		Concrete		New, minor erosion.
WBT	460	1020	Discharges to top of bank.		NW corner		6		PVC		Minor erosion.
WBT	461	204		N side		24		Concrete		943.58	
WBT	461	205		S side		12		Concrete		943.72	
WBT	461	206	Pipe appears to be outflow - unconfirmed.	SW corner	SW corner	15	12	Concrete	Concrete	894.4	Sediment.
WBT	461	207		SE corner		12		Concrete		944.5	
WBT	461	208	Pipe.	NW corner	NW corner	N/A	12	swale	Concrete	N/A	Sediment, plans show spillway.
WBT	461	1007	Pipe not on plan.		E side		15		Concrete		Sediment.
WBT	462	209		NW corner		30		Concrete		N/A	
WBT	463	210	Swale (18" pipe not seen).	NW corner	NW side	N/A	96 wide	swale	Turf	N/A	OK.
WBT	464	211		W side		24		swale		N/A	
WBT	464	1008	Pipe to CB.		Center		15		Concrete		OK.
WBT	465	212	Storm.	NW	NE corner	27	N/A	Concrete	N/A	977	Underwater.
WBT	465	213	Storm.	SW corner	NE corner	N/A	N/A	Concrete	N/A	977.5	Underwater.
WBT	465	214	Storm.	E side	SW corner	12	N/A	Concrete	N/A	977.5	Underwater.
RHC	466	250	Storm.	S side	S side	18	18	Concrete	Concrete	795.21AB	6" sediment, cattails.
RHC	466	251	Storm.	W side	W side	12	12	Concrete	Concrete	795.85AB	OK.
RHC	467	252	Storm.	SW corner	SW corner	15	15	Concrete	Concrete	796AB	50% blocked with riprap/sediment.
RHC	468	253	Storm MH to basin.	N side	N side	12	N/A	Concrete	Concrete	797.76AB	Underwater.
SOC	469	268	Pipe from basin 121.	NW end	NW	29 x 42	N/A	CMP	N/A	INV 742.10	Underwater.
BLT	471	307	Storm.	S end	E side	24	24	Concrete	Concrete	938.43	N/A.
BLT	471	308	Storm.	N end	W side	18	18	Concrete	Concrete	939.42	N/A.
BLT	471	1048	Swale from parking lot.		E side		48		Concrete		OK.
BLT	472	297	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	781.03	Buried.
BLT	473	1042	Storm.		SE		12		Concrete		1" leaves.
BLT	473	1043	Storm.		SW		12		Concrete		OK.
BLT	474	296	Storm.	E side	E side	N/A	18	N/A	Concrete	N/A	Underwater.
BLT	475	306	Storm to CB.	SW Corner	middle - S. end, from W.	21	21	Concrete	Concrete	N/A	OK.
BLT	476	303	Storm.	NW Corner	NW	30	30	Concrete	Concrete	947.04	Algae.
BLT	476	304	Storm.	W side	W	N/A	18	N/A	Concrete	N/A	OK.
BLT	476	305	Storm.	SW Corner	SW	N/A	30	N/A	Concrete	N/A	OK.
BLT	480	295	Storm.	NW Corner	NW	30	30	N/A	Concrete	N/A	50% blocked sediment and algae.
BLT	481	1305	Swale.		SW corner		N/A		Stone		OK.
BLT	482	293	Storm.	NW Corner	NW corner	15	15	Concrete	Concrete	897.29	12" sediment.
BLT	486	1046	Storm.		NE corner		24		Concrete		90% blocked.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BLT	487	309		N side		15		Concrete		903.09	
WBT	503	333	Storm.	SE corner	SE corner	12	12	Concrete	Concrete	N/A	Completely buried.
WBT	503	334	Storm.	NE corner	W side	24	24	Concrete	Concrete	957.85	End-section separated.
WBT	503	335	Storm.	N end	N end	18	24	Concrete	Concrete	N/A	50% underwater.
WBT	514	338	Pipe from CB.	S end	S corner	12	12	N/A	Concrete	969.4	Not found at basin.
WBT	521	367		S side		8		Concrete		N/A	
WBT	521	368		SW corner		N/A		Concrete		N/A	
WBT	521	369		W side		N/A		Concrete		N/A	
WBT	521	370		NW corner		8		Concrete		N/A	
WBT	523	371	Storm.	NE Corner	NE corner	12	12	Concrete	Concrete	908.14	End-section separated.
WBT	523	372	Storm.	W side	W side	12	12	N/A	Concrete	N/A	End-section eroded.
WBT	523	373	Storm.	S side	S side	12	12	Concrete	Concrete	901.54	1" sediment.
WBT	523	374		SE Corner		12		Concrete		901.96	
WBT	523	375		NW corner		12		Concrete		904.05	
WBT	523	376	Storm.	S side	S side	15	15	Concrete	Concrete	904.58	1" sediment.
WBT	523	377	Storm.	SW side	SW corner	18	18	Concrete	Concrete	907.27	6" sediment.
SOC	524	379	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	739	Buried, underwater.
SOC	525	382	Storm.	W side	W side	12	12	Concrete	Concrete	712.28AB	OK.
SOC	525	383	Storm.	N side	N side	21	21	Concrete	Concrete	711.28	Grass growing in end-section.
SOC	526	405	Roof drain.	E side	E side	8	8	N/A	N/A	660	Partly buried.
SOC	526	406	Storm.	S side	S side	12	12	N/A	Concrete	661.96	OK.
SOC	527	510		N half of W side		12		N/A		709.8	
SOC	529	511		N end		12		Concrete from basin 527		710.7	
SOC	529	512		SW corner		12		N/A		N/A	
SOC	530	409	Storm.	N side	N side	12	12	Concrete	Concrete	752.06	OK.
SOC	530	410	Storm.	NE corner	NE corner	15	15	Concrete	Concrete	751.04	OK.
SOC	531	413		center of north parking lot		12		Concrete		662	
SOC	531	1200	Pipe to CB.		from SSE to CB		12		Concrete		2" sediment
SOC	531	1201	Pipe to CB.		from SSE to CB		6		C.I.		OK
SOC	531	1202	Pipe to CB.		from SW to CB		4		Plastic		OK
SOC	531	1203	Pipe to CB.		from NW to CB		4		Plastic		OK
SOC	531	1204	Pipe to CB.		from NW to CB		6		C.I.		OK
SOC	532	414		western 4 hole restricted MH grate		21		Concrete		660	
SOC	532	415		eastern 4 hole restricted MH grate		21		Concrete		660	
SOC	534	572		E side		19 x 30		HE-4		INV 657.4	
SOC	535	571	Storm.	from NE to middle CB	E side	12	12	Concrete	Concrete	INV 652.9	OK.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	538	461	Storm.	N from CB2	N from CB2	12	12	Concrete	Concrete	700.2	OK.
BLT	543	527				12		Concrete		945.69	
BLT	544	525	Storm.	N Corner	N corner	N/A	12	N/A	Concrete	N/A	OK.
BLT	544	526	Storm.	SE Corner	SE corner	N/A	24	N/A	Concrete	N/A	2" sediment.
BLT	546	523	Storm.	NW corner	NW corner	N/A	12	N/A	CMP	843.85	OK.
BLT	546	524	Storm.	SW corner	SW corner	42	42	N/A	Concrete	843.43	Musty smell, end-section separated.
BLT	546	1068	Storm.		SW end		8		Concrete		OK.
RHC	547	528	Storm.	NW corner of NW side	NW corner of NW side	12	15	Concrete	Concrete	69.38	50 blocked with sediment and riprap.
RHC	547	529	Storm.	SW corner of NW side	SW corner of NW side	18	18	Concrete	Concrete	66.12	Sod dumped at structure.
RHC	547	530	Storm.	S half of W side	South of w side	12	12	Concrete	RCP	70.24	50% blocked with sediment, top of slope riprap.
RHC	547	531	Storm.	SW corner of SE side	SW corner of se side	18	10	Concrete	RCP	63.89	OK.
BLT	548	1100	Storm.		W end		18		Concrete		OK.
BLT	548	1102	Storm.		E end		12		Concrete		End section separated.
BLT	549	1104	Storm.		N end		30		CMP		OK.
BLT	550	1106	Storm.		south end		6		Clay		Severe erosion, massive gully, pipe sections fallen in.
BLT	550	1317	Storm.		W end		12		Concrete		OK.
SOC	552	561		NW to CB		12		Concrete		N/A	
SOC	552	562		SE to CB		10		PVC		N/A	
BLT	600	1118	Storm.		NW corner		18		Concrete		Needs some cleaning. Serves as overflow.
BLT	602	1120	Storm.		N end		12		Concrete		Standing water, partially blocked by veg.
BLT	604	1122	Storm.		NE corner		30		Concrete		OK.
BLT	606	1124	Storm.		NE corner		8		N/A		Partially buried, underwater.
BLT	608	1126	Storm.		NE corner		18		Concrete		50% blocked with sediment/veg.
BLT	608	1128	Possibly buried storm.		NW corner		N/A		N/A		Eroded swale.
BLT	630	1040	Storm.		W side		24		Concrete		50% blocked by sediment.
BLT	631	1041	Storm.		N side		36		Plastic		OK.
BLT	632	1302	Storm.		N end		36		Concrete		5" sediment, vegetation blocking.
BLT	633	1303	Storm.		W		N/A		N/A		Buried/underwater.
BLT	634	1045	Storm.		SE end		12		Concrete		Slumped sod blocking.
BLT	634	1304	Storm.		NE corner		10		Concrete		OK.
BLT	636	1306	Storm.		Center		N/A		N/A		Structure, two 12" black plastic inlets.
BLT	637	1307	Storm.		Center		N/A		N/A		Beehive.
BLT	638	1308	66" x 42" elliptical		north end		66 x 42		Concrete		ok, bolt grate at bottom
TRC	660	581	Storm.	SE corner	SE corner	66	66	Concrete with headwall and bar grate	C.I.	790.3	Has concrete headwall, OK.
TRC	661	582	Storm.	SE corner	SE side	15	15	N/A	Concrete	772	OK.
TRC	661	583	Storm.	SW corner	SW	12	12	N/A	Concrete	772	3" sediment.
TRC	662	584	Storm.	NE corner	E side	12	12	N/A	Concrete	771	OK.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
TRC	663	1254	Storm.		N end		18		Concrete		3-4" sediment.
TRC	663	1256	Storm.		SW corner		12		Concrete		OK.
WBT	664	1257	Swale.		N end		N/A		N/A		OK.
WBT	666	1258	Storm.		NE side		18		Plastic		25% blocked by sod. Connected to roadside ditch. Verify connection to nearby lake.
WBT	666	1320	Storm.		W side		12		Concrete		Separated, needs repair.
WBT	670	1260	Storm.		N end		30		CMP		75% blocked with sediment.
BLT	686	1324	Storm.		NW corner		12		Concrete		75% blocked with sediment.
WBT	691	1287	Storm.		SW corner		32		Concrete		Algae.
WBT	691	1289	Storm.		NW corner from Kroger		18		Concrete		ODOR, algae, 2" sediment, oil sheen.
WBT	691	1291	Storm.		W half of N side		24		Concrete		6" sediment.
WBT	692	1285	Storm.		NE corner		18		Concrete		25% blocked with sediment.
WBT	693	1283	Storm.		W side		15		RCP		OK.
WBT	694	1277	Storm.		W side		36		Concrete		Buried.
WBT	694	1279	Storm.		N end		24		CMP		25% blocked.
WBT	694	1281	Storm.		S side		15		Concrete		2" sediment.
WBT	695	1275	Storm.		N end		N/A		CMP		Buried.
WBT	696	1273	Storm.		W side		24		Concrete		OK, end-section separated.
WBT	697	1321	Storm.		W side		24		CMP		OK.
WBT	698	1261	Riprap		N. Side		36		Riprap		OK
WBT	698	1319	Storm.		N. Side		27		Concrete		OK
WBT	701	1293	Asphalt spillway.		NW corner		48		Asphalt		OK.
WBT	701	1295	Storm.		NE corner		12		Concrete		Buried.
RHC	705	1300	Storm.		W side		12		Concrete		OK
WBT	901	161	Pipe to stone channel.	W side	W side	18	15	N/A	Concrete	975.98	OK, pipe to stone swale.
WBT	902	1021	Storm.		E side		N/A		Concrete		Underwater.
WBT	903	141	Storm.	SW end	E side	15	N/A	N/A	N/A	N/A	Underwater.
WBT	903	142	Storm.	S end	S side	18	est. 21-24	N/A	Concrete	N/A	Underwater.
WBT	903	1301	Culvert from basin 419.	SE corner from basin 419	NW corner	24	96 x 72 arch culvert	CMP	CMP	954.3	OK.
BFV	904	1032	Storm to MH.		S side		18		Concrete		OK.
BFV	905	1033	6" concrete spillway.		NW corner		6		Concrete		OK.
BFV	907	1036	Storm.		SW corner		12		Concrete		2" leaves.
BFV	908	1037	Storm.		SW corner		12		Concrete		2" sediment.

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Table 7.3B: Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	909	1053	Storm from basin 440.		NW corner		12		HDPE		OK.
BLT	910	1050	Storm.		N corner		24		Concrete		Algae.
BLT	910	1052	Storm.		SW corner		12		Concrete		2" sediment.
BLT	912	1054	Storm.		S end		18		Concrete		2" sediment.
SOC	914	1064	Storm.		E side		12		Concrete		Separated end-section found only - pipe buried.

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Table 7.3C: Detention Basin Outflow Data

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BHV	102	1	6" restrictor on lateral at downstream side of CB	6" PVC restrictor in 15" conc. Pipe.	CB in center	E side	6	6	Concrete	PVC/Conc	705.90	OK.
SOC	103	128	3.1" restrictor in 18" pipe	18" conc. with 3" restrictor at CB.	S side	S side	3.1	3	Concrete	N/A	720	OK.
SOC	104	129	12" pipe to basin 103	Unrestricted pipe to basin 103.	S side	S side	12	12	Concrete	Concrete	722	Blocked with 4" riprap.
SOC	105	130	10" pipe to 12" with 6" restrictor?	12" to MH to 12".	E side	middle CB to E	6	12	N/A	Concrete	est. 716.80	4" sediment - no restrictor.
SOC	106	131	4' dia.., 2' deep sump to 5" pipe	48" dia. structure to 6" CI to MH.	SE corner	SE corner	5	6	PVC or CI	C.I.	721.3	Blocked, sump full.
SOC	107	136	5" PVC pipe to structure to 18" pipe to ex. ditch	Three 8" PVC pipes to overflow structure.	SE corner	SE corner	5	three 8"	Concrete	PVC	5" INV 730; 18" INV 727.86	Plan says 5" restrictor.
SOC	108	137	12" pipe to structure with 2' sump to suspended 6" PVC T-section pipe at outlet of structure with 4.39" orifice at bottom	12" to structure to 6" PVC T-section.	NE corner	NE corner	4.39	6	Concrete	PVC	6" to 12" outlet INV 736.9	2.5' of sediment in sump - above PVC outlet pipe.
SOC	109	186	12" CMP with 6" restrictor	Supposed to be 6" restrictor in 12" pipe - unverified.	SE corner	SE corner	6	N/A	CMP	N/A	744	Buried - underwater.
SOC	110	138	intake box to 42" to ditch	24" conc. to intake box to 42" to ditch.	SE corner	SE corner	42	24	N/A	Concrete	10-yr WS 745.7	22" of sediment.
SOC	111	139	1.5" restrictor in 6" pipe	Restrictor in 6" pipe.	SE corner	SE corner	1.5	1.5	Concrete	N/A	INV 733.8	Buried - 1.5" restrictor not verified.
SOC	112	140	15" with 4" restrictor	8" clay to CB.	E end	E side	4	8	Concrete	Clay	15" INV 746.70; 4" INV 747.70	Buried.
SOC	113	1257		6" black plastic pipe seen discharging to ditch.		NE corner		6		Plastic		Buried.
SOC	114	141	12" with 2" restrictor	Unrestricted pipe.	E side	E side	2	15	Concrete	Concrete	INV 772.70AB	1" sediment.
SOC	115	142	4" pipe with 2' x 2' silt trap at inlet to CB to swale to 12" culvert	Sump to pipe to CB.	S side	S side	4	N/A	Concrete	N/A	INV 778.0	Pipe buried and sump full of sediment.
SOC	116	149	12" pipe east to ditch		NE corner		12		Concrete		INV 751.30	
SOC	121	143	culvert to basin 469	Unrestricted pipe to basin 469.	SE end	SE corner	29 x 42	29 x 42	CMP	CMP	INV 744.50	Underwater.
SOC	122	145	4" to ditch to 15" CMP	6" PVC - supposed to be 4".	SE corner	SE corner	4	6	CI	PVC	INV 736.44	
SOC	125	146	12" with 4" restrictor at overflow structure	12" to stone swale to 4" restrictor at overflow.	S side	S side	4	4	Concrete	N/A	INV 736.92AB	OK.
SOC	126	147	36" CMP riser with 2' sump at 1-yr elev. with seven 1" holes at WS elev. to 6" CMP to overflow structure	36" perforated CMP riser to 6".	SW corner	SW corner	6	6	CMP	CMP	RIM 749.97; standpipe holes 749.00; 6" INV 747.31	OK.
SOC	127	148	6" pipe to overflow structure to 24" to ditch	8" to overflow structure.	E side	E side	6	8	Concrete	Clay	INV 716.50	50% blocked with sediment.
SOC	128	188	5' dia. structure with 3' deep. sump to pipe - no detail	60" dia. structure to 36" to MH to 40" to MH to 12".	W side	W side	36 to 21 to 12	12	N/A	Concrete	713.5	1' sediment in sump.
SOC	131	317	two pumps (file says inoperable)		to ditch		30" to pump to 8" check valves		N/A		704 pump on; 710 second pump on	
SOC	132	208	lake level control structure	7' weir structure, gabion.	S side	south side		84	N/A	gabion		OK.
SOC	133	152	8" pipe to MH to 12"	8" to overflow to 8".	S side	S side	8	8	N/A	N/A	INV 708.5	OK - CB supposed to drain to 12".
SOC	134	151	18" unrestricted pipe to basin 133		W side		18		Concrete		INV 708.5	
SOC	135	150	18" conc. pipe to MH with 6" restrictor in pipe leaving MH9	6" restrictor to MH 9.	NW corner	NW to W	6	6	Concrete	N/A	M.H. #9 TOP 714.60	Underwater.
SOC	136	273	12" to CB to 6" restrictor in West storm sewer	15" conc. to CB to 12" inverted elbow.	NE corner	NE corner	6	12	N/A	C.I.	709.8	CB sediment buried outflow.
SOC	139	189	12" storm to Rouge River floodplain	12" pipe.	S side	S side to RR	12	12	N/A	N/A	est. 660	50% blocked with sediment/veg.
SOC	140	190	10" pipe with 4" restrictor from CB to SE	10" conc. with 4" restrictor.	middle CB to SE	middle CB	4	4	Concrete	N/A	710.97AB	OK.
SOC	141	192	Outlet filter to 12" restrictor in 24"	12" conc.	SW corner	SW corner	12	12	Concrete	Concrete	TOP 714.75; INV 713.5	OK.
SOC	142	193	unrestricted 15"		NE corner		15		N/A		617.06AB	
SOC	144	195	restricted 12" storm from parking lot CB 1	12" conc. - cannot verify restrictor.	CB1 in NE drive flowing ENE	NE corner	4	N/A	PVC to Concrete	Concrete	N/A	Underwater - 50% blocked.
SOC	145	196	12" pipe with 2.36" restrictor to CB	Unrestricted pipe.	NE corner	NE corner	2.36	12	Concrete	N/A	722.11	50% blocked with vegetation. No 2.36" restrictor.
SOC	146	197	from CB to 15" conc. with 4" restrictor	Unrestricted pipe from middle CB.	middle CB to NE	middle	4	15	Concrete	Concrete	C/L of restrictor 718.72	OK. No 4" restrictor.
SOC	151	243	15" to MH to 27" with 6" restrictor	Unrestricted pipe.	27"E in MH S of basin	S end	6	15	Concrete	N/A	N/A	Some debris. No 6" restrictor.
SOC	153	210	12"	12" to CB.	E side	E side	12	12	Concrete	RCP	664	Phragmites, no restrictor.
SOC	154	245	10" CMP with 5.5" orifice	Unrestricted pipe.	E corner	E corner	5.5	10	CMP	CMP	79	Sewage odor. Pipe rusted out. No 5.5" restrictor.
SOC	158	246	12" CMP to CB	12" CMP to CB.	SE side	SE side	12	12	CMP	CMP	62.5	Some debris.

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Table 7.3C: Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	159	247	8" CMP to CB	12" CMP to CB.	E side	E side	8	12	CMP	CMP	74.5	OK.
SOC	160	277	8" to 48" MH with 12" sump to 6" spigot end flap valve	MH with 6" pipe flowing in with gate flap to a 24".	SW corner	SW corner - W of wall	6	6	N/A	N/A	690.34	Buried at basin.
SOC	161	278	N/A	8" clay.	N/A	SE end	8	8	N/A	Clay	688.83	End section broken.
SOC	162	279	N/A	48" conc.	S side	south side	48	48	Concrete	Concrete	690.88	1" sediment, end section separated.
SOC	163	280	trapezoidal weir	Trapezoidal weir with 9' base and 11.5' top.	SE end	SE end	9' base and 11.5' top	108	Concrete	Concrete	697	OK.
SOC	164	296	standpipe with gravel jacket and 2' sump to 18" pipe with 9" inverted elbow restrictor	Standpipe to9" inv. elbow.	W side to Pernick Creek	W side	9	N/A	N/A	N/A	694.5 Restrictor, 697.5RIM	OK.
SOC	166	297	CMP riser with 6" restrictor	Perforated CMP riser to 6" restrictor - inverted elbow.	E side of middle basin	E side - middle basin	6	6	CMP	PVC	701.5	OK.
SOC	168	298	CB to 3" orifice in 6" iron to pump	15" steel pipe in retaining wall.	SE corner	SE corner	3	15	CI	Steel	INV 694, 695RIM	50% blocked by debris.
SOC	169	299	6" CMP to overflow structure	6" CMP to overflow.	E side	E side	6	6	CMP	CMP	695	2" debris/leaves.
SOC	170	300	4" restrictor in downstream storm before MH1		N/A		4		N/A		N/A	
SOC	171	301	CB to 12" to pump to 6" line		NE end		6		N/A		N/A	
SOC	173	212	pipe with 4" restrictor	Beehive to unrestricted pipe.	SW corner	SW corner	4	est. 15	N/A	Concrete	N/A	OK - no 4" restrictor.
SOC	174	1251		48" x 48" conc. box culvert with grate to 4" CI pipe.		S side		4		C.I.		OK - underwater.
SOC	175	241	12" pipe 3" restrictor	12" conc. with 6" restrictor.	CB3 discharging E to CB2	Discharges E from CB	3	6	PVC to Concrete	Concrete	703	OK - 3" restrictor on plan.
SOC	179	213	12" unrestricted from sodded basin	Unrestricted pipe from basin.	SE corner	NE corner	12	12	N/A	Concrete	702.68	OK.
SOC	179	214	18" to 4" restricted outlet in parking lot CB on eastern end of parking lot	Unrestricted pipe - parking lot storage.	E end of south parking lot	N end	4	18	N/A	N/A	N/A	
SOC	179	1038		Pipe from first cell.		E end of first cell		12		Concrete		OK.
SOC	180	302	12" x 12" opening in overflow weir to 36"	12"x12" opening in overflow structure.	W end	E end	12 x 12	12	Concrete	Concrete	700.22	Partially blocked by debris.
SOC	181	216		Unrestricted pipe.	NE corner	NE corner	N/A	12	N/A	PVC	705.8	25% blocked by turf.
SOC	182	217	18" to 4" restrictor		NE corner		4		PVC		N/A	
SOC	183	218	18" to 4" restrictor	Unrestricted pipe.	S side	SE end	4	18	PVC	Concrete	N/A	50% blocked by rock.
SOC	184	219	4" restrictor?	24" wide beehive riser with 1" holes to 18" pipe.	SE corner	SE corner	4	Perf. riser to 18	N/A	N/A	715.35	OK.
SOC	185	221	8" orifice to 12"	Unrestricted pipe.	E side	E side	8	12	N/A	Concrete	706.22	OK - no 8" restrictor visible.
SOC	186	223	18" to 4" restrictor	Unrestricted pipe.	E side	E end	4	18	N/A	Concrete	721.01	Obstructed by fountain.
SOC	187	303	24" pipe with 8" restrictor	24" pipe.	N/A	SW corner	8	24	N/A	Concrete	N/A	No restrictor, some sediment.
SOC	188	319	3.6" restrictor in bottom of 6" PVC T-section to 18" pipe	Conc. riser structure to 18" conc. with broken conc. weir at bottom.	middle CB to SSE	middle structure to SSE	3.6	18	PVC	Concrete	INV 726	No 3.6" restrictor. Remove conc. weir and sandbags.
SOC	190	226	12" with 4" restrictor	Unrestricted pipe.	W side	W end	4	12	PVC	PVC	710.92	OK - no 4" restrictor visible.
SOC	191	304	10" PVC in middle CB with 6" restrictor	Middle CB to 10" PVC.	N side of CB	middle CB to N	6	10	Concrete	PVC	685.98	OK - no 6" restrictor.
SOC	192	320	no description. Outflow to storm sewer.		N/A		N/A		N/A		693.5	
SOC	192	1253		10" PVC from CMP riser		W side		10		PVC		OK.
SOC	200	268	5.5" dia. Plate restrictor on 12" bell end section	6" concrete pipe.	SE corner	SE corner	5.5	6	Clay	Concrete	N/A	Partially blocked.
SOC	201	269	36" standpipe with 36 - 1" holes to 12" with 6" restrictor at overflow	36" stand pipe.	SW corner	SW corner	6	N/A	Concrete	N/A	RIM 682; restictor INV 678.87	Could not inspect, flooded.
SOC	202	271	5.5" orifice in 48" square drop box structure	5.5" orifice cut at the bottom of 4' tall rectangular structure.	SE corner	SE corner	5.5	N/A	Concrete	Concrete	INV 684.25	OK.
SOC	205	306	3" CI pipe in downstream end of 6" outlet pipe	Unrestricted pipe.	W side to the NW	W side to NW	3	12	CI	Concrete	672.2	OK.
SOC	207	285	10" PVC to 12" to Pernick Drain	9" PVC to CB to 12" conc. to Pernick Drain	E side	E side	10	9	PVC	PVC	INV 671.25	30% blocked with leaves, sediment.
SOC	208	272	36" wide perforated. Riser to 3" restrictor at overflow	36" dia. Riser to 4" restrictor	E side	SE corner	3	4	N/A	N/A	RIM 671; riser holes 669	OK.
SOC	208	284	12" conc. with 3" restrictor	8" pipe	E side	E side	3	8	Concrete	Plastic	671.29	OK.
SOC	209	200	4" restricted 36" standpipe with 9-1" holes and 2' sump	36" dia. perforated riser to 4" inverted elbow to 15".	E side	E side	4	4	Concrete	PVC	669.96	OK.
SOC	210	201	21" restricted to 6"	Unrestricted 21" to MH to 24".	S side	S side	6	21	Concrete	Concrete	636	Debris on bar grate, 4" sediment.
SOC	211	202	12" to 6" restricted MH	12" to 6" restrictor at MH.	E side	E side	6	6	N/A	N/A	N/A	Wood, riprap in front.
SOC	213	203	standpipe with 3-1" holes and min. 4" restrictor	36" dia. perforated CMP riser to 12" conc.	W side	middle to West	N/A	12	Concrete	CMP	673.5	

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Table 7.3C: Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	214	206	4" outlet to swale to Rouge River	Unrestricted pipe.	S side	S side	4	6	N/A	N/A	651	No 4" restrictor.
SOC	215	204	36" CMP riser with 1' sump and 8-1" holes to 8" CMP with 4 3/8" restrictor	36" CMP riser, w/8 1" holes (buried) to 6" CMP (full of sediment).	W side	W side	4.4	N/A	CMP	CMP	664	No grate.
SOC	216	318	24" x 35" arch CMP to MH to 12"	24 x 35 arch pipe, to MH to 12"	S side	S side	12	12	CMP	Arch	79.6	Ok
SOC	217	267	18"	Unrestricted pipe.	W side	W side	18	18	N/A	Concrete	678	Bar grate rusted.
SOC	218	1029		18" unrestricted pipe.		from middle CB to SE		18		Concrete		OK - no restrictor.
SOC	219	1031		15" unrestricted pipe.		middle CB to SW		15		Concrete		OK - no restrictor.
SOC	220	281	restricted pipe	6" CMP from CB.	middle CB to NE	Center CB to NE	6	6	N/A	CMP	INV 675.79	OK.
SOC	221	237	21" pipe with 12.4" plate restrictor to MH	15" with weir structure to overflow.	E side	SE corner	12.4 to 21	15	N/A	Concrete	684.8	OK.
SOC	222	286	8"		E side		8		N/A		683.32	
SOC	224	287	12" RCP, no restriction indicated		SE corner		12		Concrete		680	
SOC	225	270	spillway to wetland - no details	"V" notch in sheet pile that flows to wetland.	SE corner	SE corner	N/A	N/A	N/A	Steel	681.8	
SOC	226	324	48" square drop structure to 66" conc.		SE corner		48		Concrete		673.31	
SOC	226	1259		48" drop structure with bar grate to 66" conc.		SE corner		66		Concrete		Some debris.
SOC	228	250	15" conc. to CB with 4" restrictor	15" to/from basin to CB.	W side	N half of W side	4	15	Concrete	Concrete	665.69	OK - No 4" restrictor in CB.
SOC	229	238	36" wide riser structure with three 1" holes	36" dia. Riser with 3-1" holes two ft below RIM.	NE corner	NE corner	three 1" holes	three 1" holes to 12	Concrete	CMP	667	Buried 1' sediment.
SOC	230	229	12" Flared End Section	12" to basin 231.	NW corner	NW corner	12	12	Concrete	Concrete	666	OK.
SOC	231	230	8" PVC with concrete headwall	42" dia. perforated riser with gravel jacket to 8" PVC.	S corner	S side	8	8	PVC	PVC	666.06	OK.
SOC	232	231	10" PVC, Schedule 40	10" pipe.	S corner	S corner	10	10	PVC	PVC	662.7	OK.
SOC	233	307	6" restrictor in 12" pipe	12" conc. pipe with 6" restrictor.	E side	S side of E basin	6	6	Concrete	PVC	663.66	OK - cattails.
SOC	234	227	24" conc., with 5 inch restrictor	Unrestricted pipe.	S end of basin	S end	5	24	Concrete	Concrete	N/A	End-section separated.
SOC	235	232	12" RCP, no restriction?		E side		12		Concrete		669.83	
SOC	236	1306	12" with 4" restriction	12" conc. with 4" restrictor.	NE corner	NE corner	4	4	N/A	Concrete	668.8	Covered with field stone.
SOC	237	222	N/A	36" dia. perforated riser to 24" CMP, holes 1.2' from top.	South end	S end	N/A	24	N/A	CMP	N/A	OK.
SOC	238	220	12" with 3" restriction		E side		3		N/A		665.86	
SOC	238	233		36" dia. riser with 24" CMP with 6" restrictor.		N side		6		CMP		OK.
SOC	239	220		12" with 3" restrictor.		N side		3		N/A		70% buried.
SOC	240	1027	34 - 1" holes in 24" wide riser to outlet pipe	24" dia. perforated CMP riser to 12" conc.	S side	S side	34 - 1" holes to 12"	12	N/A	CMP	650.93	OK.
SOC	242	239	CB structure with 2' sump to 4"	4" from CB to SW.	middle to SW	middle CB to SW	4	4	ABS	N/A	RIM 675; INV 672.48	OK.
SOC	246	256	12" standpipe	Beehive, out pipe is restricted.	S corner	S corner	12	8	N/A	Clay	663.08	Angled down toward sump.
SOC	247	295	12"	12" PVC, no restriction, connected to over 158.	SE corner	SE corner	12	12	PVC	PVC	667	Connected to over 158.
SOC	247	1104		12" black plastic.		NE corner		12		Plastic		Connected to over 1106. covered.
SOC	257	294	4" pvc	4" PVC.	S side	south side	4	4	PVC	PVC	655	OK.
SOC	258	315	restricted pipe (no details)		discharges north		8		PVC		658.41	
SOC	259	316	restricted pipe (no details)	12" conc. to overflow structure with 8" square opening in weir.	discharges north	E side	10	8	PVC	Wood	657.13	OK.
SOC	260	312	pipe to pump	18" conc. to pump.	NW corner	NW corner	N/A	18	N/A	Concrete	656.62	Vegetation blocking.
SOC	261	309	4" restrictor in 8" pipe		W side		4		CI		662.8	
SOC	262	264	N/A	6" PVC.	N side	N side	N/A	6	N/A	PVC	644	Vegetation in front.
SOC	266	261	riser structure with overflows at 1 year elevation and 100 year elevation		S end		12		Concrete		676	
SOC	266	1100		4" PVC.		south side		4		PVC		OK.
SOC	269	260	2' CB with restrictor plate	24" CB	W corner	W side	12	N/A	Concrete	N/A	634.45	Could not verify restrictor.
SOC	270	244	12" pipe with 4" restrictor	12" with 4" restrictor.	CB3 discharging SE to CB2	S side	4	4	Concrete	N/A	872	OK.

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Table 7.3C: Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	272	310	12" unrestricted pipe to basin 553 and may be restricted at last MH	12" conc., no restrictor.	N side	N side	12	12	Concrete	Concrete	669.64	No restrictor.
SOC	273	262	12" to CB with 2" restrictor	12" to restricted pipe in CB near Telegraph.	E side	E side	2	12 to a restrictor	N/A	Concrete	666.3	No end section. Could not verify restrictor size.
SOC	274	265	3" restrictor to 8" pace	8" PVC.	S side	S end	3	8	N/A	PVC	663	OK.
SOC	275	266	12"	Unrestricted pipe to basin 274.	W side	W side	12	12	Concrete	Concrete	666	25% blocked by turf.
SOC	278	293	4" pvc to 18"		N side		4		PVC		659.9	
SOC	279	234	12" conc. with 4" restriction	Unrestricted pipe.	S end of basin	S end	4	12	Concrete	Concrete	659	End-section separated.
SOC	281	236	10" conc., no restriction	10" conc. leaving beehive structure.	SW corner	SW corner	10	10	Concrete	N/A	628.6	Could not verify 10" pipe. indicated on plan, beehive buried.
SOC	285	308	6" pipe to CB	6" pipe to CB.	W side	W side	6	6	Concrete	Clay	639.95	Blocked by debris.
SOC	286	248	N/A	6" PVC with conc. headwall.	S end of basin	SW end	N/A	6	N/A	PVC	665.5	1" sediment.
SOC	287	249	12" with 4" restrictor	12" conc. with 4" restrictor at overflow.	N end	N side	4	4	N/A	Conc/PVC	659.35	8" sediment.
SOC	288	255	12" restricted pipe	36" dia. riser to 12".	W side	W side	12	12	N/A	PVC	629	Debris blocking.
SOC	293	251	12" concrete with 4" restrictor	12" conc.	S end	SE corner	4	12	Concrete	Concrete	653.74	OK.
SOC	294	252	8" PVC, no restrictor	12" conc.	W side	SE corner	8	12	PVC	Concrete	655.54	OK.
SOC	295	253	12" conc. with 4" restriction	12" concrete pipe.	NW corner	NW corner	4	12	Concrete	Concrete	650.5	OK.
SOC	297	254	18" RCP, no restriction	18" concrete to 15" East.	SW corner	SW corner	18	15	Concrete	Concrete	656.66	25% Blocked by sediment.
RHC	303	42	12" pipe with 4.5" restrictor	Unrestricted pipe.	flowing west from center CB	middle CB to S	4.5	12	Concrete	Concrete	est. 808.2	OK.
RHC	305	39	12" conc. with 4.25" restrictor	Unrestricted pipe.	E side	E side	4.25	15	Concrete	Concrete	805.21FOUND	Buried by cobble.
RHC	307	23	2' CB to 12" conc. pipe; plan calls for 3" PVC restrictor; file says no restrictor	24" CB to 12" with 4" restrictor.	center of basin	middle	3	4	Concrete	Concrete	RIM 809.93AB; 12" INV 807.53AB	Erosion.
RHC	308	21	4" restrictor (original shows 6.8") blocked previously	Unrestricted pipe.	N side	N side	4	12	Concrete	RCP	INV 813.10	OK.
RHC	309	20	pump station		E side		21 to 15 to 21		Concrete		INV 794.28AB	
RHC	311	55	22' - 3" PVC pipe through berm	3" plastic.	NE corner	NE corner	3	3	PVC	Plastic	813.3	75% blocked.
RHC	312	1046	46 x 60 concrete pipe to 8" orifice at MH to 36"	42" x 60" arch pipe, no restrictor.	W side	W side	8	42 x 60	Concrete	arch	805	Vegetation in front.
RHC	313	54	12" conc. with 3" restrictor flows west to manhole with 2' sump to a 15"	Unrestricted pipe to CB.	SW corner	SW corner	3	12	Concrete	Concrete	815.33AB	OK.
RHC	318	57	box culvert with 8" restrictor to twin 29" x 45" box culverts to junction chamber to 43" x 68" culvert		W side		8		Concrete		est. 805	
RHC	319	62	pipe restrictor in second MH	12" to 3" restrictor two MHs away to the South.	S side	SW corner	12	3	N/A	Concrete	restrictor in CB 8, INV 2.59	OK.
RHC	320	56	3" PVC restricted 12" pipe		S side		3		Concrete		805.4	
RHC	321	66	MH with 2.5' sump and four 3.3" dia. holes to 12" pipe	Offset cover on square outflow box to CB in ditch.	S side	S side	four 3.3" holes	N/A	Concrete	Concrete	RIM 849.6; INV 848.0	Underwater.
RHC	323	63	3.5" restricted 12" pipe	Unrestricted pipe flowing West - too overgrown to verify restrictor.	W side	W side	3.5	12	CMP	CMP	50.1	Underwater.
RHC	325	68	Leaching CB with 3" outlet pipe	Leaching CB to 3" pipe.	middle	middle - 3" NW	3	3	PVC	N/A	88	OK.
RHC	326	67	2" restrictor on 12" pipe	2" restrictor in 12" CMP.	N half of W side	E side	2	2	CMP	CMP	INV 93.78	OK.
RHC	327	69	3" restrictor in 12" pipe	12" conc. to MH to 3" restrictor flowing West.	S side	S flowing W.	3	3	Concrete	Concrete	849.64AB	OK - sediment in MH sump.
RHC	328	65	restricted pipe	No hole in riser to 18" unrestricted conc.	SE corner	SE corner	15	18	Concrete	Concrete	INV 30.2	Sediment to top of riser.
RHC	330	79	CB at bottom of basin with 12" pipe discharging south; 2" restrictor at downstream end	Unrestricted 12" CMP from P. lot CB.	from middle CB south	flows S	2	12	Concrete	CMP	INV 833.55 at restrictor at outfall	OK - no 2" restrictor.
RHC	331	74	pipe extension added; no restrictor	Unrestricted pipe.	S side	S side	24	24	CMP	CMP	809.53	Underwater.
RHC	332	76	12" pipe to basin 335		NE corner		12		CMP		EX861.07 trimmed back	
RHC	333	77	12" with 4" restrictor with anti-siphon diaphram	12" CMP - outlet unknown.	NE corner	NE corner	4	12	CMP	CMP	62.5	OK.
RHC	334	75	6" restrictor in 12" pipe to South Blvd. ditch	12" pipe with 6" restrictor 4' above basin bottom.	S side	SE corner	6	6	CMP	CMP	861	OK.
RHC	335	72	12" restrictor in 27" riser	Pipe to riser to MH to Borden Drain.	N half of E side	N half of E side	12	N/A	N/A	Concrete	N/A	Underwater - blocked?
RHC	336	71	42" with bar grate and 27" restrictor		NE corner		27		Concrete		842.15	

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Table 7.3C: Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
RHC	338	1035		Trap concrete weir, 2.8' wide, 1' low flow channel, .5' deep.		N end, S pond		N/A		N/A		OK.
RHC	338	1037		Trap concrete weir, 2.8' wide, 1' low flow channel, .5' deep.		N end, N pond		N/A		N/A		OK.
RHC	339	120	Pipe with a 5" orifice	36" CMP riser with 7 - 1" holes to 6" restrictor in 12" pipe.	S side	S side	5	6	CMP	CMP	819	Riser holes blocked.
RHC	340	118	18" with 6" restrictor	Temporary riser to 6" restrictor in 12" CMP to 24" conc. to CB.	NE corner	NE corner	6	6	CMP	N/A	806	OK - riser still in place.
RHC	341	125	36" riser with 1" orifice to 12" pipe with 3" restrictor	24" wide riser to 12" conc. with 3" restrictor.	SE corner	SE corner	3	3	N/A	Concrete	811.42AB	Sump full of 24" sediment.
RHC	342	119	18" with 7" restrictor		W side		7		Concrete		800.5	
RHC	343	126	12" RCP with 4" restrictor where it comes into overflow structure (blocked?)	12" conc. with 4" restrictor at overflow structure.	SW corner	SW corner	4	4	Concrete	Conc/PVC	800.48AB	5" sediment.
RHC	345	121	24" pipe with 12" restrictor	24" to CB - inlet underwater/buried, restrictor not seen.	E side	E side	12	24	CMP	CMP	795.61	Underwater - blocked?
RHC	346	124	pipe	Unrestricted 18" CMP to basin 347.	S side	S side	18	18	CMP	CMP	795.47	OK.
RHC	347	123	outlet structure to 5' wide base channel	36" x 72" box culvert under access road.	W side	W side	N/A	36 x 72	N/A	Concrete	797	OK.
RHC	348	132	6" restrictor in 12" pipe to 4' x 6' arch CMP	Overflows into CB to unrestricted 12".	SE corner	SE corner	6	12	Concrete	Concrete	796	Underwater.
RHC	349	127	4" PVC pipe	4" pipe.	W side	W side	4	4	PVC	PVC	803.5	OK.
RHC	350	80	middle CB north to MH1 12" pipe with 3" restrictor		middle		3		Concrete		INV 800.75AB; RIM 804.96AB	
RHC	351	81	middle CB north to MH 12" pipe with no restrictor shown	CB to unrestricted 12" conc.	middle	middle	12	12	Concrete	Concrete	RIM 802.2AB	Underwater.
RHC	352	73	8" restrictor in 12" pipe	12" with 8" restrictor.	W side	W side	8	8	Concrete	N/A	798.07AB	OK.
RHC	353	82	pipe with 6" restrictor	12" with 6" restrictor.	SW corner	SW corner	6	6	N/A	Concrete	809.39	OK.
RHC	354	83	12" pipe with 8" restrictor	12" with 8" restrictor.	S side	S side	8	8	Concrete	RCP	809	Veg. blocking.
RHC	355	133	15" outflow pipe with 6" restriction	6" restrictor in 15" pipe.	SW corner	SW corner	6	6	Concrete	RCP	823	OK.
RHC	356	122	12" RCP with a 9" restrictor	Pipe - restrictor not visible.	NW corner	NW corner	9	12	Concrete	RCP	818.4	OK.
RHC	357	117	12" conc. pipe with a 6" orifice	Unrestricted pipe.	NW corner	NW corner	6	12	Concrete	Concrete	825.15	OK.
BFV	358	2	3" PVC restrictor in 18" pipe	Pipe to beehive.	S side	S side	3	18	Concrete	Concrete	713.65	OK.
BFV	359	1017		CB to unrestricted 12" conc. to pump stn.		middle		12		Concrete		OK.
BFV	360	3	unrestricted pipe	Unrestricted pipe to CB.	N side, W of inflow	SE corner	15	15	Concrete	HDPE	713	OK.
TRC	361	4	N/A	Perforated 24" riser to 12".	SW corner	SW corner	10	Perf. to 12	N/A	N/A	N/A	OK.
TRC	362	5	N/A	Perforated 24" wide riser to 4".	N side	flows N	4	Perf. to 4	N/A	N/A	N/A	OK.
TRC	363	1024		Water flows under beehive rim - pipe may be blocked.		NE corner - basin bottom		24 beehive		Concrete		Pipe underwater, overgrown, may need repair.
TRC	364	6	1.04' high plate restrictor in 30" culvert flowing south in manhole 20; submersible pump during construction.	15" unrestricted pipe to MH to 30".	SW corner	SW corner	30" with 1.04' high plate restrictor	15	Concrete	Concrete	INV 818.2; RIM 826	OK.
TRC	365	7	3" restrictor bulkheaded at inlet of 12" pipe	3" restrictor in 12" pipe.	W side	W side	3	3 to 12	N/A	N/A	783.7	2" sediment.
TRC	366	8	restrictor in overflow structure	Square hole in weir wall in primary overflow structure.	NW corner	NW corner	21	12 x 12	Concrete	Concrete	795.21	OK.
TRC	367	9	no restrictor cales.	15" conc. with 4" restrictor at overflow structure.	W side	W side	30	4	Concrete	PVC	822.85	OK.
TRC	369	11	restricted pipe to wetlands	8" PVC to CB.	SW corner	SW corner	12	8	CMP	PVC	800.56	OK.
TRC	370	12	18" pipe to overflow structure	21" to 24" - plan says 18".	SW corner	SW corner	18	21	N/A	Concrete	Outflow 802.2 (pipe INV 801.75)	OK.
TRC	371	13	12" pipe with bar screen to 24" and then to 12"	MH to 24" to CB.	NE corner	NE corner	12	24	N/A	Concrete	approx. 859	Solid cover on overflow.
TRC	372	14	two 6" restrictors with flap valve draining east to Sprague Drain	Black plastic 8" restrictor to 12" CMP.	NE and SE corners	NE & SE corners	6, 6	8	PVC	CMP	800.17 (NE); 800.50 (SE)	OK.
TRC	372	1028		12" CMP.		NE corner		12		CMP		OK.
TRC	373	15	steel grate (no restrictor info)	Unrestricted 30" conc. with bar grate.	SE corner	SE corner	30	30	Concrete	Concrete	810.00 outflow (outflow pipe INV 809.6)	Algae.
TRC	374	16	rectangular weir in 48" riser structure	Rectangular weir to Over 13.	E side	E side	18	14 x 17	Concrete	Concrete	18" INV 797.00	OK.
TRC	375	17	8" underdrain to CB and overflow swale		SW corner		N/A		N/A		N/A	
BLT	376	22	8" PVC to 15" Amy Drain	8" PVC to 15" conc.	SE corner	SE corner	8	8	PVC	PVC	850.5	OK.

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Table 7.3C: Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BLT	379	24	18" conc. pipe with 15" restrictor	Plan shows 15" restrictor to 18".	NW of Basin	SW side	15	15	Concrete	Concrete	860	OK.
BLT	383	26	12" CMP	Unrestricted pipe.	S end of basin	S end	12	12	CMP	CMP	749.6	OK.
BLT	384	27	36" riser pipe		E side		36		CMP		797.75	
BLT	384	1022		Holes in riser to 12" to secondary riser.		S side		Perf. riser to 12		CMP		Blocked holes.
BLT	385	28	6" PVC	Pipe.	NW	NW corner	6	6	PVC	PVC	824	90% blocked.
BLT	387	1020		Unrestricted pipe to MH.		middle flowing SW		18		Concrete		OK.
BLT	388	29		PVC restrictor to structure.	N side	NW corner	N/A	8	N/A	PVC	896.43	Blocked.
BLT	389	30	18" conc. pipe with 4" restrictor	Unrestricted pipe.	SE corner	SE corner	4	18	Concrete	Concrete	744.75	OK.
BLT	390	31	12" conc. pipe, no restrictor	Pipe.	SE corner	SE corner	12	12	Concrete	Concrete	915.5	OK.
BLT	391	32	18" concrete	Unrestricted 15" pipe.	SE corner	SE corner	18	15	Concrete	Concrete	839	2" debris.
WBT	393	34	15" CMP	12" riser to 15" PVC to overflow structure.	S side	S side	15	12	CMP	HDPE	970	OK. 6" sediment at standpipe.
WBT	394	1008	15" - 8" restrictor	Unrestricted pipe to overflow structure.	SE corner	SE corner	8	15	Concrete	Concrete	N/A	OK.
WBT	395	1001	N/A	12" unrestricted.	SE corner	SE corner	12	12	N/A	CMP	INV 942.29	Good.
WBT	396	35	10" conc. with 4.23" steel restrictor	Pipe to MH.	W side	NW corner	4.23	36	Concrete	Concrete	896.96	50% blocked.
WBT	397	36	8" conc. with 3.39" steel restrictor	8" restrictor in 15" conc.	NW side	NW side	3.39	8	Concrete	Concrete	901.51	OK.
WBT	399	41	12" conc. pumped to grade and discarded to stream at 400 cfs max.	18" to pump stn to 12" PVC to ditch.	SW corner	W side	12	12	Concrete	Concrete	884.5	Separated pipe, unrestricted.
WBT	400	44	12" pipe with 6" restrictor	12" CMP with 8" restrictor.	S side	S side	6	8	CMP	CMP	889.3	OK.
WBT	401	45	12" pipe		S side		12		Concrete		890.5	
WBT	402	46	4" perforated drain under riprap	4" PVC to 2.5' x 2.5' overflow to OVER 31.	SE corner	SE corner	4	4	N/A	PVC	885.39	Partially blocked.
WBT	403	47	8" perforated drain under rip rap	Riprap covered pipe to overflow structure.	SW corner	SW corner	8	8	N/A	PVC	881.7	50% blocked.
WBT	404	50	4" perforated drain under riprap		NE corner		8		N/A		884.95	
WBT	405	48	12" outlet pipe with 6" orifice		S corner		6		N/A		963.87	
WBT	406	49	24" outlet pipe with no restriction to Basin 405		NW corner		24		N/A		967.68	
WBT	407	51	18" concrete pipe with 4" restrictor d/s of outlet ES	Unrestricted pipe.	SE corner	N side	4	18	Concrete	Concrete	930.51	Inlet partly covered by 8" board.
WBT	408	52	12" concrete with no restrictor. Possible that restrictor is located in d/s manhole structure	CB to pipe.	NW corner	middle	12	N/A	Concrete	N/A	880	Blocked.
WBT	409	53	24" conc. with 8" restrictor	Unrestricted pipe.	E side	NE corner	8	24	Concrete	Concrete	919.45	OK.
WBT	412	61	6" pipe	6" pipe.	NE corner	S side	6	6	N/A	N/A	945.5	OK.
WBT	413	64	3" temp. restrictor to be replaced appropriate vortex flow regulator	36" wide riser to 12" conc. to Outflow 1011.	E side	E side	3	12	Concrete	Concrete	896.22	OK.
WBT	413	1011	riser structure	30" riser to restricted 12" pipe to Overflow 44.	NE corner	NE corner	N/A	N/A	N/A	Concrete	RIM 903.52AB, INV 896.22AB	OK.
WBT	414	70	15" outlet with 6" restrictor	Unrestricted pipe.	SE side	SE corner	6	15	Concrete	Concrete	910.9	OK.
WBT	415	78	Outflow is a 36" CMP riser pipe at south end of basin. Recorded elevation is located at top of bar grate?	Three 8" slits in 4' high, 36" wide CMP riser to 15".	S end	S side	36	15	CMP	HDPW	917.49	Partly silted gravel jacket.
WBT	416	84	ES3, 12" pipe with 4" restrictor	Unrestricted pipe.	SE side	SE side	4	12	Concrete	Concrete	924.9	OK - no 4" restrictor.
WBT	417	85	24" pipe at East side, no restrictor on plans	15" pipe with 6" restrictor to overflow.	E. side	E side	12	6	N/A	N/A	894.76	OK.
WBT	418	86	12" pipe at SE. No indication of restrictor on plans		SE corner		12		N/A		901.68	
WBT	419	87	unrestricted culvert to basin 903	8' wide by 6' CMP arch culvert to basin 903.	SE corner	SE corner	24	96 x 72	CMP	CMP	954.3	1-2' sediment and riprap.
WBT	420	88	6" V.C.P.	6" pipe.	SE corner	SE corner	6	6	Clay	Clay	895.56	Bell broken off.
BLT	421	89	12" conc. pipe with 6 inch restrictor	Unrestricted pipe.	SE corner	SE corner	6	12	Concrete	Concrete	910	1" sediment.
WBT	422	90	12" conc. to CB structure with two inflows. CBs backup into basin.	12" pipe with 6" restrictor where it leaves W beehive.	W side	W side	12	6	Concrete	Concrete	N/A	OK.
WBT	424	92	two 18" CMPs to wetland?	Unrestricted pipe.	NW corner	S side	two 18	18	CMP	CMP	879.8	OK.
WBT	425	1007		Riser in center.		Center		est. 4		PVC		OK.
WBT	426	93	2.5"	12" conc. with 4" restrictor.	SW corner	SW corner	2.5	4	PVC	Concrete	890.78	OK.
WBT	429	1004		Pipe to north pond.		NE corner		15		Concrete		OK.

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Table 7.3C: Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	430	94		8" restrictor in 21" conc.	SE corner	NE corner	N/A	8	N/A	Concrete	904.08	OK.
WBT	431	1023		12" CMP to overflow structure, 4" restrictor at structure.		SW corner		4		PVC		OK.
WBT	432	1014		Two 3" PVC restrictors to 15" conc.	N end	N side	12	two 3"	N/A	Concrete	907.83	OK.
WBT	433	95		6" PVC and 3" PVC restrictors.	E side	E side	N/A	6 and 3	N/A	Concrete	901.05	OK.
WBT	437	96	12"	Unrestricted 12" CMP to overflow structure.	SE corner	SE corner	12	12	Concrete	CMP	927.04	OK.
WBT	438	97	6" CMP	6" CMP to overflow structure.	N end	N side	6	6	CMP	CMP	925.4	Buried.
BLT	439	98	8" pipe (no restrictor indicated on plans)	8" pipe.	S end	S side	8	8	Concrete	RCP	920.1	OK.
WBT	440	99	Outflow is a perforated 36" CMP riser pipe that leads to a 12" pipe	Nine 1" holes in 36" wide CMP riser.	south end	E side	12	9 x 1	N/A	CMP	900.18	Holes blocked.
WBT	441	100	Outflow is a perforated 36" CMP riser pipe that leads to a 12" pipe	12" riser in CMP riser, appears to have hole downstream of riser.	SW corner	E side	12	12	N/A	HDPE	894.43	Unrestricted.
WBT	442	101	Outflow is a 36" perforated 36" CMP riser pipe that leads to 15" pipe	1" hole in CMP riser to 12" HDPE.	E side	E side	15	12	Concrete	CMP	877.87	Holes blocked or too few.
BLT	446	1010	15" - no restrictor	Unrestricted pipe.	SE corner	SE corner	15	15	Concrete	Concrete	962	Eroded.
WBT	447	102	3" PVC?		SE side		3		PVC		945.18	
WBT	448	103	4" PVC		NE side		4		PVC		946.65	
WBT	449	104	4" PVC	4" PVC in 3.2' wide riser.	SE side	SE corner	4	4	PVC	PVC	902.85	OK.
WBT	450	105	6"	6" pipe to MH.	SW corner	SW corner	6	6	N/A	N/A	882.5	Buried.
WBT	451	1006		Unrestricted pipe to county drain.		SW corner		N/A		Concrete		6" sediment, debris, cattails.
WBT	452	106	12" conc.	Unrestricted pipe.	S corner	SE corner	12	12	Concrete	Concrete	945.55	OK.
WBT	453	107	24" conc., restrictor located at CB 2 on plans. 12" restrictor	27" to structure.	SE corner	SE corner	12	N/A	Concrete	N/A	927.5	Underwater; unrestricted?
WBT	454	108	Outlet pipe to Orchard Lake Road. 12" pipe slope toward basin, with 3" restrictor in downstream manhole	CB to pipe.	NW corner	middle	3	N/A	Concrete	N/A	884.4	Blocked.
WBT	455	109	42" dia. CMP outlet structure with to 12" CMP	42" dia. riser to 12" CMP.	S side	S side	12	12	CMP	CMP	915.52	OK.
WBT	456	1263		Pump in MH.		SW corner of site in ROW		N/A		N/A		Underwater - does not appear to work.
WBT	458	110	12" CMP in middle of basin, riser pipe	12" CMP with 3" restrictor.	S end of basin	SE corner	12	3	CMP	N/A	923.39	OK.
WBT	459	111	12" pipe with a 2" restriction	Pipe to overflow CB.	SW corner	SW corner	2	5	Concrete	C.I.	947	Buried.
WBT	460	112	12" pipe leads to a manhole with a 2' sump with a pump	Riser pipe.	SE corner	SE corner	12	8	Concrete	PVC	947	OK.
WBT	462	113	12" pipe to pump station	Pump station.	SE corner	SE corner	12	N/A	Concrete	N/A	950	Pipe under water.
WBT	463	114	pipe to another retention basin off site	Pipe to aquatic center basin.	SE corner	SE end	6	N/A	Concrete	Concrete	954	Buried.
WBT	464	115	22" CMP with pump		E side		22		CMP		946.6	
WBT	464	1002		Pipe from CB.		Center		15		Concrete		OK.
WBT	465	116	Pipe to Walnut Lake Road, can't determine if its outflow from illegible plans	PVC riser to ditch.	SE side	NW corner	N/A	6	N/A	PVC	977	OK.
RHC	466	134	riser to 4" restrictor to structure with 15" pipe north to Lueders Drain	Temporary riser to 4" to CB.	N side	N side	4	4	Concrete	N/A	RIM 797.38AB	OK.
RHC	467	135	riser to 4" restrictor to structure with 15" pipe north to Lueders Drain	Temporary perforated riser to 4".	N side	N side	4	4	Concrete	Concrete	RIM 798.08AB	OK.
SOC	469	144	15" end section to 24"	15" to perf. MH with weir with 1.6' x 0.67' slot.	SE end	SE end	15	19 x 8	N/A	Concrete	INV 741.00	OK.
BLT	471	1032		Unrestricted pipe.		S side		30		Concrete		End-section separated.
BLT	472	158	12" conc., with 3" restrictor	Unrestricted pipe to overflow structure.	SE corner	SE corner	3	12	Concrete	Concrete	780.96	Partially blocked by rock.
BLT	473	163	12" min. with 4" restrictor	4" restrictor in 12" conc. Pipe.	N end	E side	4	4	N/A	PVC/Conc	N/A	50% blocked.
BLT	474	157	pipe with 4" restrictor		W side		4		N/A		N/A	
BLT	474	1026		Pipe - restrictor not seen.		W side		15		Concrete		6" sediment.
BLT	475	162	21" conc. 5.5" restrictor	Beehive to 6" restrictor in 21" conc.	SW corner	Middle - S. end, flows S.	5.5	6	Concrete	PVC	936.94	OK.
BLT	476	161	6" with 4.5" restrictor plate	Pipe to CB.	NW corner	NE corner	4.5	6	N/A	PVC	945.84	OK.

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Table 7.3C: Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BLT	480	156	12" with 7" restrictor plate	Unrestricted CMP.	SE corner	SE corner	7	12	N/A	CMP	N/A	4" debris, no 7" restrictor.
BLT	481	1030		24" to MH with restrictor in pipe from MH to Case Drain.		SE corner		24 to 8		Concrete		OK.
BLT	482	153	18" conc. with 6" restrictor	No 6" restrictor.	SW corner	SW corner	6	18	Concrete	Concrete	896.3	OK.
BLT	482	154	18" conc. with 6" restrictor	No 6" restrictor.	S side	SE corner	6	18	Concrete	Concrete	896.3	Pipe separated.
BLT	486	164	18" with 6" restrictor	18" conc. with approx. 6" restrictor.	N/A	SW corner	6	6	N/A	Concrete	N/A	80% buried.
WBT	487	165	CB structure, same as inlet, entire structure overflows to basin. 6" restrictor in 12"	Unrestricted pipe.	N side	N side	6	24	Concrete	Concrete	900.87	50% blocked with sediment.
WBT	498	176	15" conc. pipe with 6 or 8" restrictor	Unrestricted pipe.	SE corner	SE corner	8	15	Concrete	Concrete	894.83	50% blocked, end section separated.
BLT	499	177	12" concrete pipe with 4" restrictor	Unrestricted pipe.	SE corner	E corner	4	12	Concrete	Concrete	866.94	OK.
WBT	500	178	12" conc. pipe with 8" VCP restrictor	Unrestricted pipe.	SW corner	SW corner	8	12	Concrete	Concrete	893.56	Need to remove veg.
WBT	501	179	12" conc., no restrictor (located downstream)	Unrestricted pipe.	E side	E side	12	12	Concrete	Concrete	893.82	OK.
WBT	502	180	24" conc., with 12" grouted restrictor @ manhole 6 (see plan)	24" pipe to beehive with 4" restrictor at beehive.	S end	S side	12	4	Concrete	Concrete	892.55	OK.
WBT	503	181	24" conc., restrictor located at downstream manhole	24" pipe with 8" restrictor.	S end	S end	24	8	Concrete	PVC/Conc	N/A	Restrictor not grouted in - flows bypassing.
WBT	521	185	12"		SE corner		12		Concrete		N/A	
SOC	524	187	3" restrictor		SW corner		3		N/A		738.2	
SOC	525	191	4" pipe to 48" overflow structure to 15" conc.	4" PVC to overflow structure.	NE corner	NE corner	4	4	N/A	PVC	711.07AB	OK.
SOC	526	207	12" to swale to Rouge River	Pipe to river is 10" at downstream end.	W side	W side	12	10	Concrete	PVC	657.5	Buried at basin - restrictor not verified.
SOC	527	274	12" pipe to basin 529		S side		12		Concrete		710.8	
SOC	528	275	12" pipe to CB - no restrictor in storm sewer?	12" to CB to 12" inverted elbow to 6-8" restrictor in last MH.	SW corner	SW corner	12	6 or 8	N/A	Concrete	709.36	Inverted elbow buried - sediment in CB.
SOC	529	276	12" pipe to CB - no restrictor in storm sewer?	12" conc. to 6-8" restrictor in last MH.	W side	W side	12	6 or 8	N/A	Concrete	N/A	OK - flowing due to broken sprinkler.
SOC	530	209	4" PVC	6" black plastic found in nearby wetland from direction of pond.	S side	S side	4	6	PVC	Plastic	751.1	OK.
SOC	531	1200		Plastic pipe restrictor from CB to river.		from CB to NE		est. 4		Plastic		OK
SOC	532	211	21" headwall		far eastern side of parking lot		21		N/A		N/A	
SOC	532	1201		from CBs with restricted covers East to river.		E side		21		Concrete		OK.
SOC	534	314	restricted pipe (no details)	12" to NNW to MH.	MH to NNW	N side	8	12	PVC	Concrete	INV 655.58	OK - no 8" restrictor.
SOC	535	313	6" restrictor in pipe		South CB		6		N/A		INV 652.2	
SOC	536	235	12" conc. with 4" restriction	12" with 4" restriction.	center of basin	Center of Parking lot	4	4	Concrete	N/A	660.45	Outlet pipe partially blocked.
SOC	538	242	12" pipe 3" restrictor	12" conc. with 3" restrictor.	CB1 discharging SE to ex. storm	middle CB to SE	3	3	PVC to Concrete	Concrete	700.1	OK.
BLT	543	291	12" conc. with 4" restriction	24" dia. CMP perforated riser to 12" flowing NW.	N/A	NW corner	4	12	Concrete	N/A	945.04	OK.
BLT	544	290	Standpipe?	Riser structure with 4" restrictor to 12" pipe.	SW corner	SW corner	N/A	4	N/A	PVC	N/A	OK.
BLT	545	289	30" concrete	36" conc. to perf. MH to 36" - with 36" Inflow from the west.	SW Corner	SW corner	30	36	Concrete	Concrete	847.3	No restrictor.
BLT	546	288	weir structure with 16" opening		NE corner		16		Dam		842	
BLT	546	1040		24" concrete, no restrictor.		south end		24		Concrete		OK.
RHC	547	292	12" pipe		SE side		12		Concrete		62.04	
BLT	548	1102		24" pipe.		E end		24		Concrete		Sediment blocking.
BLT	549	1106		Weir structure.		south end		N/A		N/A		Debris DS of structure, unable to measure due site access.
BLT	550	1108		12" conc, no restriction.		N end		12		Concrete		3" sediment.
SOC	552	305	12" conc. in middle CB with 4" restrictor		E side of CB		4		Concrete		690.3	
SOC	553	311	12" unrestricted pipe from basin. Storm may be restricted at last MH.	12" conc.	S half of W side	SW corner	12	12	Concrete	Concrete	669.5	Vegetation blocking.

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Table 7.3C: Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BLT	602	1110		12" conc. No restriction.		south end		12		Concrete		No restrictor.
BLT	604	1112		18" pipe with bar grate.		SE end		18		Concrete		Debris on bar grate.
BLT	608	1114		12" unrestricted pipe.		SE corner		12		Concrete		OK.
BLT	630	1309		Beehive with concrete headwall.		E end		N/A		N/A		Blocked by debris.
BLT	632	1041		18" conc., no restriction.		SW corner		18		Concrete		OK.
BLT	633	1042		Beehive to 12" conc.		N side		12		N/A		OK.
BLT	634	1043		12" conc.		NW corner		12		Concrete		No restriction observed.
BLT	635	1044		Unrestricted 12" concrete.		Center		12		Concrete		OK.
TRC	660	321	6" to overflow structure		SW corner		6		N/A		788.7	
TRC	661	322	Riser structure with four 1" holes at 1.5 yr elev., 3.57" orifice at 25 yr elev., and 3.47" orifice at 100 yr elev.	Riser, 4-1" holes@1.5 year, 3.57" restrictor@ 25 year, 3.47" restrictor @ 100 year.	NW corner	NW	four 1", 3.57", and 3.47"	3.6	N/A	Riser	775.25 - 1.5 yr; 776 - 25 yr; and 776.6 - 100 yr	OK.
TRC	662	323	Standpipe with six - 1" holes at 1.5 yr elev. to 3" restrictor in 12" pipe	36" CMP riser to 12" conc. w/ gravel jacket.	SW corner	W side	3	12	N/A	Riser	771 - 1.5 yr; 773.51RIM	No restrictor.
TRC	663	1252		8" PVC, obstructed by rocks.		SE corner		8		PVC		Rocks obstructing.
WBT	664	1254		24" conc.		E side		24		Concrete		ES separated, obstructed.
WBT	666	1256		Notch concrete weir, 40", 1' freeboard.		SE corner		N/A		Concrete		Eroded badly downstream.
WBT	668	1258		6" x 48" opening in wooden weir structure.		SE end		6 x 48		Wood		Rotting - needs repair.
WBT	670	1260		18" CMP.		SW corner		18		CMP		50% Blocked.
BLT	682	1302		Unrestricted pipe.		NW corner		15		Concrete		No restrictor.
BLT	684	1304		Unrestricted pipe.		N end		96		Concrete		OK. Algae.
BLT	686	1310		Unrestricted pipe.		NW corner		24		Concrete		6" sediment.
WBT	691	1275		15" conc. to 8" PVC at MH.		SE corner		8		PVC		Algae.
WBT	692	1273		36" dia. Perforated riser to 4" restrictor.		SE corner		4		CMP		OK.
WBT	693	1271		6" CMP to ditch.		N end		6		CMP		OK.
WBT	694	1269		16" x 8" opening in in rect. weir to drop box to 12" conc.		SE corner		16 x 8		Concrete		OK.
WBT	695	1267		1.5' x 0.5' opening in 48" rect. conc. weir to drop box to 30" conc.		SE corner		18 x 6		Concrete		OK.
WBT	696	1305		Opening at base of box drop structure with 1.3' x 0.7' opening at top weir.		E side		4 x 5		Concrete		OK.
WBT	697	1265		21" conc. to MH to 21".		SE corner		21		Concrete		75% blocked due to fence in front, no restrictor.
WBT	698	1261		36" CMP, perforated riser to 15" CMP to overflow		S Side		15		CMP		OK
SOC	699	1255		6" restrictor to MH to 18" conc.		E half of S side		6		Concrete		OK.
WBT	701	1277		6" CI pipe.		SW corner		6		C.I.		OK.
WBT	703	1279		12" CMP to CB.		SW corner		12		CMP		OK.
RHC	705	1300		12" pipe with 4" restrictor		E side		4		Concrete		OK
WBT	901	1005		Pipe with 8" board to raise water.		N side		15		Concrete		OK.
WBT	902	1009		Est. 36" to MH.		S side		N/A		N/A		Underwater; unrestricted?
WBT	903	1012		4" PVC riser to CB.		E side		4		PVC		OK.
BFV	904	1015		18" to overflow structure with 4" restrictor at structure.		S side		4		Concrete		OK.
BFV	907	1018		6" PVC to ditch.		SE corner		6		PVC		OK.
BFV	908	1019		30" wide riser to 12" CMP.		SW corner		12		CMP		OK - no restrictor.
WBT	909	1303		36" CMP riser with gravel and thirteen 1" holes.		S end		thirteen 1"		CMP		OK.
BLT	910	1034		48" wide structure under gazebo.		E side		N/A		N/A		Inaccessible.
BLT	912	1036		36" wide perforated riser to 6" restrictor.		S side		6		N/A		OK.

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Table 7.3D: Detention Basin Overflow Structure Data

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
BHV	101	1019		Stone spillway to river.	SE side		OK.
BHV	102	1	12" manhole	48" wide overflow structure to 15" concrete.	West end	RIM 713.0 (Out INV 705.39)	OK.
SOC	103	83	CB to 18" conc. pipe	CB to 18" concrete.	S side	RIM 724.00; INV 719.92	
SOC	104	84	12" overflow pipe to structure	12" concrete to structure.	S side	725	OK.
SOC	104	85	secondary CB to structure	Secondary overflow CB to structure.	S side	RIM 728.75	OK.
SOC	107	91	4' dia. MH to 18" pipe	48" dia. MH to 21" concrete.	SE corner	TOP 735.00	Bar grate off.
SOC	108	92	CB to structure with 2' sump to suspended 6" PVC T-section pipe at outlet of structure with restrictor at bottom			TOP 743; Outlet TOP 742	
SOC	110	1045		Intake box to approx. 42" concrete.	SE end		24" sediment.
SOC	112	93	CB to 15" conc. Pipe	CB to 21" concrete.	E side	RIM 754.50	50% blocked with sediment.
SOC	114	94	CB to 12" pipe	CB to 12" concrete.	E side	RIM 775.50	OK.
SOC	115	1302		CB with sump to MH.	SE corner		Full of sediment.
SOC	116	102	overflow pipe near top of dyke flowing east to ditch			755.5	
SOC	122	96	overflow swale in SE corner			741	
SOC	125	97	CB to structure to 12" pipe	CB to 15" concrete.	S end	RIM 740.86	OK.
SOC	126	98	beehive to primary overflow structure	24" perforated MH cover to pipe.	SW corner	RIM 750.70	Slopes not vegetated.
SOC	126	99	6' x 22' secondary overflow spillway			TOP 751.70	
SOC	127	100	48" overflow structure with 2' sump to 24" conc.	48" dia. structure to 24" concrete.	E side	RIM 720.00	OK. No grate.
SOC	127	101	secondary overflow spillway to ditch			est. 721	
SOC	139	115	gabion mattress on E side	Gabion mattress.	E side	est. 664	OK - grown over.
SOC	140	1058		Beehive CB.	SE corner over berm		OK.
SOC	145	117	CB with 2 ft sump to 12" conc. to ditch	CB with 2' sump to 12" to 15" concrete.	outlets to street	RIM 724	OK.
SOC	151	136	10' wide cobble stone spillway to MH			est. 698.4	
SOC	153	1047		CB to 18" concrete.	E side		OK.
SOC	154	137	24" wide CB to 10" CMP	24" dia. CB to 10" CMP.	E corner	RIM 87	Sewage odor.
SOC	158	138	CB to 30" to Rouge	CB to 30" to Rouge.	SE side	RIM 67	OK.
SOC	159	139	CB to 24" to Rouge	24" wide Overflow structure to >24" concrete pipe.	E side	RIM 80	OK.
SOC	162	1049		Spillway in turf berm.	E side		OK.
SOC	164	160	48" MH with beehive cover and 2' sump to 18" storm	24" overflow to 18", 6" sediment and stone at stream.	West side	RIM699.3	OK.
SOC	164	1255		100' concrete/enkamat.	West side		OK.
SOC	166	161	30' riprap weir at E side of middle basin	30' riprap weir.	E side - middle basin	703.9	OK.
SOC	169	162	48" overflow structure with 2' sump to 28" x 20" arch CMP to ditch	24" MH with solid cover.	E side	RIM 699	Cover should be open grate.
SOC	173	1054		MH cover with holes in lid.	SW corner		OK.
SOC	174	1251		Perf. MH cover to approx. 24" concrete.	S side		OK.
SOC	179	1050		Beehive in center of basin that connects 2 small basins from out 1038.	S end		
SOC	180	163	15.17' long weir to 36" pipe (H = 0.42)	8'x8' concrete box structure, 42" pipe leaving.	E side	703.58	OK.
SOC	181	1048		Beehive to 24".	NE corner		Board in outlet pipe.
SOC	184	1046		Riprap spillway - secondary overflow.	SE corner		Needs more riprap.
SOC	185	1044		Beehive to pipe flowing east.	E side		OK.
SOC	186	1040		Perforated MH cover.	E side		Silt at bottom.
SOC	186	1042		Perforated MH cover, 2.4' above Overflow 1040.	E side		OK.

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Table 7.3D: Detention Basin Overflow Structure Data (continued)

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	191	164	48" dia. structure with 2' sump to 15" conc.	Closed MH cover to 15" to river.	N side	RIM 692.5; 15" INV 685.43	OK - no overflow closed cover.
SOC	192	173	6" deep by 10' wide riprap overflow to wetland			693.5	
SOC	192	1253		Riprap spillway to wetland.	E side		OK.
SOC	200	146	MH to 30"			RIM703.99; 30"S - 694.79	
SOC	201	147	48" overflow structure to 24" conc.	Stand pipe, 36" dia.	SW end	RIM 683; 24" INV 676.25	OK.
SOC	202	148	48" square drop box to 24" conc.	4' square concrete structure, 24" conc. leaving.	SE corner	RIM 690.25; 24" INV 684.1	OK.
SOC	202	149	emergency spillway in earthen berm			691.5	
SOC	208	150	24" primary overflow structure to 12" RCP	24" dia. Structure to 12" conc.	E side	RIM 671.45	OK.
SOC	208	151	secondary overflow spillway	18" conc. secondary overflow spillway.	E side	est. 672.5	OK.
SOC	209	119	4' diameter. MH with beehive cover and 2' sump	48" dia. MH structure to 12".	E side	669.96	OK.
SOC	210	120	10" Overflow?			N/A	
SOC	213	121	4' diameter. Overflow MH			675	
SOC	215	122	20' wide vegetated enkamat spillway with 3 on 1 slopes			665	
SOC	215	1304		Eroded 2'.	E side		Needs repair.
SOC	216	172	60" dia. MH to 12" west	5' grate, 12" enters, 4' leaves, both concrete	SW corner	686RIM	OK
SOC	220	152	emergency overflow in berm	CB to pipe.	from CB on E side to N	684.5	OK.
SOC	221	134	MH to 42" storm	15" outflow to overflow structure to 48" concrete.	SE corner	RIM691.8	OK.
SOC	222	153	Overflow weir			688.1	
SOC	224	154	Overflow Spillway			N/A	
SOC	228	140	2' wide spillway			668.5	
SOC	229	135	36" overflow RCP to 12" RCP to wetland	36" dia. riser to 12" to wetland basin 228.	NE corner	RIM 668.47; INV 665.95	OK.
SOC	231	129	Manhole	48" dia. Overflow structure with grate to 36" concrete.	SW corner	673.1	OK.
SOC	231	130	secondary overflow sodded spillway			673.5	
SOC	233	165	48" dia. overflow structure to 24" pipe			RIM 673; 21" INV 663.35	
SOC	233	166	15' wide riprap secondary spillway	15' grouted riprap spillway to CB.	SE corner	673.5	OK - bottom of spillway not below berm.
SOC	233	1257		48" dia. structure to 24" concrete.	SE corner		OK.
SOC	234	127	catch basin			676	
SOC	235	131	unspecified structure			673.2	
SOC	236	1060	unspecified structure	24" overflow structure to 24" concrete.	NE corner	672.6	OK.
SOC	237	1052		Beehive connected at south end to outflow 222, 0.8' above riser.	S end		OK.
SOC	238	132	Overflow casting	48" conc. standpipe.	N side	667.47	24" pipe connected to outlet, has 6" restrictor.
SOC	239	124		Beehive.	N side		OK.
SOC	240	1035	24" CB to 12" pipe	24" CMP riser to 12" concrete.	S side	RIM653.5; 12" INV 650.93	OK.
SOC	246	1102		Beehive, with 18" conc. leaving.	South end		OK.
SOC	247	158	12" to MH with 4" restrictor	2' grate.	SE corner	666.97	OK.
SOC	247	1106		2' grate, standpipe, covered in geotextile.	NE side		OK.
SOC	258	169	48" dia. overflow structure to 12" RCP	24" perforated MH to pipe.	SW corner	663.1RIM	OK - bees.
SOC	259	170	72" dia. overflow structure to 36" RCP	42" x 42" box opening to structure with 6.5' high wooden weir in it to a 42" concrete.	E side	661.8RIM	OK.
SOC	260	167	12" CMP north to ditch	12" concrete N to ditch.	N	659.57 PROP.	Some veg. blocking.
SOC	262	145	overflow weir	Grass spillway.	N side	650	OK.
SOC	266	144	rip rap stone spillway	Overflow structure with 4' grate, 12" conc. leaving south.	South end	677.3	OK.

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Table 7.3D: Detention Basin Overflow Structure Data (continued)

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	269	143	stone revetment mattress			640	
SOC	278	157	Overflow structure			664	
SOC	279	1100		CB to pipe.	S end		Pipe underwater.
SOC	281	133	10' riprap spillway			634	
SOC	287	1024		24" dia. beehive.	N side		
SOC	293	1051		CB to 15" concrete.	NE corner		OK.
SOC	295	1308		CB to 15" concrete.	NW corner		OK.
RHC	311	39	field stone spillway			814.3	
RHC	312	1201	riprap spillway	Riprap spillway to county drain.	West side	N/A	OK.
RHC	313	38	48" dia. concrete beehive structure	30" wide CB to 15" concrete.	SW corner	RIM 820.5	OK.
RHC	318	40	115 yd2 riprap spillway at west side			est. 809	
RHC	323	41	sodded overflow	Sodded spillway.	West side	52.5	OK.
RHC	328	45	10' wide riprap overflow to basin B (letter in file says not connected)	10' wide riprap spillway to Basin B - outside of Rouge.	NE corner	35	OK.
RHC	329	48	riprap spillway to south	20' wide spillway in berm.	S side	est. 806	Yard waste, brush.
RHC	332	1027		12" CMP pipe in berm.	NE corner		OK.
RHC	333	50	6' wide spillway			64.5	
RHC	334	49	20' wide, 6" deep enkamat spillway	Approx. 20' x 6" deep spillway in berm to road ditch.	SW corner	864	OK.
RHC	339	74	CB with sump	12" CMP to MH to wetland.	S side	823	OK.
RHC	339	75	secondary riprap spillway	2' unvegetated spillway - MH recently excavated.	S side	823.5	Not graded/stabilized.
RHC	340	70	secondary riprap spillway on geotextile to swale			809.5	
RHC	340	71	CB with sump	CB to 18" pipe to wetland.	NE corner	808.5	OK.
RHC	341	78	overflow structure at 100-yr elev. to 12" pipe	12" to 48" wide riser to 15" concrete South.	SE corner	819	OK.
RHC	341	79	secondary overflow riprap spillway			819.57AB	
RHC	342	72	secondary riprap spillway			803.5	
RHC	342	73	CB with sump to 18" concrete			802.5	
RHC	343	80	12" overflow pipe into structure with 2' sump	12" CMP to overflow structure.	SW corner	804.25AB	OK.
RHC	343	81	4' dia. Overflow structure with 2' sump to 12" RCP	Overflow structure to pipe.	SW corner	RIM 805.5AB; 12" RCP INV 799.90AB	OK.
RHC	345	76	riprap spillway	Riprap secondary spillway to drain.	S half of E side	802.5	OK.
RHC	345	1029		CB to unrestricted 24" to drain.	E side		OK.
RHC	346	77	45' x 0.5' gabion weir on S side			797.5	
RHC	348	86	CB to structure with 2' sump	60" wide secondary riser to unrestricted 15".	SE corner	RIM 797.89	Sump full of sediment.
RHC	349	82	36 syd riprap overflow weir			TOP 808	
RHC	352	47	6' dia. Overflow structure with 24" sump to a 30" pipe	72" wide structure with 2' deep sump to 36" concrete.	West side	805.34	OK.
RHC	353	52	spillway at SW corner	12" to 48" structure to 36" pipe.	SW corner	815.5	OK.
RHC	354	53	spillway at S side			813.16AB	
RHC	354	1053		12" to 24" structure to 24".	SW corner		OK.
RHC	356	87	Overflow over berm	Spillway over berm.	N/A	822.8	OK.
RHC	357	69	overflow structure to manhole 47 on plans	48" structure to 27" pipe.	NW corner	829.04	OK.
BFV	358	2	3' wide asphalt spillway, CB on south berm	3 ft wide asphalt spillway to beehive.	S side	spillway ELEV 719.1 (beehive RIM 718.87AB)	OK.
BFV	360	3	existing swale to ditch at from Drive; NE corner	21" CB to 15".	SE corner	ELEV 719.1	OK.

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Table 7.3D: Detention Basin Overflow Structure Data (continued)

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
TRC	364	1026		Beehive on W side south to MH.	West side		OK.
TRC	365	4	bar grate on overflow inlet to 12" pipe	12" pipe with bar grate.	N/A	RIM 787.0	OK.
TRC	366	5	bar grate on 40" overflow inlet	48" high weir wall (0.6' below overflow) in 60" wide overflow structure to 30" concrete to Over 1022.	NW corner	RIM 804.2 (INV 801.09)	OK.
TRC	366	1022		Pipe to MH; MH also accepts 30" pipe from Overflow 5.	NW corner		OK.
TRC	367	6	overflow structure CB 37	48" wide structure to 12" concrete.	West side	RIM 827.00	OK.
TRC	369	8	24" dia. Manhole	24" CB to 12" concrete to Forest Creek Lake.	SW corner	TOP 801.6	OK.
TRC	370	9	49" x 33" CMP	60" wide structure to 42" x 33" CMP to drain.	SW corner	TOP 804.70 (INV 801.71)	OK.
TRC	371	10	overflow spillway to 24" pipe to 12"			TOP 862.30	
TRC	372	11	20' bituminous overflow swale			TOP 805.00	
TRC	373	12	CB to manhole	Overflows berm to CB near Long Lake.		approx. 816	OK.
TRC	374	13	48" riser structure	48" wide riser to 21" concrete.	E side	TOP 798.0 (10 yr elev)	OK - 1.5' sediment in structure.
TRC	375	1023		5' wide grass swale in berm to stream.	SW corner		OK.
TRC	375	1025		3' wide earthen swale - seems to be built afterwards by others.	N half of W. side		OK - minor erosion.
BLT	376	15	CB to manhole	30" structure to 24" concrete.	SE corner to Amy Drain	854.2	OK.
BLT	377	16	overflows over clay berm	Sodded spillway.	West side	942	OK.
BLT	379	17	riprap spillway	60" wide concrete spillway to I-75 ditch.	SW side	863.7	OK.
BLT	380	18	Sodded Spillway	Grass spillway to 4" PVC to Eastway.	SW corner	850.22	OK.
BLT	382	20	riprap spillway	Riprap spillway to stream.	S end	748	OK.
BLT	384	21	riprap spillway (?)			800.02	
BLT	384	1021		36" wider riser to 12" pipe to 60" wide secondary riser, 2.3' above primary riser, to 48" concrete.	S side		OK.
BLT	385	22	Beehive CB	CB.	N/A	823.88	Mesh in front needs removal.
BLT	387	24	Spillway			906.3	
BLT	388	25	overflow	24" wide structure to 21" concrete.	NW corner	897	8" sediment.
BLT	389	26	CB to manhole	CB to manhole.	N/A	751	OK.
BLT	390	27	Storm manhole serves as overflow?			923	
WBT	393	1001		2' wide beehive to structure.	S side		Good.
WBT	394	29	Spillway	7' wide structure to 27" concrete.	SE corner	924.5	OK.
WBT	396	30	Spillway	Grass spillway in berm.	NW corner	903.23?	OK.
WBT	402	31	overflow structure is a 3x3 foot grate at 100yr elevation	Primary 2 yr - 2.5' x 2.5' overflow structure to 12" to OVER 1013.	SE corner	890.5	OK - angled grate cover.
WBT	402	1013		Secondary 10 yr - 12" to 2.5' x 2.5' overflow structure to 21" concrete.	SE corner		OK.
WBT	403	32	overflow structure is a 3x3 foot grate at 100yr elevation	2-yr overflow - 36" x 36" structure to 15" to Overflow 1012.	SW corner	886.2	OK.
WBT	403	1012		10-yr secondary - 36" x 36" structure to 24" concrete.	SW corner		OK.
WBT	404	34	100 year overflow structure is a 3x3 ft grate.	2-yr overflow - 36" x 36" structure to 6" to Overflow 1011.	NE corner	888.8	OK.
WBT	404	1011		10-yr secondary - 36" x 36" structure to 27" concrete.	NE corner		OK.
WBT	405	33	CB at 973.2 serves as overflow?			973.2	
WBT	407	35	grassed spillway			936	
WBT	407	1064		48" wide structure to approx. 30" pipe.	N side		OK.
WBT	408	36	Emergency concrete spillway with end wall			887	
WBT	409	37	Spillway, grassed and ripraps	48" wide structure to 24" concrete to stream.	NE corner	925	OK.
WBT	413	44	concrete Overflow structure	30" riser 0.9' above Outflow 1011 to 12" concrete.	NE corner	904.52	OK.

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Table 7.3D: Detention Basin Overflow Structure Data (continued)

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	414	46	Rip rap overflow spreader on SE side	48" structure to 21" concrete.	SE corner	918	OK.
WBT	415	51	sodded overflow	36" wide CMP riser with gravel jacket to 15" HDPE.	S side	N/A	OK.
WBT	416	54	overflow structure is a 12 pipe a foot above 100 year elevation	48" wide structure to 18" pipe.	SE side	926.47	OK.
WBT	417	1005		60" wide structure to 24" pipe.	E side		Sump filled with sediment.
BLT	421	55	18" conc. pipe through berm above outlet pipe			915	
BLT	421	56	Sodded Spillway			915.5	
BLT	421	1018		18" concrete flows towards Telegraph.	SE corner		OK.
WBT	431	57	overflow structure below 100 year elevation	24" wide structure to 12" concrete.	SW corner	912.92	OK.
WBT	432	1014		15" to 21" structure to 12" concrete.	N side		OK.
WBT	433	58	N/A	21" structure to 15" concrete.	E side	908.48	OK.
WBT	437	61	Overflows into wetland/stream	24" overflow structure to 48" CMP.	SE corner	926.13	6" sediment.
WBT	438	62	Overflow discharges into stream	6" CMP to 27" structure to 18".	N side	923.45	OK.
BLT	439	63	Retention overflow ditch at south end.	Overflows south to ditch.	S side	922.5	OK.
WBT	440	64	Riser pipe, 36" CMP with grate	36" CMP riser to 12".	E side	901.33	OK.
WBT	441	65	Riser pipe, 36" CMP with grate	36" wide CMP riser not functioning as overflow, 12" HDPE riser inside.	E side	896.58	No restrictor visible.
WBT	442	66	Riser pipe, 36" CMP with grate	36" wide CMP riser to 12" HDPE to lake/wetland.	E side	879.5	OK.
WBT	453	1008		Swale to 6' wide structure to 36" concrete.	SE corner		OK.
WBT	454	1009		Pipe to MH.	NW corner		Half buried.
WBT	457	67	Nothing but elevation on plans			891.5	
WBT	458	68	36" Riser Pipe			927.22	
WBT	458	1010	riprap spillway at NE corner	Riprap spillway.	NE corner	927.56AB	OK.
WBT	459	1003		Beehive to 12 in.	SW corner		Litter, debris.
RHC	466	88	CB on N side with 2' sump to Lueders Drain	CB to 15" pipe.	N side	RIM 800.21AB	OK.
RHC	466	1033		Riprap spillway - secondary overflow.	NW corner		OK.
RHC	467	89	CB on N side with 2' sump to Lueders Drain	CB with 24" sump to 15" concrete.	N side	RIM 801.05AB	OK.
RHC	467	1031		Secondary overflow to Lueders Drain.	NE corner		Bar grate off.
RHC	468	90	riprap over geotextile spillway, 10' wide	10' wide riprap spillway.	S side	ELEV 799.5	Overflow not graded below berm.
SOC	469	95	4' open top manhole to 24" pipe			RIM 743.00	
SOC	469	1305		Perf. MH cover to 24" concrete.	SE end		OK.
BLT	472	104	Stabilized spillway, 10 foot width	Beehive structure to 3" PVC restrictor in outflow pipe instead of pipe from basin.	SE corner	784	Provides no overflow.
BLT	473	106	5' wide spillway			N/A	
BLT	474	1036		48" wide structure.	West side		100% sediment filled.
BLT	476	105	Top of stand pipe	Beehive structure to 21" HDPE.	NE corner	953.65	OK.
BLT	481	1028		Overflows east over berm to CB.	E side		OK.
BLT	486	107	riprap overflow at SE side	Pump may be for overflow.	SW corner	793.5	OK.
WBT	487	108	Beehive at SE corner.	Beehive to 12" concrete.	N side	908	OK.
WBT	502	110	CB to ditch	Beehive to pipe.	S end	894.95	OK.
WBT	503	111	sod overflow	Perforated manhole lid - outflowing pipe underwater.	S end	N/A	OK.
WBT	521	113	5' diameter. MH			N/A	

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Table 7.3D: Detention Basin Overflow Structure Data (continued)

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	524	114	grass spillway			742	
SOC	525	116	48" structure to 15" conc.			RIM 715.35AB; IE 4" SW 711.07AB; IE 15" 710.94 AB	
SOC	525	1056		30" dia. overflow structure to 15" concrete.	E side		OK.
SOC	534	171	48" dia. overflow structure to 15" RCP	24" perf. MH to 15" RCP.	N side	658.5RIM	OK.
SOC	535	168	48" dia. overflow structure to 12" RCP			658RIM	
BLT	543	156	spillway?			947.6	
BLT	544	155	Overflow structure	36" CMP with grate.	N/A	853.3	OK.
BLT	546	1080		4' grate, 4' pipe leaving.	South end		Part of structure broken.
BLT	548	1104		Grassed spillway.	E side		OK.
BLT	604	1108		18" pipe with bar grate.	SE end		
BLT	631	1303		Riprap spillway to Hood Rd.	South end		OK.
BLT	635	1041		Beehive.	Center		OK.
BLT	635	1301		CB.	Center		OK.
BLT	638	1043		grassed overflow	s end		OK
TRC	660	174	30" x 42" overflow structure to 18" conc. in SW corner	30x42 structure, to 18" concrete.	SW corner	791.2RIM	OK.
TRC	660	175	20' overflow swale on W side	20' grassed overflow swale.	SW corner	797.5	OK.
TRC	661	1252		Beehive.	NW corner		OK.
TRC	662	176	riprap spillway	10' riprap spillway.	West side	774	Not properly graded, no freeboard.
WBT	691	1265		CB to 15" pipe.	SE corner		OK.
WBT	692	1263		48" dia. riser to 18" concrete.	SE corner		OK.
WBT	696	1306		3' x 3.3' concrete box drop structure to 21" CMP.	E side		OK.
WBT	698	1261		36" CMP riser to a 15" conc.	S side		OK
WBT	703	1267		CB to 15" CMP.	SW corner		OK.
RHC	705	1300		48" dia. structure with grate to 12" pipe	N half of E side		OK.
WBT	902	1007		36" to 18" x 24" CB to 15" concrete.	S side		Unrestricted?
BFV	904	1015		48" secondary structure to 18" concrete.	SE corner		OK.
BFV	904	1016		5 ft. riprap spillway to 12" CMP.	SE corner		OK.
BFV	907	1017		3' bare soil swale in berm.	SE corner		Minor erosion.
WBT	909	1307		36" wide CMP riser to 12" HDPE south.	S side		OK.
BLT	910	1030		Beehive.	S end		OK.
BLT	912	1032		Beehive.	S end		OK.

– If a Basin ID is not referenced in this Table, there were no Overflows found on the plans or in the field.
– If all of the plan review information for an Overflows is blank, then there was no plan information available.
– If all of the field assessment information for an Overflow is blank, then it was not found in the field.

Section 8
Community-Specific Summaries

Table 8.1A: Village of Bingham Farms Detention Basin Data

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
BFV	358	Jamestown South	5	8	NE	N/A	N/A	AB 10/3/02 Mickalich & Assoc.	no calcs	N/A	24255 Thirteen Mile Rd.	Owner	N/A	Res.	3.09	10	N/A	0.59	5.35	4.9	12,873.11	14,193.19	20000
BFV	359	Jacobson Bldg.	3	5	NE	N/A	N/A	Rev. 1/20/89 Giffels Webster Eng.	some	N/A	32400 Telegraph Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	4	2.5	N/A	est. 9,320	5950
BFV	360	Woodlynne	6	4	SW	N/A	N/A	Rev. 9/30/87 Zeimet Wozniak & Assoc.	some	N/A	S. of Woodlynne	Owner	N/A	Res.	23.87	10	N/A	N/A	4	3.6	N/A	est. 121,500	136000
BFV	904	Arden Courts	N/A	8	NE	N/A	N/A	N/A	n	N/A	24005 13 Mile Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	5.8	N/A	N/A	22800
BFV	905	Bingham Office Park	N/A	8	NE	N/A	N/A	N/A	n	N/A	30100 13 Mile Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BFV	907	Danka - South	N/A	5	NE	N/A	N/A	N/A	n	N/A	32500 Telegraph Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	0.85	N/A	N/A	460
BFV	908	Danka - North	N/A	5	NE	N/A	N/A	N/A	n	N/A	32500 Telegraph	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1.5	N/A	N/A	2250

Table 8.1A: Village of Bingham Farms Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
358	Jamestown South	est. 6,900	4100	est. 225	1	0.75	N/A	N/A	square	6	3	78	78	Dry		Minimal	Poorly Drained, Ponding	Turf	Algae	0	Minor erosion, no 3" restrictor visible.	Verify restrictor.
359	Jacobson Bldg.	est. 2,330 at middle	2375	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	3	est. 133 at middle	est. 18 at middle	Dry Catchbasin		Minimal	Type C	Turf	No	0	6" roof drain, no other inflows, no restrictor visible.	Verify restrictor.
360	Woodlynne	45,000 at 717.0	37700	15,750	2	N/A	2	3	rectangular	6	3	475 at middle	60 at middle	Wet	basin in permitted wetland area. Pool volume estimated to be 20000 cft.	Minimal	N/A	Turf, Landscaping	Bulrush	50	Fountain, blue dye, mosquitoes, turtle, frog.	Verify restriction, buffer.
904	Arden Courts		3930			1.2		N/A			3			Dry		Minimal	Type C, Clayey Loam	Turf	No	0	Fertilized parking lot.	Nutrient control.
905	Bingham Office Park		3400			N/A		3			3			Wet		Minimal	N/A	Landscape, Mulch	No	100	Water feature, waterfall, fountain, no in/outflow visible.	Verify detention.
907	Danka - South		540			1.25		N/A			2			Dry		0.5 Organic	Poorly Drained	Tree, Shrub	No	100	Wooded small basin.	Enlarge.
908	Danka - North		1500			N/A		2			4			Dry		Minimal	poorly drained	trees		0	Drains SW to storm	Verify restrictor

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.1B: Village of Bingham Farms Detention Basin Inflow Data

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BFV	358	4	Storm.	N/A	SW corner	18	18	Concrete	Concrete	713.65	2" sediment.
BFV	358	5	Storm.	N/A	N side	12	12	Concrete	Concrete	716.01	OK.
BFV	359	6		N/A		N/A		N/A		761.8; RIM 765.8	
BFV	360	7	Storm.	N/A	N side	42	27	Concrete	Concrete	712.50	OK.
BFV	904	1032	Storm to MH.		S side		18		Concrete		OK.
BFV	905	1033	6" concrete spillway.		NW corner		6		Concrete		OK.
BFV	907	1036	Storm.		SW corner		12		Concrete		2" leaves.
BFV	908	1037	Storm.		SW corner		12		Concrete		2" sediment.

Table 8.1C: Village of Bingham Farms Detention Basin Outflow Data

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BFV	358	2	3" PVC restrictor in 18" pipe	Pipe to beehive.	S side	S side	3	18	Concrete	Concrete	713.65	OK.
BFV	359	1017		CB to unrestricted 12" conc. to pump stn.		middle		12		Concrete		OK.
BFV	360	3	unrestricted pipe	Unrestricted pipe to CB.	N side, W of inflow	SE corner	15	15	Concrete	HDPE	713	OK.
BFV	904	1015		18" to overflow structure with 4" restrictor at structure.		S side		4		Concrete		OK.
BFV	907	1018		6" PVC to ditch.		SE corner		6		PVC		OK.
BFV	908	1019		30" wide riser to 12" CMP.		SW corner		12		CMP		OK - no restrictor.

– If a Basin ID is not referenced in this Table, there were no Inflows, Outflows, or Overflows found on the plans or in the field.
– If all of the plan review information for an Inflows, Outflows, or Overflows is blank, then there was no plan information available.
– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.1D: Village of Bingham Farms Detention Basin Overflow Structure Data

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
BFV	358	2	3' wide asphalt spillway, CB on south berm	3 ft wide asphalt spillway to beehive.	S side	spillway ELEV 719.1 (beehive RIM 718.87AB)	OK.
BFV	360	3	existing swale to ditch at from Drive; NE corner	21" CB to 15".	SE corner	ELEV 719.1	OK.
BFV	904	1015		48" secondary structure to 18" concrete.	SE corner		OK.
BFV	904	1016		5 ft. riprap spillway to 12" CMP.	SE corner		OK.
BFV	907	1017		3' bare soil swale in berm.	SE corner		Minor erosion.

– If a Basin ID is not referenced in this Table, there were no Inflows, Outflows, or Overflows found on the plans or in the field.
– If all of the plan review information for an Inflows, Outflows, or Overflows is blank, then there was no plan information available.
– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.2A: Village of Beverly Hills Detention Basin Data

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
BHV	101	Westwood Commons	flat file 13	10	NW	N/A	96568	5/2/1996	y	n	Thistle Ln., near Riverbank Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	3.9	N/A	N/A	15,000	N/A
BHV	102	Turnberry Sub.	flat file 13	3	NW	N/A	19970172	7/17/1996	y	n	Turnberry Ct., near 13 Mile and Lahser	Owner	N/A	Res.	5	10	N/A	0.35	3	3	10,802	11,846	8500

Table 8.2A: Village of Beverly Hills Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
101	Westwood Commons	6,000	3350	1,800	N/A	N/A	N/A	3	oval	6	4	100	30	Wet	May be no outlet? Sediment basin with 2 ft storage for sediment.	N/A	N/A	Turf, Iris		25	Fountain, no outlet structure, spillway to river.	Clean structures, buffer, add controlled outlet structure.
102	Turnberry Sub.	8,512	2840	4 (2,176 sft @ 1 ft depth)	1	N/A	N/A	N/A	oval	6 max	4	225 (top) 145 (middle)	55 (top) 35 (middle)	Dry Catchbasin		Minimal	N/A	Turf	No	0	Storm pipes to and from CB and overflows up into basin. Inflow 2 not found.	

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.2B: Village of Beverly Hills Detention Basin Inflow Data

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BHV	101	1	Storm.	N/A	N end	15	27	Concrete	Concrete	669.00	Underwater, 50% blocked sediment.
BHV	102	2		N from street		12		Concrete		706.00	
BHV	102	3	Storm.	E side	E side	12	18	Concrete	Concrete	706.00	OK.

Table 8.2C: Village of Beverly Hills Detention Basin Outflow Data

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BHV	102	1	6" restrictor on lateral at downstream side of CB	6" PVC restrictor in 15" conc. Pipe.	CB in center	E side	6	6	Concrete	PVC/Conc	705.90	OK.

Table 8.2D: Village of Beverly Hills Detention Basin Overflow Structure Data

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
BHV	101	1019		Stone spillway to river.	SE side		OK.
BHV	102	1	12" manhole	48" wide overflow structure to 15" concrete.	West end	RIM 713.0 (Out INV 705.39)	OK.

– If a Basin ID is not referenced in this Table, there were no Inflows, Outflows, or Overflows found on the plans or in the field.
– If all of the plan review information for an Inflows, Outflows, or Overflows is blank, then there was no plan information available.
– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.3A: Bloomfield Township Detention Basin Data

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
BLT	376	Eastway Farms Sub.	N/A	11	NE	N/A	N/A	AB 6/2/01, Kieft Eng.	y	N/A	Ginger Ct. and Palms	Owner	N/A	Res.	13.04	100 year	N/A	0.38	3.5	3.7	55166	67602	12700
BLT	377	Meadowlands of Bloomfield	N/A	6	SW	N/A	N/A	AB 11/14/88, John Seelbach	y	N/A	Bloomfield Ct., near Square Lake and Hamilton	Owner	N/A	Res.	23.6	100 year (back to back)	N/A	0.38	6	5	243700	244500	181700
BLT	378	Meadowlake Sub.	N/A	6	SW	N/A	N/A	AB 11/14/88, John Seelbach	y	N/A	E. Hammond Lake, near Square Lake	Owner	N/A	Res.	1.1 sub., 2.5 park	N/A	N/A	0.35 sub, 0.15 park	1	N/A	18900	23750	N/A
BLT	379	Bloomfield North Estates	N/A	1	NW	N/A	N/A	AB 4/9/90, MCS Associates	some	N/A	Square Lake and Squirrel Rds.	Owner	N/A	Res.	72.2	N/A	N/A	N/A	5	2.6	145681	171099	110000
BLT	380	Palmer Woods	N/A	11	NE	N/A	N/A	AB 2/6/90 Giffels Webster	y	N/A	Wellsley & Eastways	Owner	N/A	Res.	6.53	100 year (back to back)	N/A	0.3	6.72	4	64647	69666	33800
BLT	382	Willisons Bloomfield Farms Sub. - pond 1	N/A	24	NE	N/A	N/A	AB 6/19/84 Zeimet-Wozniak & Associate	some	N/A	Browning Ct., near Wattles and Adams	Owner	N/A	Res.	N/A	100	N/A	N/A	2	1	N/A	67875	13800
BLT	383	Willisons Bloomfield Farms Sub. - pond 2	N/A	24	NE	N/A	N/A	AB 6/19/84 Zeimet-Wozniak & Associate	some	N/A	Browning Ct., near Wattles and Adams	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3	N/A	49400	56100
BLT	384	Spruce Hills	RB-51	32	SW	N/A	N/A	AB 7/22/96 Zeimet-Wozniak & Associate	y	N/A	Wing Lake and Fourteen Mile Rd.	Owner	N/A	Res.	17.5	10	N/A	0.03	N/A	2	30839	31001	58500
BLT	385	Quarton Orchards	RB-39	27	NW	N/A	N/A	AB 3/3/88 Zeimet-Wozniak & Associate	y	N/A	York Ct., near Lahser and Quarton	Owner	N/A	Res.	6.6	10	0.645	0.31	3	2.3	5940.195	12154	20700
BLT	387	Pinetree Estates - basin B	N/A	11	NW	N/A	N/A	AB 9/26/97 Giffels Webster	y	N/A	Sequoia Ct.	Owner	N/A	Res.	6.47	5	N/A	0.41	4.46	1.2	13441	9000	1500
BLT	388	Pinetree Estates - N. basin	N/A	11	NW	N/A	N/A	AB 9/26/97 Giffels Webster	y	N/A	Brownley Ct.	Owner	N/A	Res.	3	10	N/A	0.39	1.46	1.6	7455	7682	3300
BLT	389	Pinebrooke Manor Condos	RB-35	25	NW	N/A	N/A	4/1/86 Urban Land Consultants	y	N/A	Pinbrooke Ct., near Big Beaver and Woodward	Owner	N/A	Res.	5.63	10	0.49	0.41	6.25	4.6	14897	14850	20300
BLT	390	Carrillon Hills	RB-32	17	SE	N/A	N/A	10/14/87	y	N/A	Carollin Ct., near Franklin and Long Lake	Owner	N/A	Res.	15	100 year (back to back)	0.667	0.3	7.71	7.6	47394.41	94789	82200
BLT	391	Applegrove	N/A	30	SW	N/A	N/A	AB 7/16/85 Zeimet-Wozniak	y	N/A	Applegrove, near Inkster and Maple	Owner	N/A	Res.	6.3	10	0.2	0.4	6.5	8	16171	74960	99200
BLT	421	Bloomfield Chase	N/A	9	SW	N/A	N/A	Approved 8/9/96 Nowak and Fraus	y	N/A	Hickory Grove and Telegraph	Owner	N/A	Res.	13.695	10	N/A	0.35	5	3.8	29592	29926	16900
BLT	439	Echowood Sub.	N/A	20	NE	N/A	N/A	AB 9/18/80 Feldhauser Asscociates	Plan incomplete. No calcs.	N/A	Susans Way, near Lone Pine	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	83200
BLT	471	Costco	N/A	5	SE	N/A	HRC 93026	GWE rev. 2/19/93	y. No calcs	N/A	Telegraph and Square Lake Rds.	Owner	N/A	Com.	3.25	N/A	10.82	N/A	N/A	5	N/A	N/A	109600
BLT	472	Kent Ridge Sub.	N/A	27	NE	N/A	HRC 89532	Zeitmet Wozniak & Assoc. 9/7/90AB	y	N/A	Quarton Rd. & Covington	Owner	N/A	Res.	1.46	10	N/A	0.35	2.5	2.8	3156.52	3229	2940
BLT	473	Provencal	N/A	16	NE	N/A	HRC 89552	Kieft Engineering 11/12/90AB Watermain Only	No calcs. plans incomplete	N/A	Provencal Pl.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	3500
BLT	474	Bloomfield Knoll	RB-25	12	SW	N/A	HRC 96269	Nowak & Fraus 3/25/99AB	No calcs. plans incomplete	N/A	Westview and Squirrel	Owner	N/A	Res.	5.9	N/A	N/A	N/A	N/A	1.3	N/A	N/A	12700

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.3A: Bloomfield Township Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
376	Eastway Farms Sub.	Est. 25350(top)	3450	Est. 13750	1	0.8	3 min.	4	irregular	6	3	190	150	Wet		>10 YD3 At Inflows	N/A	Turf	Cattail, Bulrush, Fine Rush	0	Fountain, blue dye, sediment from construction.	Dredge, buffer.
377	Meadowlands of Bloomfield	55200 at 942.00	36300	26300 at 936.00 Avg. 40750	1	0.5	N/A	4	square	6	3	260	215	Retention		N/A	Hydric	Turf	Cattail, Algae	0	Inflow 42 underwater. Mowed to edge.	Veg. buffer.
378	Meadowlake Sub.	28000 at 922.8	41200	19500 at 921.9 Avg. 23750	N/A	N/A	N/A	3	oval	0.0016	3	300	150	Wet	Existing before construction of sub.	N/A	N/A	Woods	Algae, Wetland spp.	0	Natural water feature. No Inflows, no Outflow structure. Not very accessible.	Verify detention/outlet.
379	Bloomfield North Estates	est. 50700 at 858.7	42150	2200, calculated from volume at 859	n/a (spillway at 863.70)	1	N/A	N/A	rectangular	4	2	390	130	Dry		Minimal	Poorly drained.	Turf	Cattail, Willow, Sedge	0	Litter. 4' fence.	
380	Palmer Woods	20169	8450	3543	N/A	1	1	4	irregular	6	2	180	95	Retention		None Visible	N/A	Turf, Stone Edging	Algae	0	Fountain. No outflow found.	Nutrient control.
382	Willisons Bloomfield Farms Sub. - pond 1	N/A	13800	N/A	N/A	N/A	N/A	2.5	irregular	3	4	185	90	Wet		No Pool Depth	N/A	Tree, Shrub, Forb	No	0	No controlled outflow.	
383	Willisons Bloomfield Farms Sub. - pond 2	7800 est.	18700	6125 est.	N/A	1	N/A	1	rectangular	5	2.5	160	90	Wet		Sediment Bar At Outflow	N/A	Tree, Forb	No	0	No inflowing storm - may not provide much detention?, fountain may need repair.	
384	Spruce Hills	19125	29250	1750	1	N/A	N/A	N/A	irregular	N/A	20	N/A	N/A	Dry Extended Detention	information on the plans for 10yr. event as well	N/A	N/A	Turf, tree, wetland spp.	sedge, cattail	25	Riser holes blocked. Good vegetated buffer.	Clean structures.
385	Quarton Orchards	12950	9000	0	N/A	N/A	N/A	N/A	oval	N/A	6	150	85	Dry		Minimal	Hydric	Turf	Purple L., Cattail	25	Outlet and both inflows blocked, remove mesh from overflow CB.	Clean structures.
387	Pinetree Estates - basin B	N/A	1100	N/A	N/A	N/A	N/A	N/A	N/A	2	5.5	N/A	N/A	Dry Catchbasin		Minimal	Poorly Drained	Turf	No	0	No detention.	Verify restrictor.
388	Pinetree Estates - N. basin	4765	2050	600	1	N/A	N/A	N/A	triangular	N/A	5.5	N/A	N/A	Dry		Minimal	Type C	Turf	No	0		Clean structures.
389	Pinebrooke Manor Condos	6300	4420	900	N/A	N/A	N/A	N/A	oval	N/A	5	N/A	N/A	Dry		Minimal	N/A	Turf	No	0	4'-6' stone low flow channel.	Verify restrictor.
390	Carrillon Hills	22300	10800	500	N/A	0.5	N/A	N/A	rectangular	5	5	200	115	Dry		N/A	Hydric, Ponding	Turf Sides	Purple L., Cattail	25	Overflow not found.	Clean structures.
391	Applegrove	13600	12400	7360	N/A	1	N/A	3	irregular	5	5	N/A	N/A	Wet		Sediment Bar at Inflow	N/A	Turf	No	0	Fountain.	Verify restrictor.
421	Bloomfield Chase	11200	4440	2400	1	1.3	0	N/A	rectangular	5	3	140	80	Dry		Minimal	N/A	Turf, Tree, Shrub	Cattail, Daylilies	0		Verify restrictor.
439	Echowood Sub.	N/A	27700	N/A	N/A	N/A	N/A	N/A	irregular	N/A	4	N/A	N/A	Dry		Minimal	2-3" Topsoil Over Type B	Turf	No	0		
471	Costco	N/A	21900	N/A	N/A	N/A	N/A	2	N/A	N/A	6	N/A	N/A	Wet	Outlet or overflow not listed.	N/A	N/A	Shrub	Purple L., Cattail, Willow	0	Fenced, ice rink dumping paint and snow runoff into basin, overgrown.	Check illicit discharges from ice rink and fat bins.
472	Kent Ridge Sub.	1262	1050	0	0.5	N/A	2.5	N/A	irregular	6	3	40	30	Dry		Minimal	N/A	Turf	No	0	No overflow - pipe from overflow structure is restricted instead of pipe from basin.	Verify overflow.
473	Provencal	N/A	1170	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry		0.5 Ft.	very poorly drained	turf	algae	0		
474	Bloomfield Knoll	13860	9750	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry		Basin Silt In From Constr.	N/A	Grass, Sedge	Purple L., Cattail, Arrowhd.	0	Sediment from construction.	Verify restrictor, dredge, clean structures.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.3A: Bloomfield Township Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
BLT	475	Detroit Skating Club	N/A	5	SE	N/A	HRC 94006	Nowak and Fraus - REV 7/15/94	y	N/A	888 Denison	Owner	N/A	Com.	2.359	50	0.87	0.82	6.7	2.1	15209.13	15168.76	8200
BLT	476	Lowe's	N/A	6	NE	N/A	HRC 19990587	D. P. Smith & Assoc. 12/4/00AB	plans incomplete. No calcs	N/A	Fairfax	Owner	N/A	Com.	N/A	N/A	N/A	N/A	11	7.65	N/A	N/A	180000
BLT	480	Whispering Pines	RB-30	16	SE	N/A	HRC 89463	Professional Engineering Assoc. 9/13/99	calcs and plans incomplete	N/A	Overbrook and Lahser	Owner	N/A	Res.	N/A	100	N/A	N/A	1.5	1.9	24254	45152	154700
BLT	481	Kirkway Ravines	RB-13	8	NE	N/A	HRC 880396	N/A	no plans. calcs only.	N/A	Pembury Ct., near Hickory Grove and Franklin	Owner	N/A	Res.	11.94	N/A	3.45 cfs	0.3	3.94	4.1	18104	18104	28300
BLT	482	Dordan Sub.	RB-16	10	NE	N/A	HRC 94351	Milletic and Associates REV 6/12/95	y	N/A	Dordan	Owner	N/A	Res.	13.32	10	2.5 cfs	0.35	4	3.55	29326	55729	60400
BLT	486	Bloomfield Club Sub.	RB-41	27	NW	N/A	N/A	Professional Engineering assoc. 10/22/79	No plan available	N/A	Burningbush, near Lahser and Quarton	Owner	N/A	Res.	37.4	10	N/A	0.5	7.91	8.2	196,350	204,215	118100
BLT	498	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	SW corner of Cherrywood	Owner	OCDC Ch. 18	Res.	3.7	100	1.31	0.5	5.2	7.6	18600	19200	36500
BLT	499	Stonehollow	N/A	21	SW	N/A	N/A	Ziement and Wozniak AB 6/18/86	no calcs	N/A	Quarton and Telegraph Rds.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.1	N/A	N/A	14400
BLT	543	Square Lake Country Club Sub.	RB-10	6	SE	N/A	N/A	W. Morrison and Asscoiates - 9/1/93 AB	n	N/A	Klingensmith and Square Lake Rd.	Owner	N/A	Res.	1.78	N/A	1.99	0.28	2.56	3	N/A	N/A	21200
BLT	544	Mitchell Ct. Condos	RB-54	11	NE	N/A	N/A	Giffells Webster - 8/23/99	y	N/A	Severn Lane and Eastway	Owner	N/A	Res.	6.25	100	0.31	0.32	4.3	4	24573.45	20000	12750
BLT	545	Hidden Pines Sub.	RB-24	12	SW	N/A	N/A	MCS Engineers - 5/21/76	no calcs	N/A	W. of Squirrel Rd., S. of Westview	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	7.7	N/A	N/A	18500
BLT	546	Bloomfield Crossing Sub.	RB-17	11	NW	N/A	N/A	Mason Brown - 3/11/71	n	N/A	Off Bridlepath Ct.	Owner	N/A	Res.	83.5	10	16.7	0.3	3.35	6.4	147173	148900	112300
BLT	548	Knollwood Pointe	N/A	30	SW	N/A	N/A	N/A	n	N/A	Inkster and Maple	Owner	N/A	Res.	6.54	10	0.29	0.2	4	5.3	32000	36000	52900
BLT	549	Franklin Ravines Sub.	N/A	31	NE	N/A	N/A	N/A	no. Calcs incomplete	N/A	Pickering, off Franklin, N. of Fourteen Mile	Owner	N/A	Res.	39	10	0.667	0.3	3	2.5	N/A	68739	45700
BLT	550	Knollwood Office Plaza	RB-47	30	SW	N/A	N/A	N/A	No plan. Used latest calcs. (incomplete)	N/A	Inkster and Maple	Owner	N/A	Com.	2.07	100	5.71	N/A	7.3	9.2	N/A	35122	48300
BLT	551	Clarendon Crest	N/A	19	SE	N/A	N/A	N/A	n	N/A	Clarendon Crest Circle	Owner	N/A	Res.	N/A	N/A	N/A	N/A	1.5-2.5	1.9	N/A	N/A	7400
BLT	600	Crofton Sub.	R.B-21	11	NE	N/A	N/A	N/A	n	N/A	Crofton Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	6.3	N/A	N/A	63400

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.3A: Bloomfield Township Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
475	Detroit Skating Club	9087.39	3880	N/A	1	N/A	N/A	N/A	rectangular	5	1.5	336.57	27	Dry Catchbasin	Volume required is more than volume provided. Additional storage computations listed. Assumed addition built and added to capacity (parking lot storage).	Minimal	Poorly Drained	Grass, Shrub	Willows, Phragmites	50	Upland area to the north unvegetated.	
476	Lowe's	31000 EST	23500	17250 EST	N/A	2	N/A	N/A	triangular	3	1.5	310	200	Dry		1'	N/A	N/A	algae	36	6' fence, side slopes not vegetated, litter	
480	Whispering Pines	59346	81400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	var	N/A	N/A	Wetland		N/A	Hydric	Tree, Shrub	Cattail	0	Area from GIS/aerial.	Verify restrictor.
481	Kirkway Ravines	19720	6900	0	N/A	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	Dry		Minimal	Clay Loam, Poorly Drained	Turf	No	0	No storm inflows, Outflow discharge east to MH. MH has 8" restrictor flowing E to Case Drain.	
482	Dordan Sub.	N/A	17000	N/A	1	N/A	N/A	N/A	irregular	1	3	N/A	N/A	Dry		Minimal	Poorly Drained	Turf, Shrub, Rushes	No	25	No restrictors - two outflows, some sub. construction.	Verify restrictors.
486	Bloomfield Club Sub.	35500	14400	15575	1	N/A	N/A	N/A	irregular	4	2	N/A	N/A	Dry		Minimal	N/A	Turf	Purple L., Cattail	0	Outlet buried, pump in SW corner may be for overflow?	Clean structures.
498	Chimney Hills Apt.	6400	4800	900	N/A	N/A	N/A	N/A	rectangular	5	2.5	80	30	Dry	basin serves as overflow for nearby catch basin.	N/A	Hydric	Wetland	Cattail, Purple L.	0	Storm sewer restricted and backs up into basin. Outlet blocked with sediment.	Verify restrictor, clean structures.
499	Stonehollow	N/A	6850	N/A	N/A	N/A	N/A	N/A	irregular	5	6	N/A	N/A	Dry Catchbasin		Minimal	N/A	Turf	Sedges	0	No inflowing storm, bottom unvegetated.	Verify restrictor, stabilize bottom.
543	Square Lake Country Club Sub.	N/A	7050	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Dry Extended Detention		Minimal	silty clay	trees, forbs	cottonwood, sedges	25	Inflow not found, densely vegetated	Verify Inflow.
544	Mitchell Ct. Condos	7980	3200	1020	N/A	N/A	N/A	N/A	triangular	N/A	3	120	130	Dry Extended Detention		minimal at SE inlet	silty clay, inundated	forbs, trees	cattails, willows	25	Cable piled by inlets, attached to power pole	
545	Hidden Pines Sub.	7650 EST	2400	3000 EST	N/A	N/A	0	N/A	triangular	3	3	170	90	Dry		Minimal	Poorly Drained, Some Ponding	Turf, Shrub, Tree	Buckthorn, Cattail, Willow	0	Basin flows through perf. MH to unrestricted pipe and backs up into basin - no restrictor unless located downstream.	Verify restrictor.
546	Bloomfield Crossing Sub.	56500	17550	33375	N/A	3	0	1	irregular	4	2	N/A	N/A	Dry	Outlet structure is a dam	N/A	Hydric	Forb, Tree	Purple L., Rush, cattail	0	Adjacent house discharging water from underground source on bank/ inlet 524 has separated end section.	Investigate source of leaking water.
548	Knollwood Pointe	19200	10000	0	N/A	N/A	N/A	N/A	N/A	N/A	2.5	N/A	N/A	Dry		Some At Outflow	Sandy	Turf, Tree	Lawn, Willows, Pines	0	Some erosion DS of inlet 1100, sediment blocking outflow.	Clean outflow pipe.
549	Franklin Ravines Sub.	22500 EST	18300	N/A	N/A	N/A	N/A	4	N/A	N/A	3	150	150	Wet		None	Hydric	Shrub, Tree, Turf	Buckthorn, Willow, Dogwood	0	Manhole structure near inlet is exposed, slumping into basin, has fountain.	Repair manhole.
550	Knollwood Office Plaza	6435	5250	2925	N/A	N/A	N/A	N/A	N/A	N/A	1.5	N/A	N/A	Dry		Deposits From Inlet 1106	Sandy	Shrub, Tree	Buckthorn, Willow	0	Severe erosion at inlet 1106.	Stabilize area around inlet 1106, parking lot my be at risk.
551	Clarendon Crest	N/A	3900	N/A	N/A	N/A	N/A	1	N/A	5	2.5	N/A	N/A	Dry		None	Hydric	Turf, Bare, Tree	Grass	50	No inlets or outlets seen, swale enters from road.	
600	Crofton Sub.	N/A	10050	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.5	N/A	N/A	Dry		None	Sandy	Turf	Lawn	0	Gully on west side. Inlet also serves as outlet, may be restrictor in storm sewer.	Verify restrictor. Remove material in front of inlet.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.3A: Bloomfield Township Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
BLT	602	Quarton Ridge	RB-38	27	NW	N/A	N/A	N/A	n	N/A	Quarton Ridge Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3.9	N/A	N/A	12800
BLT	604	Indianmound Sub.	RB-37	27	SE	N/A	N/A	N/A	n	N/A	Indianwood Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	4.8	N/A	N/A	136550
BLT	606	Gilbert Lake Estates	RB-42	28	NW	N/A	N/A	N/A	n	N/A	Quarton Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	0.1	N/A	N/A	400
BLT	608	Sandlewood Condos	RB-43	28	NW	N/A	N/A	N/A	n	N/A	Quarton Rd. and Telegraph Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	7.5	N/A	N/A	88400
BLT	630	Hammond Lake Estates	N/A	6	NW	N/A	N/A	N/A	n	N/A	Kemp St.			Res.						4			44200
BLT	631	Golling Chrysler	N/A	5	NW	N/A	N/A	N/A	n	N/A	Hood and Telegraph Rd.			Com.						3.2			18600
BLT	632	Oakhills Condos	N/A	12	SE	N/A	N/A	N/A	n	N/A	Auburn Ct., near Long Lake and Adams			Res.						2.6			7000
BLT	633	Willoway Place	N/A	16	SW	N/A	N/A	N/A	n	N/A	Willowway Place			Res.						3.3			25750
BLT	634	Adams Ct.	N/A	25	NE	N/A	N/A	N/A	n	N/A	End of Adams Ct.			Res.						3.7			8800
BLT	635	Covington School	N/A	27	NE	N/A	N/A	N/A	n	N/A	Covington and Quarton			Inst.						1			23050
BLT	636	Meadowlake Farms	N/A	31	SW	N/A	N/A	N/A	n	N/A	7501 Hiddenbrooke Ct.			Res						1.6			11900
BLT	637	Pinehurst Sub.	N/A	33	SE	N/A	N/A	N/A	n	N/A	Lahser/14 Mile			Res.						1.7			800
BLT	638	Shaker Heights	N/A	2	NE	N/A	N/A	N/A	n	N/A	Shaker Heights Drive			Res.						5.1			89950
BLT	682	Westview Basin	N/A	12	SE	N/A	N/A	N/A	n	N/A	Thedford and Westview	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3.6	N/A	N/A	114700
BLT	684	Bloomfield Place Apt.	N/A	5	SW	N/A	N/A	N/A	n	N/A	1655 Bloomfield Place Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BLT	686	MDOT Regional	N/A	2	NE	N/A	N/A	N/A	n	N/A	I-75 and Square Lake Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	22	N/A	N/A	N/A
BLT	910	Maple Village	N/A	28	SW	N/A	N/A	N/A	n	N/A	Maple and Telegraph Rds.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	29800
BLT	912	Maple Village	N/A	28	SW	N/A	N/A	N/A	n	N/A	Maple and Telegraph Rds.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	6.8	N/A	N/A	3450

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.3A: Bloomfield Township Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
602	Quarton Ridge	N/A	3275	N/A	N/A	1	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry		Minimal	Silty	Turf	Lawn	0	Spoke with resident, no prior history of overflow.	Verify restrictor, inlet needs cleaning.
604	Indianmound Sub.	N/A	28450	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	Dry		No	Silty	Turf	Buckthorn	0	Concrete low flow channel.	Verify restrictor.
606	Gilbert Lake Estates	N/A	3550	N/A	N/A	1	N/A	N/A	N/A	N/A	6	N/A	N/A	Dry		No	N/A	Turf	No	50	Outflow not found - overgrown to west.	Clean structures, verify restrictor.
608	Sandlewood Condos	N/A	11800	N/A	N/A	1	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry		No	Silty Clay, Saturated Near Inflows	Turf	No	0		Verify restrictor.
630	Hammond Lake Estates		11050			1.1		N/A			2			Dry		At Structures	Saturated, Hydric	Forb, Shrub	Willow, Phragmites	0	Outlet blocked.	Inlet and outlet need cleaning.
631	Golling Chrysler		5775			N/A		N/A			2			Dry		Minimal	Inundated, Hydric	Forb	Cattail, Rushes	0	No outlet found, buried?	Verify outlet location.
632	Oakhills Condos		2700			0.5		N/A			3			Dry		0.45 At Inlet	Hydric	Forb	Cattail	0		Inlet will need maintenance, verify restrictor.
633	Willoway Place		7800			1.5		N/A			2			Dry		Minimal	Hydric	Forb	Cattail	0		Clean out inlet.
634	Adams Ct.		2380			N/A		N/A			2			Dry		Minimal	Silty	Turf		0	Paved low flow channel, spoke with resident, no prior history of overflowing.	Verify restrictor.
635	Covington School		23050			N/A		N/A			3			Dry		Minimal	loamy clay	Turf		0	no inlet structures, receives drainage from adjacent soccer fields, CB and Beehive in the center	
636	Meadowlake Farms		7400			0.5		N/A			2			Dry		Minimal	silt	Turf		0	2 inlets coming into structure, with outlet	Verify restrictor
637	Pinehurst Sub.		475			N/A		N/A			2			Dry		Minimal	silt loam	Turf		0	surcharges through beehive	
638	Shaker Heights		17600			2		N/A			3			Dry		at structures, approximated	silty	Trees, shrubs, forbs	cattail, Purple L.,buckthorn	0	headwall at inlet in good shape	Grate inlet needs to be completely bolted (bolted only at top) found outlets structure in manhole nearby, did not find in basin
682	Westview Basin		31850			N/A		N/A			18			Dry		N/A	Hydric, Some Clay	Turf		0	Evidence of previous standing water. Fenced - gate needs repair.	Verify restrictor. Repair fence gate.
684	Bloomfield Place Apt.		132900			N/A		3			var			Wet		Minimal	N/A	Forb, Shrub	Algae, Buckthorn, Pondweed	0	No restrictor visible.	Verify restrictor. Nutrient control.
686	MDOT Regional		N/A			N/A		1			4			Wet		Yes. No pool depth	N/A	Tree, Shrub, Forb	Algae, Cattail, Duckweed	75	Strong smell of decayed organics. Excessive algae.	Verify Outflow design. Nutrient control.
910	Maple Village	N/A	7450	N/A	N/A	N/A	N/A	2	irregular	N/A	3	N/A	N/A	Wet	suspected to be 477, misdrawn on map	N/A	N/A	Landscape Plants	No	0	Lava rock edging, fountain, treated for algae.	Verify restrictor.
912	Maple Village	N/A	500	N/A	N/A	N/A	N/A	N/A	irregular	N/A	5	N/A	N/A	Dry Extended Detention	suspected to be 478, misdrawn on map	N/A	N/A	Wetland	Cattail, Poplar	0		

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.3B: Bloomfield Township Detention Basin Inflow Data

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BLT	376	40	Storm.	NW corner	NW corner	21	21	Concrete	Concrete	850	6" sediment.
BLT	376	41	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	850	8" sediment.
BLT	377	42	Storm.	S side	S side	36	36	N/A	Concrete	N/A	Underwater.
BLT	379	43	Storm.	NE corner	NE side	48	48	Concrete	Concrete	859.05	OK.
BLT	380	1038	Storm.		NE corner		N/A		N/A		Underwater.
BLT	380	1039	Storm.		SE corner		N/A		N/A		Underwater.
BLT	382	44	Storm.	NE corner	NE corner	24	24	CMP	CMP	758	Underwater.
BLT	384	45	Storm.	W side	SW corner	36	36	Concrete	Concrete	798.3	Overgrown.
BLT	384	46	Storm.	NW corner	NW corner	18	18	Concrete	Plastic	797.6	OK.
BLT	385	47	Storm.	SW corner	SW corner	12	12	Concrete	Concrete	824.51	75% blocked.
BLT	385	48	Storm.	SE corner	SE corner	18	18	Concrete	Concrete	825.25	4" sediment.
BLT	387	50	Storm to CB.	N/A	middle - from N	N/A	18	N/A	Concrete	904.99	OK.
BLT	388	51	Storm to stone channel.	N/A	SW corner	N/A	12	N/A	Concrete	894.97	Pipe may be separated, 2" sediment.
BLT	389	52	Storm.	E side	E side	18	18	Concrete	Concrete	745.5	3" sediment.
BLT	390	53	Storm.	NE corner	NE corner	21	21	Concrete	Concrete	917	6" sediment.
BLT	391	54	Storm.	NE corner	NE corner	15	15	Concrete	Concrete	839.33	OK.
BLT	391	55	Storm.	NW	NW corner	24	24	Concrete	Concrete	839.3	2" sediment.
BLT	421	147	Storm.	NE corner	NE corner	15	18	Concrete	Concrete	914.12	50% underwater.
BLT	421	148	Storm.	NW corner	NW corner	15	15	Concrete	Concrete	910.9	OK.
BLT	421	149	Storm.	SW corner	SW corner	12	12	Concrete	Concrete	910.68	OK.
BLT	421	150	Crimped rubber end-section.	SE corner	SE corner	15	15	Concrete	N/A	909.96	Unknown.
BLT	439	174		NE corner		240		swale		921.24	
BLT	439	175	Storm.	N side	N side	12	12	Concrete	Concrete	920.67	OK.
BLT	439	176	Storm.	W corner	W corner	15	15	Concrete	Concrete	921	OK.
BLT	471	307	Storm.	S end	E side	24	24	Concrete	Concrete	938.43	N/A.
BLT	471	308	Storm.	N end	W side	18	18	Concrete	Concrete	939.42	N/A.
BLT	471	1048	Swale from parking lot.		E side		48		Concrete		OK.
BLT	472	297	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	781.03	Buried.
BLT	473	1042	Storm.		SE		12		Concrete		1" leaves.
BLT	473	1043	Storm.		SW		12		Concrete		OK.
BLT	474	296	Storm.	E side	E side	N/A	18	N/A	Concrete	N/A	Underwater.
BLT	475	306	Storm to CB.	SW Corner	middle - S. end, from W.	21	21	Concrete	Concrete	N/A	OK.
BLT	476	303	Storm.	NW Corner	NW	30	30	Concrete	Concrete	947.04	Algae.
BLT	476	304	Storm.	W side	W	N/A	18	N/A	Concrete	N/A	OK.
BLT	476	305	Storm.	SW Corner	SW	N/A	30	N/A	Concrete	N/A	OK.
BLT	480	295	Storm.	NW Corner	NW	30	30	N/A	Concrete	N/A	50% blocked sediment and algae.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.3B: Bloomfield Township Detention Basin Inflow Data

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BLT	481	1305	Swale.		SW corner		N/A		Stone		OK.
BLT	482	293	Storm.	NW Corner	NW corner	15	15	Concrete	Concrete	897.29	12" sediment.
BLT	486	1046	Storm.		NE corner		24		Concrete		90% blocked.
BLT	487	309		N side		15		Concrete		903.09	
BLT	543	527				12		Concrete		945.69	
BLT	544	525	Storm.	N Corner	N corner	N/A	12	N/A	Concrete	N/A	OK.
BLT	544	526	Storm.	SE Corner	SE corner	N/A	24	N/A	Concrete	N/A	2" sediment.
BLT	546	523	Storm.	NW corner	NW corner	N/A	12	N/A	CMP	843.85	OK.
BLT	546	524	Storm.	SW corner	SW corner	42	42	N/A	Concrete	843.43	Musty smell, end-section separated.
BLT	546	1068	Storm.		SW end		8		Concrete		OK.
BLT	548	1100	Storm.		W end		18		Concrete		OK.
BLT	548	1102	Storm.		E end		12		Concrete		End section separated.
BLT	549	1104	Storm.		N end		30		CMP		OK.
BLT	550	1106	Storm.		south end		6		Clay		Severe erosion, massive gully, pipe sections fallen in.
BLT	550	1317	Storm.		W end		12		Concrete		OK.
BLT	600	1118	Storm.		NW corner		18		Concrete		Needs some cleaning. Serves as overflow.
BLT	602	1120	Storm.		N end		12		Concrete		Standing water, partially blocked by veg.
BLT	604	1122	Storm.		NE corner		30		Concrete		OK.
BLT	606	1124	Storm.		NE corner		8		N/A		Partially buried, underwater.
BLT	608	1126	Storm.		NE corner		18		Concrete		50% blocked with sediment/veg.
BLT	608	1128	Possibly buried storm.		NW corner		N/A		N/A		Eroded swale.
BLT	630	1040	Storm.		W side		24		Concrete		50% blocked by sediment.
BLT	631	1041	Storm.		N side		36		Plastic		OK.
BLT	632	1302	Storm.		N end		36		Concrete		5" sediment, vegetation blocking.
BLT	633	1303	Storm.		W		N/A		N/A		Buried/underwater.
BLT	634	1045	Storm.		SE end		12		Concrete		Slumped sod blocking.
BLT	634	1304	Storm.		NE corner		10		Concrete		OK.
BLT	636	1306	Storm.		Center		N/A		N/A		Structure, two 12" black plastic inlets.
BLT	637	1307	Storm.		Center		N/A		N/A		Beehive.
BLT	638	1308	66" x 42" elliptical		north end		66 x 42		Concrete		ok, bolt grate at bottom
BLT	686	1324	Storm.		NW corner		12		Concrete		75% blocked with sediment.
BLT	910	1050	Storm.		N corner		24		Concrete		Algae.
BLT	910	1052	Storm.		SW corner		12		Concrete		2" sediment.
BLT	912	1054	Storm.		S end		18		Concrete		2" sediment.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.3C: Bloomfield Township Detention Basin Outflow Data

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
BLT	376	22	8" PVC to 15" Amy Drain	8" PVC to 15" conc.	SE corner	SE corner	8	8	PVC	PVC	850.5	OK.
BLT	379	24	18" conc. pipe with 15" restrictor	Plan shows 15" restrictor to 18".	NW of Basin	SW side	15	15	Concrete	Concrete	860	OK.
BLT	383	26	12" CMP	Unrestricted pipe.	S end of basin	S end	12	12	CMP	CMP	749.6	OK.
BLT	384	27	36" riser pipe		E side		36		CMP		797.75	
BLT	384	1022		Holes in riser to 12" to secondary riser.		S side		Perf. riser to 12		CMP		Blocked holes.
BLT	385	28	6" PVC	Pipe.	NW	NW corner	6	6	PVC	PVC	824	90% blocked.
BLT	387	1020		Unrestricted pipe to MH.		middle flowing SW		18		Concrete		OK.
BLT	388	29		PVC restrictor to structure.	N side	NW corner	N/A	8	N/A	PVC	896.43	Blocked.
BLT	389	30	18" conc. pipe with 4" restrictor	Unrestricted pipe.	SE corner	SE corner	4	18	Concrete	Concrete	744.75	OK.
BLT	390	31	12" conc. pipe, no restrictor	Pipe.	SE corner	SE corner	12	12	Concrete	Concrete	915.5	OK.
BLT	391	32	18" concrete	Unrestricted 15" pipe.	SE corner	SE corner	18	15	Concrete	Concrete	839	2" debris.
BLT	421	89	12" conc. pipe with 6 inch restrictor	Unrestricted pipe.	SE corner	SE corner	6	12	Concrete	Concrete	910	1" sediment.
BLT	439	98	8" pipe (no restrictor indicated on plans)	8" pipe.	S end	S side	8	8	Concrete	RCP	920.1	OK.
BLT	446	1010	15" - no restrictor	Unrestricted pipe.	SE corner	SE corner	15	15	Concrete	Concrete	962	Eroded.
BLT	471	1032		Unrestricted pipe.		S side		30		Concrete		End-section separated.
BLT	472	158	12" conc., with 3" restrictor	Unrestricted pipe to overflow structure.	SE corner	SE corner	3	12	Concrete	Concrete	780.96	Partially blocked by rock.
BLT	473	163	12" min. with 4" restrictor	4" restrictor in 12" conc. Pipe.	N end	E side	4	4	N/A	PVC/Conc	N/A	50% blocked.
BLT	474	157	pipe with 4" restrictor		W side		4		N/A		N/A	
BLT	474	1026		Pipe - restrictor not seen.		W side		15		Concrete		6" sediment.
BLT	475	162	21" conc. 5.5" restrictor	Beehive to 6" restrictor in 21" conc.	SW corner	Middle - S. end, flows S.	5.5	6	Concrete	PVC	936.94	OK.
BLT	476	161	6" with 4.5" restrictor plate	Pipe to CB.	NW corner	NE corner	4.5	6	N/A	PVC	945.84	OK.
BLT	480	156	12" with 7" restrictor plate	Unrestricted CMP.	SE corner	SE corner	7	12	N/A	CMP	N/A	4" debris, no 7" restrictor.
BLT	481	1030		24" to MH with restrictor in pipe from MH to Case Drain.		SE corner		24 to 8		Concrete		OK.
BLT	482	153	18" conc. with 6" restrictor	No 6" restrictor.	SW corner	SW corner	6	18	Concrete	Concrete	896.3	OK.
BLT	482	154	18" conc. with 6" restrictor	No 6" restrictor.	S side	SE corner	6	18	Concrete	Concrete	896.3	Pipe separated.
BLT	486	164	18" with 6" restrictor	18" conc. with approx. 6" restrictor.	N/A	SW corner	6	6	N/A	Concrete	N/A	80% buried.
BLT	499	177	12" concrete pipe with 4" restrictor	Unrestricted pipe.	SE corner	E corner	4	12	Concrete	Concrete	866.94	OK.
BLT	543	291	12" conc. with 4" restriction	24" dia. CMP perforated riser to 12" flowing NW.	N/A	NW corner	4	12	Concrete	N/A	945.04	OK.
BLT	544	290	Standpipe?	Riser structure with 4" restrictor to 12" pipe.	SW corner	SW corner	N/A	4	N/A	PVC	N/A	OK.
BLT	545	289	30" concrete	36" conc. to perf. MH to 36" - with 36" Inflow from the west.	SW Corner	SW corner	30	36	Concrete	Concrete	847.3	No restrictor.
BLT	546	288	weir structure with 16" opening		NE corner		16		Dam		842	
BLT	546	1040		24" concrete, no restrictor.		south end		24		Concrete		OK.
BLT	548	1102		24" pipe.		E end		24		Concrete		Sediment blocking.
BLT	549	1106		Weir structure.		south end		N/A		N/A		Debris DS of structure, unable to measure due site access.
BLT	550	1108		12" conc, no restriction.		N end		12		Concrete		3" sediment.
BLT	602	1110		12" conc. No restriction.		south end		12		Concrete		No restrictor.
BLT	604	1112		18" pipe with bar grate.		SE end		18		Concrete		Debris on bar grate.
BLT	608	1114		12" unrestricted pipe.		SE corner		12		Concrete		OK.
BLT	630	1309		Beehive with concrete headwall.		E end		N/A		N/A		Blocked by debris.
BLT	632	1041		18" conc., no restriction.		SW corner		18		Concrete		OK.
BLT	633	1042		Beehive to 12" conc.		N side		12		N/A		OK.
BLT	634	1043		12" conc.		NW corner		12		Concrete		No restriction observed.
BLT	635	1044		Unrestricted 12" concrete.		Center		12		Concrete		OK.
BLT	682	1302		Unrestricted pipe.		NW corner		15		Concrete		No restrictor.
BLT	684	1304		Unrestricted pipe.		N end		96		Concrete		OK. Algae.
BLT	686	1310		Unrestricted pipe.		NW corner		24		Concrete		6" sediment.
BLT	910	1034		48" wide structure under gazebo.		E side		N/A		N/A		Inaccessible.
BLT	912	1036		36" wide perforated riser to 6" restrictor.		S side		6		N/A		OK.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.3D: Bloomfield Township Detention Basin Overflow Structure Data

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
BLT	376	15	CB to manhole	30" structure to 24" concrete.	SE corner to Amy Drain	854.2	OK.
BLT	377	16	overflows over clay berm	Sodded spillway.	West side	942	OK.
BLT	379	17	riprap spillway	60" wide concrete spillway to I-75 ditch.	SW side	863.7	OK.
BLT	380	18	Sodded Spillway	Grass spillway to 4" PVC to Eastway.	SW corner	850.22	OK.
BLT	382	20	riprap spillway	Riprap spillway to stream.	S end	748	OK.
BLT	384	21	riprap spillway (?)			800.02	
BLT	384	1021		36" wider riser to 12" pipe to 60" wide secondary riser, 2.3' above primary riser, to 48" concrete.	S side		OK.
BLT	385	22	Beehive CB	CB.	N/A	823.88	Mesh in front needs removal.
BLT	387	24	Spillway			906.3	
BLT	388	25	overflow	24" wide structure to 21" concrete.	NW corner	897	8" sediment.
BLT	389	26	CB to manhole	CB to manhole.	N/A	751	OK.
BLT	390	27	Storm manhole serves as overflow?			923	
BLT	421	55	18" conc. pipe through berm above outlet pipe			915	
BLT	421	56	Sodded Spillway			915.5	
BLT	421	1018		18" concrete flows towards Telegraph.	SE corner		OK.
BLT	439	63	Retention overflow ditch at south end.	Overflows south to ditch.	S side	922.5	OK.
BLT	472	104	Stabilized spillway, 10 foot width	Beehive structure to 3" PVC restrictor in outflow pipe instead of pipe from basin.	SE corner	784	Provides no overflow.
BLT	473	106	5' wide spillway			N/A	
BLT	474	1036		48" wide structure.	West side		100% sediment filled.
BLT	476	105	Top of stand pipe	Beehive structure to 21" HDPE.	NE corner	953.65	OK.
BLT	481	1028		Overflows east over berm to CB.	E side		OK.
BLT	486	107	riprap overflow at SE side	Pump may be for overflow.	SW corner	793.5	OK.
BLT	543	156	spillway?			947.6	
BLT	544	155	Overflow structure	36" CMP with grate.	N/A	853.3	OK.
BLT	546	1080		4' grate, 4' pipe leaving.	South end		Part of structure broken.
BLT	548	1104		Grassed spillway.	E side		OK.
BLT	604	1108		18" pipe with bar grate.	SE end		
BLT	631	1303		Riprap spillway to Hood Rd.	South end		OK.
BLT	635	1041		Beehive.	Center		OK.
BLT	635	1301		CB.	Center		OK.
BLT	638	1043		grassed overflow	s end		OK
BLT	910	1030		Beehive.	S end		OK.
BLT	912	1032		Beehive.	S end		OK.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.4A: OCDC Detention Basin Data

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSETMAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
RHC	312	Lueders Drain Regional - Phase II	29-426-004-0115	29	SE	N/A	005; HRC 870725	HRC 4/24/96 AB	y. No calcs.	y	S. of Austin Ave.	Owner	Oakland County Drain Comm., Ch. 20 Lueders Drain Dist., 1 Public Works Dr., Waterford, MI 48328-1907	Com.	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	526600
RHC	331	Robert Evans Drain Regional - Outlot B	31-201-048-0354	31	NE	N/A	N/A	1976 (8/2/74 Johnson & Anderson)	n	n	Willet Ave.	Owner	Drainage Board for Ch. 20 The Robert J Evans Relief Drain, 1 Public Works Drive, Waterford, MI 48328, 1-248-858-0958	Res.	N/A	N/A	N/A	N/A	14	9	N/A	N/A	3094000
WBT	394	Amberleigh Sub.	N/A	33	NE	N/A	N/A	AB 9/27/99 Zeimet Wozniak	y	N/A	W. of Brook Hollow Ct. and S. of Beechtree Trail	Owner	OCDC, Ch. 18	Res.	40.2	500	N/A	43	5.4	5.3	197493	206450	245700
WBT	407	Maplecreek Condo 2	N/A	34	NW	N/A	N/A	AB 12/12/94 Giffels-Webster	no calcs	N/A	Walnut Creek Circle	Owner	OCDC, Ch. 18	Res.	10.45	100	N/A	0.32	3	2.2	N/A	N/A	46300
WBT	409	Maple Creek Condos 4	N/A	34	NW	N/A	N/A	8/16/95 for OCRC Review	some	N/A	Trailview & Maple Creek	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	6	6	N/A	N/A	81100
WBT	414	Maple Creek Condos 4	N/A	34	SW	N/A	N/A	8/16/95 OCRC Review	some	N/A	Trailridge & Treeline Dr.	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	N/A	5	N/A	N/A	172400
WBT	415	Maple Creek Condos 3	N/A	34	NE	N/A	N/A	AB 9/94 Giffels Webster Engineers	Plan incomplete. No calcs.	N/A	Forestview Dr.	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	7.45	5.3	N/A	N/A	149000
WBT	416	Maple Creek Condos 2	N/A	34	NE	N/A	N/A	AB 9/94 Giffels Webster Engineers	Plan incomplete. No calcs.	N/A	end of Maple Creek Ct.	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	1.47	2.65	N/A	N/A	338550
WBT	419	Maple Place - W basin	N/A	32	NE	N/A	N/A	AB 3/19/87 Zeimet/Wozniak	Plan incomplete. No calcs.	N/A	Maple Lakes	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	177000
WBT	422	Maplewoods Sub.	N/A	27	SW	N/A	N/A	Revised AB 12/29/92 Zeimet/Wozniak	plans incomplete	N/A	Peggy St.	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	N/A	2.5	N/A	N/A	41600
WBT	454	Westwood Office Center	N/A	35	SW	N/A	N/A	12/17/86 Kaipio Survey	y	N/A	E. of Orchard Lake Rd., N. of Fourteen Mile	Owner	OCDC, Ch. 18	Com.	2.07	100	0.42	0.63	4	3.8	14626	16558	20500
WBT	487	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	S. of Applewood	Owner	OCDC Ch. 18	Res.	13.1	100	2.5	0.5	7	5.8	77689	77975	82900
WBT	500	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	E of Chimney Hill Dr. - N basin	Owner	OCDC Ch. 18	Res.	24.7	10	4.94	0.5	1.2	N/A	51147	52630	N/A
WBT	501	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	some calcs missing	N/A	E of Chimney Hill Dr. - W basin	Owner	OCDC Ch. 18	Res.	N/A	N/A	N/A	0.5	3	3.7	N/A	N/A	11700
WBT	502	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	E of Chimney Hill Dr. - S basin	Owner	OCDC Ch. 18	Res.	1.767	100	12.14	0.5	3	5.1	35476	36430	46000
WBT	503	Woodcliff on the Lake	N/A	22	NW	N/A	N/A	Herman Frankel AB 8/31/90	Calcs no complete. Some of plans unreadable.	N/A	Panorama Cir., near Orchard Lake and Pontiac Trail	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	N/A	3	94546	95370	53000
WBT	514	Perrytown Estates	N/A	28	SE	N/A	N/A	S.J Harb & Assoc. AB 11-26-85	incomplete	N/A	Cedarhurst Dr.	Owner	OCDC, Ch. 18	Res.	4.63	N/A	N/A	0.3	N/A	N/A	8248.75	N/A	N/A
WBT	521	Village Square	N/A	33	SE	N/A	N/A	Ziement and Wozniak AB1-16 98	some	N/A	Village Square Ct.	Owner	OCDC, Ch. 18	Res.	66.58	100	N/A	N/A	N/A	3	N/A	817500	208800
WBT	523	Autumn Ridge Estates	N/A	22	SE	N/A	N/A	Giffels Webster - AB 4/18/88	No calcs	N/A	Autumn Ridge Dr.	Owner	OCDC Ch. 18	Res.	40.36	N/A	N/A	N/A	N/A	6.5	N/A	N/A	80600
WBT	903	Maple Place - E basin	N/A	32	NE	N/A	N/A	N/A	Plan incomplete. No calcs.	N/A	Maple Lakes	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	N/A	3.8	N/A	N/A	120900

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.4A: OCDC Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
312	Lueders Drain Regional - Phase II	N/A	87800	N/A	est. 2.2	2.2	est. 2.5	3	irregular	N/A	var	N/A	N/A	Wet	Records 1990.	Needs Dredging	N/A	Tree, Shrub, Forb	Cattail, Phragmites, Algae	0	E side of basin has turf, has significant toe erosion.	Dredge, verify restrictor.
331	Robert Evans Drain Regional - Outlot B	N/A	343800	N/A	N/A	N/A	N/A	5	irregular	2	var	est. 940	est. 400	Wet	Robert J. Evans Relief Drain inline detention pond - contact OCDC for calcs	At Inflows	Historically Peat Bottom	Turf, Woods	Buckthorn, Purple L.	0	Resident complained of algae, odor - needs dredging.	Dredging. Nutrient control.
394	Amberleigh Sub.	53000	46350	21500	0.5	1	3.6	0.3	triangular	6	4	245	285	Dry	detention basin has forebay with standing water	Basin/Forebays Full	N/A	Sedge And Forb	No	0	Geese, sediment traps full, active construction. No 8" restrictor.	Verify restrictor. Dredge, nutrient control, buffer.
407	Maplecreek Condo 2	N/A	21000	N/A	0.5	1	N/A	2	irregular	6	4	315	120	Wet		Minimal	N/A	Willow, Forb	Cattail, Duckweed, Bulrushes	25	Fountain - not on.	Verify restrictor, clean structures, nutrient control.
409	Maple Creek Condos 4	N/A	13500	N/A	1	0.5	1	0.75	oval	6	1.5	112	75	Dry		0.3	N/A	Turf, Grass	Algae, Cattail	0	Outfall to stream OK.	Verify restrictor, clean structures, increase buffer, nutrient control.
414	Maple Creek Condos 4	N/A	34500	N/A	1	N/A	3	2.5	irregular	6	4	220	335	Wet	receives flow from nearby wetland and sediment basin	>1 In Trap, 0.75 Basin	N/A	Turf, Tree	Wetland	0		Buffer.
415	Maple Creek Condos 3	N/A	28100	N/A	N/A	1.7	N/A	0.5	irregular	6	3	N/A	N/A	Dry Extended Detention		>1, No Pool Depth	N/A	Grass, Tree	Sedges, Rushes, Arrowhead	50	Sediment basin riser still in place.	
416	Maple Creek Condos 2	N/A	127750	N/A	1	N/A	2	N/A	irregular	N/A	6	595	250	Dry		Minimal	Hydric	Wetland	Purple L., Some Algae	0	Geese, active construction eroding to Inflow 63.	Verify restrictor, dredge, erosion control, clean structures.
419	Maple Place - W basin	N/A	29500	N/A	N/A	N/A	N/A	7	irregular	5	2.5	N/A	N/A	Wet		1	N/A	Turf	Some Attached Algae	0	Algaecide application posted; drains unrestricted to basin 903; inflows underwater; fountain. Goose droppings.	Veg. buffer. Goose and nutrient control. Use as sediment trap for second basin.
422	Maplewoods Sub.	N/A	16650	N/A	N/A	N/A	N/A	N/A	irregular	N/A	5.5	N/A	N/A	Dry		Minimal	N/A	Turf	No	0	Backyard depression, pipes to and from CB structures.	Area used by residents - retrofit may be discouraged.
454	Westwood Office Center	6578	5400	735	N/A	N/A	0	N/A	irregular	N/A	3	N/A	N/A	Dry Catchbasin	pipe sloped toward basin serves as outlet? Has 3 in restrictor.	<0.5	Poorly Drained	Turf	No	0	CB blocked, inflows submerged, ponding.	Clean structures.
487	Chimney Hills Apt.	N/A	14300	N/A	0.5	N/A	N/A	N/A	irregular	5	2	N/A	N/A	Dry		N/A	N/A	Turf	No	0	Storm sewer restricted and backs up into basin. Sand dumped on E bank.	Clean structures, remove stockpile.
500	Chimney Hills Apt.	N/A	15500	N/A	N/A	N/A	N/A	N/A	irregular	5	2	N/A	N/A	Dry	basin 498 also drains to outlet structure	N/A	Hydric	Turf	Purple L., Cattail, Willow	0	Storm sewer restricted and backs up into basin.	Verify restrictor, clean structures.
501	Chimney Hills Apt.	3300	3150	400	N/A	N/A	N/A	N/A	triangular	5	2	110	60	Dry	drains to basin 502 where restrictor is located.	N/A	Hydric, Type C/D	Turf	Cattail, Purple L.	0	Storm sewer restricted and backs up into basin. small basin with no overflow so depth could not be determined.	Verify restrictor.
502	Chimney Hills Apt.	N/A	9000	N/A	N/A	N/A	N/A	N/A	irregular	5	2	N/A	N/A	Dry	last basin in series. All basin connected to this basin.	N/A	Hydric	Turf	Cattail, Purple L., Willow	0	Storm sewer restricted and backs up into basin. Restrictor installed at beehive.	
503	Woodcliff on the Lake	N/A	17650	N/A	N/A	1	N/A	1	irregular	6	2.5	N/A	N/A	Dry		Erosion At Inflow 334	N/A	Wetland	Cattail, Purple L.	0	Flows bypass restrictor - not grouted in, Inflow 333 buried.	Repair end section Inflow 334, clean structures, Grout restrictor in place.
514	Perrytown Estates	N/A	21300	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	N/A	N/A	N/A	Wetland		N/A	N/A	Wetland, Grass		0	Overgrown. No outflow on plans and none found. Site inaccessible.	Clean structures. Verify storage.
521	Village Square	N/A	69600	N/A	N/A	2	N/A	3.5	irregular	N/A	3	N/A	N/A	Wet		N/A	N/A	Turf	Purple L.	0	No Outflow found. Five geese killed.	Verify Outflow. Clean structures.
523	Autumn Ridge Estates	N/A	12400	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2	N/A	N/A	Wetland		N/A	N/A	N/A		0	No outlet found. Inflows 374 and 375 not found. Area from aerial.	Verify outflow/restrictor, Repair end section Inflow 371. Clean structures.
903	Maple Place - E basin	N/A	31800	N/A	N/A	N/A	N/A	8	irregular	5	2.3	N/A	N/A	Wet		N/A	N/A	Turf	Some Algae	0	Algaecide applied; fountain; connected unrestricted to basin 419. Goose droppings.	Veg. buffer. Goose and nutrient control.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.4B: OCDC Detention Basin Inflow Data

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
RHC	312	1310	Storm.	NE corner	NE	42	36	Concrete	Concrete	N/A	Gabion stabilized, debris on grate.
RHC	312	1311	Storm.	NW corner	NW corner	18	15	Concrete	Concrete	N/A	No grate, OK.
RHC	331	123	Open drain to 72" CMP.	N end	N end	72	72	Concrete	CMP	812.81AB	Pipe separated N of berm. Sediment bar from open channel.
RHC	331	1314	Concrete pipe with bar grate.		NE corner		72		Concrete		Sediment and algae in front.
RHC	331	1315	Storm.		W side		48		Concrete		Algae, sediment, aquatic veg. in front.
RHC	331	1316	Storm.		S half of W side		12		Concrete		OK.
WBT	394	62	Storm.	NW corner	NW corner	N/A	N/A	N/A	Concrete	N/A	Sediment.
WBT	394	63	Storm.	NE corner	NE corner	N/A	48	N/A	Concrete	N/A	Sediment.
WBT	407	87	Storm.	NW corner	SW corner	12	12	Concrete	Concrete	932.03	OK.
WBT	407	88	Storm.	SW corner	SE corner	12	12	Concrete	Concrete	931.87	6" sediment, veg.
WBT	407	89	Storm.	NE corner	N side	12	12	Concrete	Concrete	931.65	OK.
WBT	409	92	Storm.	W side	SW corner	24	24	Concrete	Concrete	922.04	OK.
WBT	409	93	Storm.	S side	W side	21	21	Concrete	Concrete	919.69	OK.
WBT	414	114	Storm.	E side (e6)	E side	12	12	Concrete	Concrete	911.5	OK.
WBT	414	115	Storm.	E in sediment basin upstream (es14)	S of sediment trap	27	18	Concrete	Concrete	917.75	OK.
WBT	414	116	Storm.	N end of the sediment basin upstream (es3)	N side of sediment trap	18	18	Concrete	Concrete	919	OK.
WBT	415	130	Storm.	NW corner (es6)	NW corner	12	12	Concrete	Concrete	919.97	Blocked.
WBT	415	131	Storm.	W side (es7)	W side	21	21	Concrete	Concrete	918.02	4" sediment.
WBT	415	132	Storm.	N end of basin (es5)	N side	N/A	18	N/A	Concrete	920.1	6" sediment.
WBT	416	135	Storm.	SW corner (es3)	SW corner	18	18	Concrete	Concrete	924.9	OK.
WBT	416	136	Storm.	W side (es2)	W side	18	18	Concrete	Concrete	925.1	OK.
WBT	419	143	Storm.	S end, N pond	SW corner	15	N/A	N/A	N/A	N/A	Underwater.
WBT	419	144		W end, N pond		24		N/A		N/A	
WBT	422	151	Pipe to West beehive.	NW corner	NW corner	18	18	Concrete	Concrete	RIM 48.47	OK.
WBT	422	1013	Pipe to East beehive.	NE corner	NE corner	12	12	Concrete	Concrete	RIM 45.8	OK.
WBT	454	193		E corner		12		Concrete		884.4	
WBT	454	194		NW corner		12		Concrete		884.5	
BLT	487	309		N side		15		Concrete		903.09	
WBT	503	333	Storm.	SE corner	SE corner	12	12	Concrete	Concrete	N/A	Completely buried.
WBT	503	334	Storm.	NE corner	W side	24	24	Concrete	Concrete	957.85	End-section separated.
WBT	503	335	Storm.	N end	N end	18	24	Concrete	Concrete	N/A	50% underwater.
WBT	514	338	Pipe from CB.	S end	S corner	12	12	N/A	Concrete	969.4	Not found at basin.
WBT	521	367		S side		8		Concrete		N/A	
WBT	521	368		SW corner		N/A		Concrete		N/A	
WBT	521	369		W side		N/A		Concrete		N/A	
WBT	521	370		NW corner		8		Concrete		N/A	
WBT	523	371	Storm.	NE Corner	NE corner	12	12	Concrete	Concrete	908.14	End-section separated.
WBT	523	372	Storm.	W side	W side	12	12	N/A	Concrete	N/A	End-section eroded.
WBT	523	373	Storm.	S side	S side	12	12	Concrete	Concrete	901.54	1" sediment.
WBT	523	374		SE Corner		12		Concrete		901.96	
WBT	523	375		NW corner		12		Concrete		904.05	
WBT	523	376	Storm.	S side	S side	15	15	Concrete	Concrete	904.58	1" sediment.
WBT	523	377	Storm.	SW side	SW corner	18	18	Concrete	Concrete	907.27	6" sediment.
WBT	903	141	Storm.	SW end	E side	15	N/A	N/A	N/A	N/A	Underwater.
WBT	903	142	Storm.	S end	S side	18	est. 21-24	N/A	Concrete	N/A	Underwater.
WBT	903	1301	Culvert from basin 419.	SE corner from basin 419	NW corner	24	96 x 72 arch culvert	CMP	CMP	954.3	OK.

– If a Basin ID is not referenced in this Table, there were no Inflows, Outflows, or Overflows found on the plans or in the field.
– If all of the plan review information for an Inflows, Outflows, or Overflows is blank, then there was no plan information available.
– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.4C: OCDC Detention Basin Outflow Data

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
RHC	312	1046	46 x 60 concrete pipe to 8" orifice at MH to 36"	42" x 60" arch pipe, no restrictor.	W side	W side	8	42 x 60	Concrete	arch	805	Vegetation in front.
RHC	331	74	pipe extension added; no restrictor	Unrestricted pipe.	S side	S side	24	24	CMP	CMP	809.53	Underwater.
WBT	394	1008	15" - 8" restrictor	Unrestricted pipe to overflow structure.	SE corner	SE corner	8	15	Concrete	Concrete	N/A	OK.
WBT	407	51	18" concrete pipe with 4" restrictor d/s of outlet ES	Unrestricted pipe.	SE corner	N side	4	18	Concrete	Concrete	930.51	Inlet partly covered by 8" board.
WBT	409	53	24" conc. with 8" restrictor	Unrestricted pipe.	E side	NE corner	8	24	Concrete	Concrete	919.45	OK.
WBT	414	70	15" outlet with 6" restrictor	Unrestricted pipe.	SE side	SE corner	6	15	Concrete	Concrete	910.9	OK.
WBT	415	78	Outflow is a 36" CMP riser pipe at south end of basin. Recorded elevation is located at top of bar grate?	Three 8" slits in 4' high, 36" wide CMP riser to 15".	S end	S side	36	15	CMP	HDPW	917.49	Partly silted gravel jacket.
WBT	416	84	ES3, 12" pipe with 4" restrictor	Unrestricted pipe.	SE side	SE side	4	12	Concrete	Concrete	924.9	OK - no 4" restrictor.
WBT	419	87	unrestricted culvert to basin 903	8' wide by 6' CMP arch culvert to basin 903.	SE corner	SE corner	24	96 x 72	CMP	CMP	954.3	1-2' sediment and riprap.
WBT	422	90	12" conc. to CB structure with two inflows. CBs backup into basin.	12" pipe with 6" restrictor where it leaves W beehive.	W side	W side	12	6	Concrete	Concrete	N/A	OK.
WBT	454	108	Outlet pipe to Orchard Lake Road. 12" pipe slope toward basin, with 3" restrictor in downstream manhole	CB to pipe.	NW corner	middle	3	N/A	Concrete	N/A	884.4	Blocked.
WBT	487	165	CB structure, same as inlet, entire structure overflows to basin. 6" restrictor in 12"	Unrestricted pipe.	N side	N side	6	24	Concrete	Concrete	900.87	50% blocked with sediment.
WBT	500	178	12" conc. pipe with 8" VCP restrictor	Unrestricted pipe.	SW corner	SW corner	8	12	Concrete	Concrete	893.56	Need to remove veg.
WBT	501	179	12" conc., no restrictor (located downstream)	Unrestricted pipe.	E side	E side	12	12	Concrete	Concrete	893.82	OK.
WBT	502	180	24" conc., with 12" grouted restrictor @ manhole 6 (see plan)	24" pipe to beehive with 4" restrictor at beehive.	S end	S side	12	4	Concrete	Concrete	892.55	OK.
WBT	503	181	24" conc., restrictor located at downstream manhole	24" pipe with 8" restrictor.	S end	S end	24	8	Concrete	PVC/Conc	N/A	Restrictor not grouted in - flows bypassing.
WBT	521	185	12"		SE corner		12		Concrete		N/A	
WBT	903	1012		4" PVC riser to CB.		E side		4		PVC		OK.

Table 8.4D: OCDC Detention Basin Overflow Structure Data

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
RHC	312	1201	riprap spillway	Riprap spillway to county drain.	West side	N/A	OK.
WBT	394	29	Spillway	7' wide structure to 27" concrete.	SE corner	924.5	OK.
WBT	407	35	grassed spillway			936	
WBT	407	1064		48" wide structure to approx. 30" pipe.	N side		OK.
WBT	409	37	Spillway, grassed and ripraps	48" wide structure to 24" concrete to stream.	NE corner	925	OK.
WBT	414	46	Rip rap overflow spreader on SE side	48" structure to 21" concrete.	SE corner	918	OK.
WBT	415	51	sodded overflow	36" wide CMP riser with gravel jacket to 15" HDPE.	S side	N/A	OK.
WBT	416	54	overflow structure is a 12 pipe a foot above 100 year elevation	48" wide structure to 18" pipe.	SE side	926.47	OK.
WBT	454	1009		Pipe to MH.	NW corner		Half buried.
WBT	487	108	Beehive at SE corner.	Beehive to 12" concrete.	N side	908	OK.
WBT	502	110	CB to ditch	Beehive to pipe.	S end	894.95	OK.
WBT	503	111	sod overflow	Perforated manhole lid - outflowing pipe underwater.	S end	N/A	OK.
WBT	521	113	5' diameter. MH			N/A	

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– If all of the plan review information for an Inflows, Outflows, or Overflows is blank, then there was no plan information available.
– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.5A: City of Rochester Hills Detention Basin Data

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
RHC	303	True Green Chemlawn	28-303-015-0154	28	SW	N/A	517	1984 John W. Payne	y	n	2711 Commerce	Owner	Trugreen of Detroit-Rochester Hills, C/O Rash #916-22-47150, P.O. Box 1600, Rowlett. TX 75030-1600	Com.	2.3	10	N/A	0.71	est. 2	2	9,699	10,460	9000
RHC	305	M.O.L. Investment	28-351-020-0123	28	SW	N/A	405 (83-405MF)	1983	y	n	2776 Commerce	Owner	Schain Properties LLC, 2776 Commerce Dr., Rochester Hills, MI 48304-3402	Com.	2.3	10	N/A	0.7	4.25	6.2	9,265	N/A	25100
RHC	307	Hi-Tech	28-376-019-0129	28	SW	15-28-376-019	603	1987	no calcs	n	2798 Product Dr.	Owner	Hi Tech Mold and Engineering Inc., 2775 Commerce Rd., Rochester Hills, MI 48309-3815	Ind.	N/A	10	N/A	N/A	approx. 3	3.2	4,161	5,159	2300
RHC	308	Guardian Angel	28-377-008-0001	28	SW	15-28-377-008	N/A	1984. plan for addition 8/22/01 Cheryl Ball, John Asselin & Assoc.	No details	n	1715 Northfield Dr., near Crooks	Owner	Kassab Management LLC, 291 Cross Creek Blvd., Rochester Hills, MI 48306-4566	Ind.	0.64 (orig. 1.15)	10	N/A	0.8 (orig. 0.48)	2.07	2.6	5064.4 (orig. 4,000)	N/A	1750
RHC	309	Northfield Industrial	28-377-016-0132	28	SE	N/A	831	1978 AB 9/19/78 Morrison & Peters	n	y	E. of Product, N. of Northfield	Owner	Northfield Industrial Park, 1180 Big Beaver Rd., Troy, MI 48083-1934	Ind.	N/A	N/A	N/A	N/A	est. 15	N/A	N/A	est. 308,400	N/A
RHC	311	Devondale Warehouse	29-402-008-0329	29	SE	N/A	134	1980 Feldhauser Assoc.	y	n	2385 Devondale	Owner	Robert L. Moncrieff, 6230 Sandshores Dr., Troy, MI 48085-1357	Com.	0.2	10	N/A	0.6	1.5	1.3	4,861	5,400	7800
RHC	312	Lueders Drain Regional - Phase II	29-426-004-0115	29	SE	N/A	005; HRC 870725	HRC 4/24/96 AB	y. No calcs.	y	S. of Austin Ave.	Owner	Oakland County Drain Comm., Ch. 20 Lueders Drain Dist.,1 Public Works Dr., Waterford, MI 48328-1907	Com.	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	526600
RHC	313	NY Coney	29-427-004-0122	29	SE	N/A	123	1989 Urban Land Consultants	y	y	2652 Crooks Rd.	Owner	Christenson and Christenson Commercial, 435 E. Maple Rd., Troy, MI 48083-2720	Com.	2.67	10	N/A	0.9	5.18	4.2	18,565	19,568AB	18500
RHC	314	Colonial Mini Storage	29-427-017-0002	29	NE	N/A	N/A	1989 (12/2/87 GWE)	some	n	2570 Colonial Dr.	Owner	Nolan Brothers of Texas Inc., P.O. Box 101835, Fort Worth, Texas 76185-1835	Com.	6.59 Colonial MiniStorage	10	N/A	0.8 Colonial MS	N/A	N/A	39,850 Colonial MS	N/A	N/A
RHC	315	Red Roof Inn	29-427-018-0001	29	SE	15-29-427-033 and 15-29-427-018	N/A	1988	some	yes, Mcdonald's also	2500 Colonial Dr.	Owner	Acor North America Red Top Property LLC, P.O. Box 117508, Carrolton, Texas 75011-7508	Com.	4.07 Red Roof; 1.21 McDonalds	10	N/A	0.9; 0.9	N/A	N/A	28,108 Red Roof; 8,361 McDonalds	N/A	N/A
RHC	318	Lueders Drain Regional - Midvale basin	29-452-019-0358	29	SE	N/A	RHC E90-011; HRC 870725	10/20/1988 HRC	some. no calcs	n	N. of Midvale Dr.	Owner	Paul Colwell, 24215 W. River Rd., Grosse Ile, MI 48138-1658	Res.	N/A	N/A	N/A	N/A	est. 4	N/A	N/A	est. 320,000	N/A
RHC	319	Auburn Place	29-477-029-0328	29	SE	N/A	621; Micro85-621	1985 AR Decker & Assoc.	y	n	NW corner of Crooks and Auburn Rd.	Owner	Curtis Properties Inc.,5364 Cheltenham Dr., Troy, MI 48098-2470	Com.	3.22	10	0.64	0.8	5	5.3	19,344	17,700 and 4,170 on parking area	20400
RHC	320	Crooks Road Medical Center	29-477-034-0069	29	SE	N/A	N/A	1988 Nowak & Fraus	y	y	2840 Crooks Rd.	Owner	(North bldg.) 2820 Crooks, OSC Properties, 2820 Crooks,Suite 200, Roch. Hls., MI 48309-3607,(South bldg.) 2840 Crooks, Levon & Ann Derdian, 3510 Metemora, Metamora, MI 48455-9345	Com.	2.66	10	N/A	0.8	2.6	N/A	15,981	N/A	N/A

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.5A: City of Rochester Hills Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
303	True Green Chemlawn	N/A	4500	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	6	est. 153	est. 30	Dry Catchbasin		Minimal	N/A	Turf	No	0	Plans show some rear parking lot storage.	Verify restrictor.
305	M.O.L. Investment	N/A	4050	middle est. 3,520	N/A	N/A	N/A	N/A	rectangular	5	3	110.5	27.6	Dry		Minimal	N/A	Turf	No	0	Cobble bottom.	Verify restrictor, clean structures.
307	Hi-Tech	est. 2,550	730	N/A	N/A	N/A	N/A	N/A	V-shaped	N/A	4	est. 180	est. 10-25	Dry Catchbasin	Records 1991.	Minimal	N/A	Turf	No	0	Outlet structure eroded around frame.	Stabilize outlet.
308	Guardian Angel	N/A	675	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	Dry	Note on plan says addition not built. Three 0.5 ft x 0.5 ft openings in bottom of 6 ft high concrete wall to the south for drainage. Records 1991.	Minimal	N/A	Turf	No	75	No inflows to basin.	Verify restrictor.
309	Northfield Industrial	est. 42,050 (20,560 at middle)	23300	N/A	N/A	N/A	N/A	N/A	rectangular	3	3	est. 290 (235 at middle)	est. 235 (88 at middle)	Pumped Detention	ADCO Properties Project; drains to 310. Flooding 1999.	Some - Turbid Water	N/A	Grass, Sedge, Forb	Algae, Pondweed	0	6' fence with barbed wire, pumped basin, outlet pipe not seen - underwater?	Verify outflow pipe is not blocked.
311	Devondale Warehouse	est. 10,200	6000	N/A	0.5	N/A	N/A	N/A	rectangular	4	3	top est. 170	top est. 60	Dry	shallow depression bermed on two sides	No	Type B/C	Turf	No	100	Black residue from metal shop.	Clean parking lot CB and pavement - metal finings.
312	Lueders Drain Regional - Phase II	N/A	87800	N/A	est. 2.2	2.2	est. 2.5	3	irregular	N/A	var	N/A	N/A	Wet	Records 1990.	Needs Dredging	N/A	Tree, Shrub, Forb	Cattail, Phragmites, Algae	0	E side of basin has turf, has significant toe erosion.	Dredge, verify restrictor.
313	NY Coney	est. 6,600	4400	est. 2,275	1	N/A	N/A	N/A	boot-shaped	3	1	middle est. 88	middle est. 48	Dry	6 ft. fence; low flow channel; temporary sediment trap at inflow pipe	Minimal	Sandy	Grass, Forb	No	100	No fencing.	Verify restrictor.
314	Colonial Mini Storage	N/A	137600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Wetland	3 sites drain to wetland (Red Roof Inn, McDonalds, Colonial MiniStorage). Records 1990.	N/A	N/A	Wetland, Tree	No	0	Area from City GIS. Storm discharging to ditch along NE side of wetland, no controlled outlet.	
315	Red Roof Inn	N/A	137950	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Wetland	3 sites drain to wetland (Red Roof Inn, McDonalds, Colonial MiniStorage). Records 1990.	N/A	N/A	Shrub, Forb, Duckweed	Buckthorn, Nettles	0	Area from City GIS. Inflows 111 and 112 not found, no controlled outlet, storm discharges to wetland.	
318	Lueders Drain Regional - Midvale basin	est. 85,000	246200	est. 75,000	est. 1	N/A	N/A	1	roughly triangular	6	var	est. MID 400	est. MID 325	Wet		Approx. 2	N/A	Tree	Buckthorn, Algae	100	No outlet found. 18" appears to be entering basin from MH at Midvale Dr. - not found.	Verify restriction. Dredge. Clean structures.
319	Auburn Place	est. 6,825	3850	est. 1,890	N/A	N/A	N/A	N/A	rectangular	14 - 21%	2	est. MID 90	est. MID 45	Dry	minor sediment and debris, cattails, no buffer. Records 1990.	Some, <1	Poorly Drained Sediment	Grass, Sedge	Reed, Cattail	0	50% 6' fence and 50% 4' wall, restrictor two MHs downstream, recently mowed.	
320	Crooks Road Medical Center	est. 13,500	16150	N/A	N/A	N/A	N/A	1	rectangular, one end wider	N/A	1	est. TOP 225	est. top 60	Wetland		1	N/A	Turf, Shrub	Phragmites, Purple L., Duckw	0	Inflow 97 and Outflow 56 not found. AB plan says outflow not built.	Clean structures. Construct outlet.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.5A: City of Rochester Hills Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
RHC	321	Michigan Humane Society	30-376-003-0110	30	SW	N/A	177	1982 Gillett Assoc.	y	n	3600 W. Auburn	Owner	Michigan Humane Society, 7401 Chrysler Dr., Detroit, MI 48211-1942	Com.	10.01	3.5 in over site at 0.2cfs/ac	N/A	n/a	2.87	3.9	126,418	N/A	100600
RHC	322	Rochester Hills Corp. Ctr. Sub.	30-377-004-0101	30	SE	N/A	622	10/30/85 Lehner Assoc.	y	y	2937 Waterview Dr.	Owner	Rochester Hills Corp., 250 Martin Street, Suite 100, Birmingham, MI 48009-3382	Ind.	63.145	2 - 100 yr	N/A	0.8	4	4	1,667,028	1,785,445	1468200
RHC	323	Combustion Research	30-451-038-0108	30	SE	15-30-451-038	480	1975	y	n	2516 Leach Rd.	Owner	Winifred B. Johnson, 2611 Lake Chamwood, Troy, MI 48098-2177	Ind.	1.84 site	10	N/A	0.7	2.4	2.5	9,430 site	3,021	6700
RHC	325	Meadowbrook Ice Cream	30-452-040-0105	30	SE	N/A	466	1984 (AB 1/12/00 GWE)	y	n	2885 Leach Rd.	Owner	Fred Mehrpay, 911 Westview Rd., Bloomfield Hills, MI 48304-2065	Com.	0.38	10	N/A	0.42	1.75	2	1,138?	1,535	3800
RHC	326	Meadowbrook Ice Cream	30-452-040-0106	30	SE	N/A	466	1999 (AB 1/12/00 GWE)	y	n	2885 Leach Rd.	Owner	Fred Mehrpay, 911 Westview Rd., Bloomfield Hills, MI 48304-2065	Com.	0.76	10	N/A	0.42	2.28	2.3	2,277	2,147	2500
RHC	327	Allen Brothers	30-452-057-0001	30	SE	N/A	1922	1989 (AB 2/8/01 AES Engineers)	y	y	2691 Leach Rd.	Owner	R & G Property Company, 2691 Leach, Rochester Hills, MI 48309-3558	Com.	1.33	10	N/A	0.6	3.86	5.2	5,671	7,373	8400
RHC	328	Rochester Hills Exec - A	30-477-006-0111	30	SE	N/A	571	1986 GWE	y	y	2993 Technology Dr., West basin A	Owner	Rochester Hills Executive Park, 500 Stephenson Highway, Troy, MI 48083-1118	Ind.	35.91	10	N/A	0.75	3.5	2.8	199,850	193,560	268000
RHC	329	Adams Oaks	31-055-035-0232	31	NW	N/A	327	1996	some	y	3845 Beechcrest	Owner	Adams Oaks LLC, P.O. Box 255005, West Bloomfield, MI 48325-5005, parcel i.d. 15-31-155-032	Res.	15.18 (per DA plan)	N/A	N/A	0.4	est. 4	5	N/A	N/A	93750
RHC	330	State Farm Insurance	31-201-005-0096	31	NE	N/A	156 (Micro 80-156)	1981 (1/24/75 Giffels Webster Engineers)	y	n	3345 W. Auburn Rd.	Owner	Joseph L. Zajac, 870 Peach Blossom Lane, Rochester Hills, MI 48306-3347	Com.	1.07	10	N/A	0.72	1.76	1	5,693	6,336	3600
RHC	331	Robert Evans Drain Regional - Outlot B	31-201-048-0354	31	NE	N/A	N/A	1976 (8/2/74 Johnson & Anderson)	n	n	Willet Ave.	Owner	Drainage Board for Ch. 20 The Robert J Evans Relief Drain, 1 Public Works Drive, Waterford, MI 48328, 1-248-858-0958	Res.	N/A	N/A	N/A	N/A	14	9	N/A	N/A	3094000
RHC	332	American House	31-301-008-0231	31	SW	N/A	3573	1987 (Micro 83-857.3)	y	n	3741 Adams Rd.	Owner	Prudential Huntoon Paige Karen Quast, 379 Thornall Street, Suite 10, Edison, New Jersey 08837-2226	Com.	25.78	10 (100)	N/A	0.46	6.5	N/A	100,588.71 (165,350.45)	294530.05 (total vol. 662,151.8AB)	N/A
RHC	333	United Methodist Church	31-301-030-0095	31	SW	15-31-301-012	751	1986 Giffels Webster Eng.	y	n	3821 Adams Rd.	Owner	Grace Evangelical Free Church of Bloomfield Hills, 100 North Crooks Rd., Suite 110B, Clawson, MI 48017-2800	Com.	7.02	10	N/A	0.37	2	2	16,300	23,558	28600
RHC	334	Assisted Living Complex	31-326-032-0297	31	SW	15-31-326-003; 15-31-326-017	518 (Micro 84-518)	1985 Zeitmet Wozniak	y	y	3500 South Blvd.	Owner	Pomdan Associates, 74 E. Long Lake Rd.,FL 1, Bloomfield Hills, MI 48304-2380	Com.	13.5	10 and 100	N/A	0.55	3	3.2	(95,853 - 100 yr)	n/a	67200
RHC	335	Pinetrace Sub. - park B	31-326-900-0072 gce	31	SW	N/A	104	10/9/1990 Zeitmet Woznial & Assoc.	y	y	W. of Sahalee Dr. and Merion Ct.	Owner	Pine Trace Village (Homeowners Association)-James Carson, 3459 Warwick, Rochester Hills, MI 483009	Res.	16.03	10	N/A	0.47	1.65	N/A	57,862 (86,945 - 100 yr)	70,000	N/A
RHC	336	Pinetrace Sub. - park A	31-377-900-0071 gce	31	SW	N/A	104	10/9/1990 Zeitmet Woznial & Assoc.	y	y	E. of Greenwood Dr., N. of Seminole Ct.	Owner	Pine Trace Village (Homeowners Association)-James Carson, 3459 Warwick, Rochester Hills, MI 483009	Res.	37.47	10	N/A	0.35	2.95	6.6	61,903 (129,823 - 100 yr)	90,250 (162,475 - 100 yr)	158000

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Table 8.5A: City of Rochester Hills Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
321	Michigan Humane Society	N/A	25800	N/A	0.7	1.4	6	5	irregular	N/A	5	est. 330	est. 275	Wet		1	N/A	Tree, Shrub	Buckthorn, Algae	0	Area estimated from aerial.	Verify restrictor. Outflow pipe may need repair.
322	Rochester Hills Corp. Ctr. Sub.	N/A	367050	418,612	4	N/A	4	4	irregular	4 (6 below water)	N/A	N/A	N/A	Retention	Records 1990. Pool volume 1667000 cft.	N/A	Sandy	Turf, Trees, Forbs	Lily pads	0		
323	Combustion Research	6,376	2700	5,708	0.3	1.2	N/A	1	L-shaped	5	2	est. MID 110	est. MID 30	Dry		Minimal	Poorly Drained	Turf	No	100	L-shaped basin, Fire protection basin 324 not there.	Verify restrictor - blockage, basin 324 not present - verify adequate storage.
325	Meadowbrook Ice Cream	1,621	1900	0 (est. MID 1,005)	0	N/A	N/A	N/A	rectangular	6	1.5	est. 70	est. 25	Dry Catchbasin	file says built undersized	Minimal	Sandy, Type A/B	Turf	No	0	8" plastic pipe to CB from rooftop.	
326	Meadowbrook Ice Cream	2,207.40	1100	0 (est. MID 710)	0	0.4	N/A	N/A	rectangular	N/A	2	est. 125	est. 20	Dry	file says built undersized	Minimal	Sandy	Turf	No	0	Poorly defined spillway in East berm, dirt stockpiled at S. end.	Remove stockpile, debris.
327	Allen Brothers	est. 2,800	1600	N/A	0.5	N/A	N/A	N/A	oval	N/A	2	est. 92 (MID 80)	est. 31 (MID 20)	Dry	cobble stone flowline	Minimal	N/A	Turf	No	0	Cobble bottom.	Clean structures.
328	Rochester Hills Exec - A	104,240	95700	est. MID 35,560	2	4.5	1.9 (1986)	N/A	rectangular with extension	6	3	est. 180 (pond ext. 240)	est. 210 (pond ext. 45) @ 35	Dry	Records 1990.	3.5 at overflow	Hydric	Forb, Tree	Phragmites, Reed	0	Inflow 105 not found, outflow not built per plan, side slopes not mowed.	Verify outflow.
329	Adams Oaks	est. TOP 28,000 at 855	18750	est. 13,200 (MID 20,000)	3	1.7	4	2	oval	N/A	2.5	est. TOP 280 (MID 250)	est. TOP 100 (MID 80)	Wet	concern over cattails; 10 in restrictor in MN A 24 in pipe to proposed Chester Drain to north. Records 1995 (TP).	2 (4 Pool Depth Per Plan)	Sand	Turf	Cattail, Bulrush, Sedge	0	No controlled outflow, pet waste, mosquitoes, blue dye, pesticide sign.	Remove yard waste from overflow, clean structures, buffer.
330	State Farm Insurance	est. 16,000	3600	N/A	0	N/A	N/A	N/A	L-shaped	N/A	N/A	est. 144 x 63 and 63 x 110	N/A	Parking	with CB at the bottom, it should be dry	In CB Sump	Asphalt	N/A	No	0	CB to 12" CMP with new end section at drain, restrictor removed.	Verify restrictor/storage, clean structures, 4" drain to CB.
331	Robert Evans Drain Regional - Outlot B	N/A	343800	N/A	N/A	N/A	N/A	5	irregular	2	var	est. 940	est. 400	Wet	Robert J. Evans Relief Drain inline detention pond - contact OCDC for calcs	At Inflows	Historically Peat Bottom	Turf, Woods	Buckthorn, Purple L.	0	Resident complained of algae, odor - needs dredging.	Dredging. Nutrient control.
332	American House	51,327.41	51300	4,339.23	2.5	4	1	N/A	rectangular	N/A	2	est. 327	est. 167	Pumped Detention	drains to basin 335. 18 in along E side not detained? Only swale draining to basin? NW inflow bulkheaded?	Some E. Side	Sandy, Type A/B	Turf	Cattail	0	Outflow through pump in NE corner of property, fenced.	
333	United Methodist Church	24,350	14300	4,775	1	N/A	N/A	N/A	rectangular	N/A	N/A	est. 175	est. 150	Dry		No	Sandy	Tree, Sedge	No	100	Overflow not found. No evidence that it receives much water.	
334	Assisted Living Complex	est. 33,000 at 863.0	21000	est. 25,000MID	0.5	N/A	4	0.5	triangular	6	2.5	est. 285	est. 232	Wet	temp. sediment trap in NW corner	Some At Inflows	Sand	Turf	Algae, Bulrush	0	Outlet 4 ft above bottom? - wet pond built in sandy soils.	Clean structures.
335	Pinetrace Sub. - park B	38,000	35450	32,000	0.9	N/A	N/A	2.5	round	N/A	2	est. 210	est. 210	Wet	Exisiting basin (no details). 100 yr overflow to CB 41 and 42. Records 1992.	Turbid Water	N/A	Tree, Forb, Willow	Phragmites, Cattail	0	Inflow not visible, fountain not on, flows to Borden Drain, outflow riser underwater.	Check blocked overflow, clean structures.
336	Pinetrace Sub. - park A	45,125	23900	19,250	N/A	N/A	6.15	5	round	3	4	est. 200	est. 155	Wet	100 yr overflow to MH3. Records 1992.	N/A	N/A	N/A		0		

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Table 8.5A: City of Rochester Hills Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
RHC	338	Pine Trace Golf Club	31-400-015-0353	31	SE	N/A	N/A	1986	n	n	3600 South Blvd.	Owner	Pine Trace Golf Club, 3600 Pine Trace Blvd., Rocheser Hills, MI 48309-3978	Com.	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	59400
RHC	339	Kingston Pointe North	32-126-094-0001	32	NW	N/A	N/A	1999	y	y	Florence Dr.	Owner	Kingston Pointe LLC, 2025 W. Long Lake Rd., Suite 104, Troy, MI 48098-4100	Res.	12.36	10	N/A	0.35	4	3	31,859	32,232	48000
RHC	340	Kingston Pointe South	32-126-108-0001	32	NW	N/A	N/A	1999; MCS 10/23/98	y	y	2520 Jackson	Owner	Kingston Pointe LLC, 2025 W. Long Lake Rd., Suite 104, Troy, MI 48098-4100	Res.	5.74	10	N/A	0.35	2.5	2.8	12,400	12,571	31400
RHC	341	Rockhaven Estates Condos	32-126-901-0332 gce	32	NW	N/A	397	1993; Oakwood Engineering, Inc. 10/94	y	y	3083 Honor Dr.	Owner	Rockhaven Estates (Homeowners Association), Eric Muir, 2508 Brilliance, Rochester Hills, MI 48309 1-248-299-9009	Res.	7.83	100 (1-yr, 48 hr)	N/A	0.35	2	5.8	29,934 (4,786)	N/A	94400
RHC	342	Kingston Pointe South	32-201-053-0001	32	NW	N/A	N/A	1999; MCS 10/23/98	y	y	2439 Jackson	Owner	Kingston Pointe LLC, 2025 W. Long Lake Rd., Suite 104, Troy, MI 48098-4100	Res.	8.61	10	N/A	0.35	2	2.1	18,601	18,633	31000
RHC	343	American House	32-226-001-0100	32	NE	N/A	503	1989; RK Engineering 9/15/92	y	y	2251 W. Auburn Rd., W. of Crooks	Owner	American House Elmwood Ltd., 6405 Telegraph Rd., Suite J-2, Bloomfield Hills, MI 48301-1775	Com.	3.69	10	N/A	0.9 and 0.2	3.85	3.9	12,548	16,024AB	18100
RHC	344	Pine Trace Regional - SE basin	32-300-017-0351	32	SW	N/A	N/A	1987	no details or calcs	n	3600 South Blvd., discharges to Borden Drain	Owner	Pine Trace Golf Club, 3600 Pine Trace Blvd., Rocheser Hills, MI 48309-3978	Com.		N/A	N/A	N/A	3.5	N/A	N/A	prop. 300,000	N/A
RHC	345	Walnut Brook Estates	32-376-902-0331 gce	32	SW	N/A	808	2000; Anayas Engineering, Inc. 1/26/00	y	y	3695 Cedar Brook Dr.	Owner	Walnut Brook Estates, Rochester Hills Development,Gary Leigh, President, 3607 Walnut Brook Dr., Rochester Hills, MI 48309, 1-248-299-0030	Res.	43.78	10	N/A	0.35	4.56	3.1	94,580	109,919	56000
RHC	346	South Blvd. Municipal - N basin	32-401-005-0373	32	SE	N/A	HRC 870013	1987; HRC 10/27/87	n	n	N. of South Blvd	Owner	Leuders Drain, City of Rochester Hills, 1000 Rochester Hills Drive, Rochester Hills, MI 48309-3034	Res.	N/A	N/A	N/A	N/A	N/A	1.85	N/A	N/A	583900
RHC	347	South Blvd. Municipal - S basin	32-401-005-0374	32	SE	N/A	HRC 870013	1987; HRC 10/27/87	y. No calcs	n	N. of South Blvd	Owner	Leuders Drain, City of Rochester Hills, 1000 Rochester Hills Drive, Rochester Hills, MI 48309-3034	Res.	N/A	N/A	N/A	N/A	10	N/A	N/A	2,000,000	N/A
RHC	348	Sanctuary in the Hills - basin A	32-401-015-0001	32	SE	15-32-401-004	89-114	1989: Fenn & Assoc. 2/22/02	y	yes and wetland easement	Sanctuary	Owner	Sanctuary of Rochester LLC, 2038 Big Beaver Rd., Suite 200, Troy, MI 48084-3410	Res.	4.29	10	N/A	0.4	2	0.6	11,012	23,453	6400
RHC	349	Deerfield Elementary	32-426-018-0097	32	SE	N/A	Micro 89-122	1989; TMP Assoc. 7/24/89	y	n	S. of Cattail Cir.	Owner	Avondale School, 260 Squirrel Rd., Auburn Hills, MI 48326-3255	Inst.	4.77	10	N/A	0.63	4.5	3.5	21,500	26,417	45500

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.5A: City of Rochester Hills Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
338	Pine Trace Golf Club	N/A	59350	N/A	N/A	N/A	N/A	10	N/A	N/A	var	N/A	N/A	Wet	no basin plans or calcs	Minimal	n/a	turf	Algae	0	2-8" PVC - pump house well, 2 connected ponds, s. pond to weir to swale to small N pond to weir to wetland, grass clippings	
339	Kingston Pointe North	14,039	16000	MID 8,679	1	N/A	2 temp.	3	rectangular	N/A	3	MID 135	MID 66	Dry Extended Detention	temporary 1-year extended detention provided with 3 ft depth (removed?)	Minimal	N/A	Turf	Algae, Cattail, Willow	50	2' sediment storage, temp. riser still in place, spillway not graded/stabilized, > area and < depth than design.	Buffer, remove riser, grade/stabilize overflow.
340	Kingston Pointe South	7,374.87	11200	3,003.44	0.5	0.5	2 temp.	1.5	rectangular	N/A	3	MID 103	MID 58	Dry Extended Detention	temporary 1-year extended detention provided with 1.5 ft depth (removed?)	0.5	N/A	Turf, Cattail, Bulrush	Algae, Sedge	0	Litter, grass clippings, flows to wetland, west slope unvegetated.	Stabilize west slope, clean structures.
341	Rockhaven Estates Condos	N/A	16300	N/A	N/A	N/A	N/A	N/A	rectangular	6	3	TOP 214	TOP 105	Dry Extended Detention	100-yr and 1-yr, 48 hr extended detention; no as-built volumes	Minimal	N/A	Sedge, Forb	Purple L., Algae, Cattail	0		Clean structures.
342	Kingston Pointe South	11,666.76	14800	7,149.56	0.5	1.5	5	5	rectangular	6	3	MID 115	MID 86	Wet	Pool volume estimated to be 19325 cft.	Minimal	Poorly Drained	Turf, Cattail	Algae, Phragmite, Reed	0	Under construction, east slope unvegetated.	Stabilize east slope, clean structures.
343	American House	6,750AB	4600	1,575AB (MID 4,162)	0.1	N/A	N/A	N/A	rectangular	6	3	TOP 135 (MID 120)	TOP 50 (MID 33)	Dry	Excludes 1.03 ac. Accounted for in original detention calc - where is that stored? C factors seem low. Discharges to Sprague Drain.	Minimal	Hydric	Turf Sideslopes	Phragmites, Buckthorn, Ctail	50		Clean structures.
344	Pine Trace Regional - SE basin	N/A	41350	est. 72,000MID	N/A	N/A	8	3	N/A	6	var	EST MID 360	est mid 200	Wet		Some	N/A	Turf	Purple L., Phragmites, Algae	0	Natural pond. No outlet weir.	Verify that outlet was constructed.
345	Walnut Brook Estates	45,000	18100	10,000	1.5	0.6	N/A	N/A	triangular	6	2	est. 318 MID	est. 180 MID	Dry	file says that restrictor not installed 1/18/01. to Lueders Drain	Minimal	Poorly Drained, Ponding	Turf, Sedge, Reed	Purple L., Cattail	0	Spillway 0.6' above overflow structure, TOB 1.3' above riprap spillway, bottom graded to drain, Inflow 223 and 226 not found.	Verify restrictor and storage depth, outflow underwater - blocked?, remove yard waste from Inflow 225.
346	South Blvd. Municipal - N basin	N/A	315600	N/A	N/A	N/A	N/A	N/A	irregular	N/A	N/A	N/A	N/A	Wetland	no plans or calcs, outlet detail (weir 3) only	N/A	Hydric	Tree, Wetland		0	Area from aerial at elev. 796, steel sheeting and gabion overflow weir.	
347	South Blvd. Municipal - S basin	est. 750,000	328300	N/A	N/A	N/A	N/A	N/A	irregular	6	N/A	est. 1,000	est. 750	Wetland		N/A	Hydric	Tree, Wetland		0	Area from aerial at elev. 796, outflow under access road to Sprague Drain, Inflows 228 and 230 not found.	Consider multi-staged outlet.
348	Sanctuary in the Hills - basin A	13,782	10700	9,785	N/A	2	6	7	rhombus-like	4; 6 below WS	4	est. 128	est. 93	Wet	Pool volume estimated to be 29760 cft.	Minimal (plan Shows 6 Pool)	N/A	Turf	Algae, Buckthorn, Cattail	0	Fountain, dye, inflows not found - underwater?	Verify restrictor. Clean structures.
349	Deerfield Elementary	calc. 4,782	13000	est. MID 9,760	N/A	N/A	N/A	N/A	irregular (L-shaped)	N/A	2	N/A	N/A	Dry		No Pool Depth	Hydric	Tree, Shrub, Forb	Buckthorn, Phragmites, Reed	0	Area from City GIS, wetland, 4' fence, overgrown, overflow spillway not found.	Clean structures.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.5A: City of Rochester Hills Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
RHC	350	Crooks Crossing East	32-426-026-0001	32	NE	N/A	231	1997	y	y	2153 Alsdorf Ave.	Owner	Crooks Crossing East, Rosen and Schott, Richard Rosen, 1400 Woodward, # 100, Bloomfield Hills, MI 48304	Res.	0.44	10	N/A	0.35	est. 1	N/A	946.3	1,472	N/A
RHC	351	Crooks Crossing East	32-426-027-0002	32	NE	N/A	231	1997	y	y	2089 Alsdorf Ave.	Owner	Crooks Crossing East, Rosen and Schott, Richard Rosen, 1400 Woodward, # 100, Bloomfield Hills, MI 48304	Res.	0.89	10	N/A	0.35	est. 1	1.9	1,924	4,025	9500
RHC	352	Meadowcreek Condos	32-426-050-0001 gce	32	SE	15-32-426-004	040	1999 (6/21/02 Fenn and Assoc.)	y	yes (not recorded)	2220 Lagoon Dr.	Owner	Meadow Creek Estates LLC, 2038 Big Beaver Rd., Suite 200, Troy, MI 48084-3410	Res.	21.18	10	N/A	0.39	6.88AB	6.8	52,633	50,200AB	88400
RHC	353	Northbrook Sub. - basin 2	33-126-010-0304	33	NW	N/A	340	1993 (6/28/94 Raj Khatri, P.E. and P.S.	y	y	Gilsam Ct., near Auburn and Crooks	Owner	(owner) Singh of Northbrooke, P. O. Box 25505, West Bloomfield, MI 48325-5005,(homeowners assoc.) David Turer, 1646 Newstead, Rochester Hills, MI 48309, 1-248-853-1613	Res.	10.18	10 (100)	N/A	0.35	5.61	6.3	21,992.76 (40,051.18)	49,337.6AB	61700
RHC	354	Northbrook Sub. - basin 1	33-126-020-0303	33	NW	N/A	340	1993 (6/28/94 Raj Khatri, P.E. and P.S.	y	y	Davenport, near Auburn and Crooks	Owner	(owner) Singh of Northbrooke, P. O. Box 25505, West Bloomfield, MI 48325-5005,(homeowners assoc.) David Turer, 1646 Newstead, Rochester Hills, MI 48309, 1-248-853-1613	Res.	13.12	10 (100)	N/A	0.35	4	4.5	22,770.5 (40,320.77)	26649.6AB	41000
RHC	355	Avondale Middle School	33-200-001-0094	33	NE	N/A	006	1993	y	y	Dearborn and Auburn	Owner	Avondale School Number 10 Fractional, 2950 Waukegan St., Auburn Hills, MI 48326-3264	Inst.	6.54	10	N/A	0.71	4.75	7.6	748134	68058	110500
RHC	356	Meadowbrook Elementary	33-200-018-0093	33	NE	15-33-200-001	006	1993	y	y	Dearborn and Auburn	Owner	Avondale School, 260 Squirrel Rd., Auburn Hills, MI 48326-3255	Inst.	11.8	10	N/A	0.49	4.4	6.4	79282	80706	247600
RHC	357	Kensington Sub.	33-201-012-0073	33	NE	N/A	252	1991	y	y	Lexhan and Auburn	Owner	Biltmore Properties, 2025 Long Lake Rd., Suite 104, Troy, MI 48098-4100	Res.	12.62	10	N/A	0.4	2.35	5.6	32790	38300	83500
RHC	466	Sanctuary in the Hills - basin B	N/A	32	NE	N/A	89-114	1989: Fenn & Assoc. 2/22/02	y	N/A	3640 Winding Brook Cir.	Owner	Sanctuary of Rochester LLC, 2038 Big Beaver Rd., Suite 200, Troy, MI 48084-3410	Res.	4.9	10	N/A	0.4	5.04AB	4.8	12,578	22,167AB	19300
RHC	467	Sanctuary in the Hills - basin C	N/A	32	NE	N/A	89-114	1989: Fenn & Assoc. 2/22/02	y	N/A	Winding Brook Ct.	Owner	Sanctuary of Rochester LLC, 2038 Big Beaver Rd., Suite 200, Troy, MI 48084-3410	Res.	4.5	10	N/A	0.4	5.61AB	5.3	11,551	17,396AB	11300
RHC	468	Sanctuary in the Hills - basin D	N/A	32	SE	N/A	89-114	1989: Fenn & Assoc. 2/22/02	y	N/A	3750 Winding Brook Cir.	Owner	Sanctuary of Rochester LLC, 2038 Big Beaver Rd., Suite 200, Troy, MI 48084-3410	Res.	0.91	10	N/A	0.4	3.15AB	N/A	2,336AB	2,622AB	N/A
RHC	547	Chope Union	30-302-012-0001	30	SW	N/A	N/A	Stenrose Assoc.	y	y	2737 Adams	N/A	N/A	Com./ Ind.	16.04	2 - 100 yr	N/A	0.7	8	8	370524	509890	587900
RHC	705	Dana Automotive	N/A	30	SE	N/A	N/A	N/A	n	N/A	2910 Waterview Dr.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4.7	N/A	N/A	35700

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.5A: City of Rochester Hills Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
350	Crooks Crossing East	3,200	1200	N/A	N/A	N/A	N/A	N/A	rectangular	4	N/A	160	20	Dry Catchbasin	Discharges north to 77" x 121" storm under Alsdorf Rd. No restrictor shown, top of detention 804	Minimal	N/A	Turf	No	0	Fenced - no access, no longer provides detention per City.	Verify adequate storage off site.
351	Crooks Crossing East	5,000	5000	N/A	est. 1	N/A	N/A	N/A	rectangular	4	N/A	250	20	Dry Catchbasin	Discharges north to 77" x 121" storm under Alsdorf Rd. Top of detention 807.	Minimal	N/A	Turf	No	0	No longer provides detention per City.	Verify adequate storage off site.
352	Meadowcreek Condos	16,332AB	13000	2,506AB	1	0.8	N/A	N/A	rectangular	6	2.5	est. 170 (MID 135)	est. 107 (MID 67)	Dry	Plan shows 0.197 ac. temporary sediment basin.	Turbid Water	Clayey	Turf, 50% Unvegetated	Algae	75	Over excavated for sediment storage, temp. inflow from sediment trap is 21" conc. with 3" sediment.	Stabilize side slopes, clean structures.
353	Northbrook Sub. - basin 2	est. 17,050	9800	est. MID 8,000	>1	2	N/A	N/A	round	N/A	3	est. 110	est. 155	Dry		Some At Inflow 134	N/A	Grass, Cattail	Canary Grass, Purple L.	0		Clean structures.
354	Northbrook Sub. - basin 1	calc. 11,440	9100	est. MID 8,580	1.2	1	N/A	N/A	rectangular	N/A	1.5	208 (MID 195)	55 (MID 44)	Dry		Minimal	N/A	Turf, Cattail	Purple L.	0	Outflows south to pond.	Clean structures.
355	Avondale Middle School	N/A	14500	N/A	N/A	1	N/A	N/A	irregular	0.109	4	N/A	N/A	Dry	South basin	Sediment On West Slope	Hydric	Turf, Wetland	Cattail	25	Inlets blocked by cattails.	Clean structures.
356	Meadowbrook Elementary	N/A	38700	N/A	1	0.5	N/A	N/A	triangular	N/A	4	390	245	Dry	North basin	No Pool Depth	Hydric	Turf	Cattail	0	Sediment and weeds blocking path to basin.	Verify restrictor.
357	Kensington Sub.	N/A	14900	N/A	1.5	N/A	N/A	N/A	irregular	6	5	130 est	165(longest)	Dry	Records 2001 (TP).	Minimal	Clayey	Turf, Grass	No	0	Underdrain to outflow, bypass is 15" pipe.	Verify restrictor.
466	Sanctuary in the Hills - basin B	9,887AB	4025	692AB	N/A	2	N/A	N/A	triangular	6	6	est. 90 MID	est. 45 MID	Dry Extended Detention		Minimal	Poorly Drained	Turf	Purple L., Cattail	0	8" PVC at S end from wetland area.	
467	Sanctuary in the Hills - basin C	8,045AB	2100	152AB	N/A	2	N/A	N/A	semi-rectangular.	6	6	est. 105 MID	est. 50 MID	Dry Extended Detention		Minimal	Poorly Drained	Turf	Purple L., Cattail	0	Area under construction. Drains north to Lueders Drain.	Clean structures following construction.
468	Sanctuary in the Hills - basin D	1,908AB	1540	117AB	N/A	N/A	N/A	0.5	triangular	6	6	est. 50 MID	est. 30 MID	Dry		Turbid Water	Poorly Drained, Ponding	Turf	Cattail	0	Small basin with no controlled outflow visible. Inflow underwater.	
547	Chope Union	65060	73500	32760	N/A	N/A	N/A	N/A	L-shaped	N/A	1	N/A	N/A	Retention	No overflow. Inspection and corresponance records.	Minimal	Sandy, Oxidized-north Side	Grass, Forb	Buckthorn	0	6' fence.	
705	Dana Automotive		7600			N/A		N/A			2.5			Dry		no	Silty clay	Turf, Forbs	Some Cattails	0	Seepage around 4" PVC pipe at S end.	Inspect 4" PVC for erosion or separation.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.5B: City of Rochester Hills Detention Basin Inflow Data

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
RHC	303	73	Storm.	from NE to middle CB	middle CB from NE	12	12	Concrete	Concrete	est. 808.3	OK.
RHC	303	74	Storm.	from SE to middle CB	middle CB from SE	12	12	Concrete	Concrete	est. 808.3	OK.
RHC	305	71	Storm.	S side	S side	18	18	Concrete	Concrete	805.95	75% blocked sediment.
RHC	307	1056	Grass swale.		S end		36		Grass		OK.
RHC	309	39	Storm.	W side	SW corner	36	36	Concrete	Concrete	INV 795.40AB	Underwater.
RHC	311	1057	Storm.		NW corner		6		Plastic		Black residue.
RHC	312	1310	Storm.	NE corner	NE	42	36	Concrete	Concrete	N/A	Gabion stabilized, debris on grate.
RHC	312	1311	Storm.	NW corner	NW corner	18	15	Concrete	Concrete	N/A	No grate, OK.
RHC	313	94	Storm.	NE corner	NE corner	12	18	Concrete	Concrete	816.46AB	Broken bar grate made of rebar.
RHC	314	117	Storm.	Colonial MS - NE corner from existing MH	NE corner	36	36	Concrete	Concrete	INV 807.88 at MH	OK.
RHC	315	111	Storm.	Red Roof - NW corner; ES#1	SW corner	18	18	Concrete	Concrete	810	Bar grate off.
RHC	315	112		Red Roof - W side; ES#3		12		Concrete		810	
RHC	315	113		Red Roof - SW corner; ES#2		18		Concrete		809.6	
RHC	318	98		N side		24		Concrete		est. 809.5	
RHC	319	101	Storm.	E side	E side	15	15	N/A	Concrete	3.78	OK.
RHC	320	95	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	807.35AB	2" sediment.
RHC	320	96	Storm.	E side	E side	15	15	Concrete	Concrete	806.56AB	13" sediment.
RHC	320	97		SE corner		12		Concrete		807AB	
RHC	321	108	Storm.	N side	N side	16	18	Concrete	Concrete	N/A	OK.
RHC	322	107		NW corner		24		Concrete		842.18	
RHC	323	102	Storm.	SE corner	SE corner	12	12	Concrete	Concrete	50.1	OK.
RHC	323	1061	Storm.		S end		12		CMP		OK.
RHC	325	1059	Parking lot spillway.		SE corner		8		Concrete		OK.
RHC	326	109	Spillway.	E side	W side	N/A	36	N/A	Concrete	N/A	OK.
RHC	327	110	Storm.	N side	N side	12	12	Concrete	Concrete	850.77AB	OK.
RHC	328	105		SW corner		N/A		N/A		30.25	
RHC	328	106	Storm.	NW corner	NW corner	N/A	42	N/A	Concrete	31.6	OK.
RHC	329	124	Storm.	N side	N side	36	36	Concrete	Concrete	848041	18" sediment.
RHC	329	125	Storm.	NE corner	NE corner	18	18	Concrete	CMP	849.2	90% blocked sediment, cattail.
RHC	330	133		E side		N/A		swale		839.71AB	
RHC	331	123	Open drain to 72" CMP.	N end	N end	72	72	Concrete	CMP	812.81AB	Pipe separated N of berm. Sediment bar from open channel.
RHC	331	1314	Concrete pipe with bar grate.		NE corner		72		Concrete		Sediment and algae in front.
RHC	331	1315	Storm.		W side		48		Concrete		Algae, sediment, aquatic veg. in front.
RHC	331	1316	Storm.		S half of W side		12		Concrete		OK.
RHC	332	128	Storm.	NW corner	NW corner	N/A	36	swale	Concrete	N/A	6" sediment.
RHC	333	129	Swale.	SW corner	SW corner	24	24	swale	Grass	N/A	OK.
RHC	334	126	Storm.	N end	N side	24	24	CMP	CMP	860.98	Bottom rusted, erosion, sediment.
RHC	334	127	Storm.	SW corner	SW corner	18	18	Concrete	Concrete	858.52	2" sediment.
RHC	335	121		SE corner		8		N/A		860.2	
RHC	336	118		SE corner		30		Concrete		N/A	
RHC	336	119		SW corner		8		N/A		847.98	

– If a Basin ID is not referenced in this Table, there were no Inflows, Outflows, or Overflows found on the plans or in the field.
– If all of the plan review information for an Inflows, Outflows, or Overflows is blank, then there was no plan information available.
– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.5B: City of Rochester Hills Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
RHC	336	120		NW corner		15		N/A		N/A	
RHC	338	1081	Storm.		SE corner		8		PVC		OK.
RHC	338	1083	Storm.		W Side		N/A		N/A		End-section separated, underwater.
RHC	339	221	Storm.	W side	W side	27	27	N/A	Concrete	820	OK.
RHC	340	216	Storm.	SW corner	SW corner	15	15	N/A	Concrete	806.8	12" sediment.
RHC	340	217	Storm.	NW corner	NW corner	15	15	N/A	Concrete	806.3	OK.
RHC	341	231	Storm.	SW corner	SW corner	21	24	Concrete	Concrete	817.71AB	Discharges to gully filled with riprap.
RHC	342	218		NW corner		18		N/A		797.72	
RHC	342	219		NE corner		18		N/A		797.5	
RHC	342	220		SE corner		12		Concrete		798.5	
RHC	343	232	Storm.	NE corner	NE corner	18	15	Concrete	Concrete	800.48AB	Phragmites.
RHC	343	233	Storm.	N side	N side	12	12	Concrete	Concrete	801.71AB	OK.
RHC	344	1085	Open channel.		NW corner		216 TOP, 144 BOT, 36		Earthen		OK.
RHC	345	222	Storm to swale.	N end	N end	N/A	36	sewer to swale	Concrete	N/A	2" sediment.
RHC	345	223		N half of W side		36		CMP		N/A	
RHC	345	224	Storm.	N half of W side	N half of W side	36	36	CMP	Concrete	N/A	OK.
RHC	345	225	Swale - storm inflow not found.	S half of W side	S half of W side	N/A	36	sewer to swale	Veg.	N/A	Yard waste.
RHC	345	226		SW corner		N/A		swale		N/A	
RHC	347	228		SE corner		71 x 47		arch CMP		793.5	
RHC	347	229	Outflow from basin 346.	N side from basin 346	N side	18	18	CMP	CMP	795.47	OK.
RHC	347	230		S side		30		Clay		est. 796	
RHC	348	246		NW corner		12		Concrete		794.59	
RHC	348	247		S side		12		Concrete		794.78	
RHC	349	234	Storm.	N side	N side	12	15	Concrete	Concrete	804.7	50% sediment.
RHC	349	235	Storm.	SW corner	SW corner	21	21	Concrete	Concrete	804.4	OK.
RHC	352	122	Storm.	NE corner	NE corner	30	30	Concrete	Concrete	797.96AB	OK.
RHC	353	134	Storm.	NW corner	NW corner	N/A	30	N/A	Concrete	809.27	4" sediment.
RHC	354	1309	Storm.		E side		24		Concrete		Algae.
RHC	355	248	Storm.	SW corner	SW corner	30	30	Concrete	RCP	823	Cattails.
RHC	355	249	Storm.	SW corner	SW corner	15	15	Concrete	RCP	823	Cattails.
RHC	356	227	Storm.	NW Corner	NW corner	36	36	Concrete	RCP	823.8	OK.
RHC	357	215	Storm.	E side	E side	18	18	Concrete	Concrete	824.8	OK.
RHC	466	250	Storm.	S side	S side	18	18	Concrete	Concrete	795.21AB	6" sediment, cattails.
RHC	466	251	Storm.	W side	W side	12	12	Concrete	Concrete	795.85AB	OK.
RHC	467	252	Storm.	SW corner	SW corner	15	15	Concrete	Concrete	796AB	50% blocked with riprap/sediment.
RHC	468	253	Storm MH to basin.	N side	N side	12	N/A	Concrete	Concrete	797.76AB	Underwater.
RHC	547	528	Storm.	NW corner of NW side	NW corner of NW side	12	15	Concrete	Concrete	69.38	50 blocked with sediment and riprap.
RHC	547	529	Storm.	SW corner of NW side	SW corner of NW side	18	18	Concrete	Concrete	66.12	Sod dumped at structure.
RHC	547	530	Storm.	S half of W side	South of w side	12	12	Concrete	RCP	70.24	50% blocked with sediment, top of slope riprap.
RHC	547	531	Storm.	SW corner of SE side	SW corner of se side	18	10	Concrete	RCP	63.89	OK.
RHC	705	1300	Storm.		W side		12		Concrete		OK

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.5C: City of Rochester Hills Detention Basin Outflow Data

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
RHC	303	42	12" pipe with 4.5" restrictor	Unrestricted pipe.	flowing west from center CB	middle CB to S	4.5	12	Concrete	Concrete	est. 808.2	OK.
RHC	305	39	12" conc. with 4.25" restrictor	Unrestricted pipe.	E side	E side	4.25	15	Concrete	Concrete	805.21FOUND	Buried by cobble.
RHC	307	23	2' CB to 12" conc. pipe; plan calls for 3" PVC restrictor; file says no restrictor	24" CB to 12" with 4" restrictor.	center of basin	middle	3	4	Concrete	Concrete	RIM 809.93AB; 12" INV 807.53AB	Erosion.
RHC	308	21	4" restrictor (original shows 6.8") blocked previously	Unrestricted pipe.	N side	N side	4	12	Concrete	RCP	INV 813.10	OK.
RHC	309	20	pump station		E side		21 to 15 to 21		Concrete		INV 794.28AB	
RHC	311	55	22' - 3" PVC pipe through berm	3" plastic.	NE corner	NE corner	3	3	PVC	Plastic	813.3	75% blocked.
RHC	312	1046	46 x 60 concrete pipe to 8" orifice at MH to 36"	42" x 60" arch pipe, no restrictor.	W side	W side	8	42 x 60	Concrete	arch	805	Vegetation in front.
RHC	313	54	12" conc. with 3" restrictor flows west to manhole with 2' sump to a 15"	Unrestricted pipe to CB.	SW corner	SW corner	3	12	Concrete	Concrete	815.33AB	OK.
RHC	318	57	box culvert with 8" restrictor to twin 29" x 45" box culverts to junction chamber to 43" x 68" culvert		W side		8		Concrete		est. 805	
RHC	319	62	pipe restrictor in second MH	12" to 3" restrictor two MHs away to the South.	S side	SW corner	12	3	N/A	Concrete	restrictor in CB 8, INV 2.59	OK.
RHC	320	56	3" PVC restricted 12" pipe		S side		3		Concrete		805.4	
RHC	321	66	MH with 2.5' sump and four 3.3" dia. holes to 12" pipe	Offset cover on square outflow box to CB in ditch.	S side	S side	four 3.3" holes	N/A	Concrete	Concrete	RIM 849.6; INV 848.0	Underwater.
RHC	323	63	3.5" restricted 12" pipe	Unrestricted pipe flowing West - too overgrown to verify restrictor.	W side	W side	3.5	12	CMP	CMP	50.1	Underwater.
RHC	325	68	Leaching CB with 3" outlet pipe	Leaching CB to 3" pipe.	middle	middle - 3" NW	3	3	PVC	N/A	88	OK.
RHC	326	67	2" restrictor on 12" pipe	2" restrictor in 12" CMP.	N half of W side	E side	2	2	CMP	CMP	INV 93.78	OK.
RHC	327	69	3" restrictor in 12" pipe	12" conc. to MH to 3" restrictor flowing West.	S side	S flowing W.	3	3	Concrete	Concrete	849.64AB	OK - sediment in MH sump.
RHC	328	65	restricted pipe	No hole in riser to 18" unrestricted conc.	SE corner	SE corner	15	18	Concrete	Concrete	INV 30.2	Sediment to top of riser.
RHC	330	79	CB at bottom of basin with 12" pipe discharging south; 2" restrictor at downstream end	Unrestricted 12" CMP from P. lot CB.	from middle CB south	flows S	2	12	Concrete	CMP	INV 833.55 at restrictor at outfall	OK - no 2" restrictor.
RHC	331	74	pipe extension added; no restrictor	Unrestricted pipe.	S side	S side	24	24	CMP	CMP	809.53	Underwater.
RHC	332	76	12" pipe to basin 335		NE corner		12		CMP		EX861.07 trimmed back	
RHC	333	77	12" with 4" restrictor with anti-siphon diaphram	12" CMP - outlet unknown.	NE corner	NE corner	4	12	CMP	CMP	62.5	OK.
RHC	334	75	6" restrictor in 12" pipe to South Blvd. ditch	12" pipe with 6" restrictor 4' above basin bottom.	S side	SE corner	6	6	CMP	CMP	861	OK.
RHC	335	72	12" restrictor in 27" riser	Pipe to riser to MH to Borden Drain.	N half of E side	N half of E side	12	N/A	N/A	Concrete	N/A	Underwater - blocked?
RHC	336	71	42" with bar grate and 27" restrictor		NE corner		27		Concrete		842.15	
RHC	338	1035		Trap concrete weir, 2.8' wide, 1' low flow channel, .5' deep.		N end, S pond		N/A		N/A		OK.
RHC	338	1037		Trap concrete weir, 2.8' wide, 1' low flow channel, .5' deep.		N end, N pond		N/A		N/A		OK.
RHC	339	120	Pipe with a 5" orifice	36" CMP riser with 7 - 1" holes to 6" restrictor in 12" pipe.	S side	S side	5	6	CMP	CMP	819	Riser holes blocked.
RHC	340	118	18" with 6" restrictor	Temporary riser to 6" restrictor in 12" CMP to 24" conc. to CB.	NE corner	NE corner	6	6	CMP	N/A	806	OK - riser still in place.
RHC	341	125	36" riser with 1" orifice to 12" pipe with 3" restrictor	24" wide riser to 12" conc. with 3" restrictor.	SE corner	SE corner	3	3	N/A	Concrete	811.42AB	Sump full of 24" sediment.
RHC	342	119	18" with 7" restrictor		W side		7		Concrete		800.5	
RHC	343	126	12" RCP with 4" restrictor where it comes into overflow structure (blocked?)	12" conc. with 4" restrictor at overflow structure.	SW corner	SW corner	4	4	Concrete	Conc/PVC	800.48AB	5" sediment.
RHC	345	121	24" pipe with 12" restrictor	24" to CB - inlet underwater/buried, restrictor not seen.	E side	E side	12	24	CMP	CMP	795.61	Underwater - blocked?
RHC	346	124	pipe	Unrestricted 18" CMP to basin 347.	S side	S side	18	18	CMP	CMP	795.47	OK.
RHC	347	123	outlet structure to 5' wide base channel	36" x 72" box culvert under access road.	W side	W side	N/A	36 x 72	N/A	Concrete	797	OK.
RHC	348	132	6" restrictor in 12" pipe to 4' x 6' arch CMP	Overflows into CB to unrestricted 12".	SE corner	SE corner	6	12	Concrete	Concrete	796	Underwater.
RHC	349	127	4" PVC pipe	4" pipe.	W side	W side	4	4	PVC	PVC	803.5	OK.
RHC	350	80	middle CB north to MH1 12" pipe with 3" restrictor		middle		3		Concrete		INV 800.75AB; RIM 804.96AB	
RHC	351	81	middle CB north to MH 12" pipe with no restrictor shown	CB to unrestricted 12" conc.	middle	middle	12	12	Concrete	Concrete	RIM 802.2AB	Underwater.
RHC	352	73	8" restrictor in 12" pipe	12" with 8" restrictor.	W side	W side	8	8	Concrete	N/A	798.07AB	OK.
RHC	353	82	pipe with 6" restrictor	12" with 6" restrictor.	SW corner	SW corner	6	6	N/A	Concrete	809.39	OK.
RHC	354	83	12" pipe with 8" restrictor	12" with 8" restrictor.	S side	S side	8	8	Concrete	RCP	809	Veg. blocking.
RHC	355	133	15" outflow pipe with 6" restriction	6" restrictor in 15" pipe.	SW corner	SW corner	6	6	Concrete	RCP	823	OK.
RHC	356	122	12" RCP with a 9" restrictor	Pipe - restrictor not visible.	NW corner	NW corner	9	12	Concrete	RCP	818.4	OK.
RHC	357	117	12" conc. pipe with a 6" orifice	Unrestricted pipe.	NW corner	NW corner	6	12	Concrete	Concrete	825.15	OK.
RHC	466	134	riser to 4" restrictor to structure with 15" pipe north to Lueders Drain	Temporary riser to 4" to CB.	N side	N side	4	4	Concrete	N/A	RIM 797.38AB	OK.
RHC	467	135	riser to 4" restrictor to structure with 15" pipe north to Lueders Drain	Temporary perforated riser to 4".	N side	N side	4	4	Concrete	Concrete	RIM 798.08AB	OK.
RHC	547	292	12" pipe		SE side		12		Concrete		62.04	
RHC	705	1300		12" pipe with 4" restrictor		E side		4		Concrete		OK

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.5D: City of Rochester Hills Detention Basin Overflow Structure Data

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
RHC	311	39	field stone spillway			814.3	
RHC	312	1201	riprap spillway	Riprap spillway to county drain.	West side	N/A	OK.
RHC	313	38	48" dia. concrete beehive structure	30" wide CB to 15" concrete.	SW corner	RIM 820.5	OK.
RHC	318	40	115 yd2 riprap spillway at west side			est. 809	
RHC	323	41	sodded overflow	Sodded spillway.	West side	52.5	OK.
RHC	328	45	10' wide riprap overflow to basin B (letter in file says not connected)	10' wide riprap spillway to Basin B - outside of Rouge.	NE corner	35	OK.
RHC	329	48	riprap spillway to south	20' wide spillway in berm.	S side	est. 806	Yard waste, brush.
RHC	332	1027		12" CMP pipe in berm.	NE corner		OK.
RHC	333	50	6' wide spillway			64.5	
RHC	334	49	20' wide, 6" deep enkamat spillway	Approx. 20' x 6" deep spillway in berm to road ditch.	SW corner	864	OK.
RHC	339	74	CB with sump	12" CMP to MH to wetland.	S side	823	OK.
RHC	339	75	secondary riprap spillway	2' unvegetated spillway - MH recently excavated.	S side	823.5	Not graded/stabilized.
RHC	340	70	secondary riprap spillway on geotextile to swale			809.5	
RHC	340	71	CB with sump	CB to 18" pipe to wetland.	NE corner	808.5	OK.
RHC	341	78	overflow structure at 100-yr elev. to 12" pipe	12" to 48" wide riser to 15" concrete South.	SE corner	819	OK.
RHC	341	79	secondary overflow riprap spillway			819.57AB	
RHC	342	72	secondary riprap spillway			803.5	
RHC	342	73	CB with sump to 18" concrete			802.5	
RHC	343	80	12" overflow pipe into structure with 2' sump	12" CMP to overflow structure.	SW corner	804.25AB	OK.
RHC	343	81	4' dia. Overflow structure with 2' sump to 12" RCP	Overflow structure to pipe.	SW corner	RIM 805.5AB; 12" RCP INV 799.90AB	OK.
RHC	345	76	riprap spillway	Riprap secondary spillway to drain.	S half of E side	802.5	OK.
RHC	345	1029		CB to unrestricted 24" to drain.	E side		OK.
RHC	346	77	45' x 0.5' gabion weir on S side			797.5	
RHC	348	86	CB to structure with 2' sump	60" wide secondary riser to unrestricted 15".	SE corner	RIM 797.89	Sump full of sediment.
RHC	349	82	36 syd riprap overflow weir			TOP 808	
RHC	352	47	6' dia. Overflow structure with 24" sump to a 30" pipe	72" wide structure with 2' deep sump to 36" concrete.	West side	805.34	OK.
RHC	353	52	spillway at SW corner	12" to 48" structure to 36" pipe.	SW corner	815.5	OK.
RHC	354	53	spillway at S side			813.16AB	
RHC	354	1053		12" to 24" structure to 24".	SW corner		OK.
RHC	356	87	Overflow over berm	Spillway over berm.	N/A	822.8	OK.
RHC	357	69	overflow structure to manhole 47 on plans	48" structure to 27" pipe.	NW corner	829.04	OK.
RHC	466	88	CB on N side with 2' sump to Lueders Drain	CB to 15" pipe.	N side	RIM 800.21AB	OK.
RHC	466	1033		Riprap spillway - secondary overflow.	NW corner		OK.
RHC	467	89	CB on N side with 2' sump to Lueders Drain	CB with 24" sump to 15" concrete.	N side	RIM 801.05AB	OK.
RHC	467	1031		Secondary overflow to Lueders Drain.	NE corner		Bar grate off.
RHC	468	90	riprap over geotextile spillway, 10' wide	10' wide riprap spillway.	S side	ELEV 799.5	Overflow not graded below berm.
RHC	705	1300		48" dia. structure with grate to 12" pipe	N half of E side		OK.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.6A: City of Southfield Detention Basin Data

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	103	Walgreens - SE basin	7-1 a	7	SE	07-477-015	7-2-018	Nudell Architects 10/00	y	N/A	29030 Northwestern Hwy.	Owner	N/A	Com.	2.31 site	10	N/A	0.65	3.08	3	10,813 site	5,318 (11,160 site)	7250
SOC	104	Walgreens - NW basin	7-1 b	7	SE	07-477-015	7-2-018	Nudell Architects 10/00	y	N/A	29030 Northwestern Hwy.	Owner	N/A	Com.	2.31 site	10	N/A	0.65	3	1.6	10,813 site	1,034 (11,160 site)	1475
SOC	105	CDI Systems	7-2	7	SE	07-477-003	7-2-003	251; Z/L Assoc. 8/76	y. No detail.	N/A	29299 Franklin Rd.	Owner	N/A	Com.	1.3	10	N/A	0.33	2.3	5.3	5,532	7,000	18500
SOC	106	Claymoor Apartments	7-3	7	SE	07-476-042	7-2-007	331; Postiff Co. 5/9/73	y. No calcs.	N/A	29260 Franklin Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	5	N/A	20,075 at 724.20	42400
SOC	107	The Pines Apartments	7-4	7	SE	07-476-056	7-2-004	331; Postiff Co. 2/22/74	y. Weir detail on sheet 6 n/a. No calcs.	N/A	29500-29550 Franklin	Owner	N/A	Res.	N/A	N/A	N/A	N/A	5	6.5	18,364	18,550	55150
SOC	108	Weatherstone S. Townhouses	7-5	7	SE	07-476-063	7-2-013	251; Professional Engineering Assoc. 8/9/83	y. No calcs.	N/A	29600 Franklin Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	est. 5.97	6.2	N/A	28,800	42900
SOC	109	Weatherstone N. Townhouses	7-6	7	SE	07-401-025	7-2-016	331; Warner, Cantrell & Padmos 6/10/86AB	y. No AB size.	N/A	29900 Franklin Rd.	Owner	N/A	Res.	6	10	1.2	0.5	2	N/A	20403	est. 7175	N/A
SOC	110	Chelsea Crossing Condos	7-7	7	SW	07-326-034	7-3-009	252; Postiff Co. 6/25/74	y. No details or calcs.	N/A	26644 Farmbrooke Villa Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	calc. 7.7	3.3	N/A	96,000	63100
SOC	111	BP Gas Station	7-8	7	SW	07-326-019	7-3-017	253; Marathon Rev. 4/25/78	y	N/A	29150 Northwestern Hwy.	Owner	N/A	Com.	0.333 (0.41 ac. - site)	N/A	N/A	N/A	4	3.2	est. 2,420	2,456	1600
SOC	112	Fishbone's	7-9	7	SW	07-326-030	7-3-019	253; Nowak & Fraus rev. 11/8/79	y. No calcs.	N/A	29244 Northwestern Hwy.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	est. 2.6	6.5	N/A	est. 6,100	14800
SOC	113	Franklin Racquet Club	7-10	7	SW	07-326-028	7-3-010	252	n	N/A	29350 Northwestern Hwy	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SOC	114	LaFontaine Office Building	7-11	7	SW	07-301-008	7-3-027	254; Nowak & Fraus AB 3/4/85	y. Calcs from hand-written notes.	N/A	29580 Northwestern Hwy.	Owner	N/A	Com.	0.92	N/A	N/A	0.7	est. 2.8	2.3	N/A	est. 7,000	4800
SOC	115	DIL	7-12	7	SW	07-301-010	7-3-012	252; Nowak & Fraus rev. 6/21/77	No calcs.	y	29600 Northwestern Hwy.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	est. 2.5	2.4	N/A	16,950	10250
SOC	116	Pavillion Townhouse Condos	7-13	7	SW	07-352-001 thru 036	7-3-022	on site; Morrison & Peters rev. 5/5/81	y	N/A	27316-27375 Apple Blossom Ln.	Owner	N/A	Res./ Com.	Total 18.91 (8.54 site)	10	N/A	Avg. 0.61 (3.32 ac @ 0.2; 15.59 @ 0.7)	4	6.3	74376	77589	127000
SOC	121	Carson Center - W basin	7 -15	7	SW	07-351-108	7-3-031	254; Zeitman Wozniak & Assoc. rev. 9/12/86	y		29333 Northwestern Hwy.	Owner	N/A	Com.	4.73 Site	10	N/A	0.7	2	3.25	24,237 site	14000	44600
SOC	122	Pilots Cove	7 -16	7	SW	07-351-075 thru 094	7-3-016	253; Morrison & Peters AB 7/29/80	y. No calcs	y	26900-26926 Twelve Mile Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	calc. 4.56	3.7	N/A	est. 14045	8050
SOC	125	Fountain Park Office Complex	7-19	7	SW	07-351-032	N/A	JRJ Group 9/13/94AB	y	y	29000 Inkster Rd.	Owner	N/A	Com.	1.77	10	N/A	0.53 (low)	1.5	4.2	6500	8244	27100
SOC	126	Fountain View Office	7-20	7	SW	07-351-111	N/A	Landtech rev. 4/27/04	y. New plan from Jonna.	N/A	E. side of Inkster Rd.	Owner	N/A	Com.	5.86	10	1.17	0.64	1.7	2.5	27010	27936	41900

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
103	Walgreens - SE basin	3,413	2400	737	N/A	1	N/A	N/A	irregular	n/a	3	est. MID95	est. MID22	Dry	SE basin - has only restrictor on site	0.2 - 0.5	Type C, Poorly Drained	Turf	No	0	Basin was being fertilized. Restrictor located at CB.	Nutrient control.
104	Walgreens - NW basin	1,322	925	14	N/A	1.65	N/A	N/A	irregular	6	2	est. MID62	est. MID35	Dry	NW basin - connected to SE basin	0.2	Type C, Poorly Drained	Turf	No	0	Flows unrestricted to basin 103.	
105	CDI Systems		3500	est. WS 4,025	N/A	N/A	est. 4	N/A	triangular	n/a	4	est. WS 115	est. WS 70	Dry Catchbasin		No	Loamy Sand, Type B	Turf	No	0	CB supposed to back up into basin, but no restrictor.	Verify restrictor.
106	Claymoor Apartments	est. 8,190	8500	est. 6,200	N/A	N/A	N/A	1	triangular	4	1	est. WS 117	est. WS 140	Dry	No overflow shown	2	Minimal	Tree, Shrub	Buckt., Purple L., Algae	0	4' fence.	Clean structures.
107	The Pines Apartments	est. 5,740	8500	est. 1,430	N/A	1	N/A	N/A	triangular	3	2	est. 100 MID	est. 62 MID	Dry	Discharges east to existing ditch. Pool volume estimated to be 17000 cft.	2.5	Muck	Tree, Shrub	Buckthorn, Purple L.	0	4' fence, bar grate is separated from overflow, outflow is buried.	Dredge, verify restrictor, repair bar grate.
108	Weatherstone S. Townhouses	est. 8,450	6900	est. 4,800	0.5	N/A	N/A	4	rectangular	est. 5	5	est. 160 MID	est. 30 MID	Wet	Discharges east to Farmbrook Rd. ditch.	No Pool Depth	N/A	Turf, Tree	Buckthorn	0	Water level too high - outlet blocked.	Clean structures. Consider modifying outlet.
109	Weatherstone N. Townhouses	N/A	7550	est. 3587MID	1.5	N/A	8	8	round	4	var	est.104	est.80	Wet	Check for spillway.	N/A	Hydric	Tree, Shrub	Poplar, Willow, Purple L.	100	Concrete bags found near outlet, site overgrown. Area from aerial.	Structures need cleaning.
110	Chelsea Crossing Condos	est. 26,085	19100	est. 16,555	N/A	N/A	N/A	2	irregular	3	4	est. 230 MID	est. 130 MID	Wet		2	Sandy Slope	Tree, Shrub, Algae	Willow, Purple L., Algae	0	Odor of decayed organics, litter, sediment.	Dredge, Nutrient Control.
111	BP Gas Station	est. 625	500	est. 300	N/A	N/A	N/A	N/A	triangular	1	2	N/A	N/A	Dry	Pond to be gravel.	1	Poorly Drained, Ponding	Grass, Forb	Cattail	0	Retaining wall. Inflow 260 from gas pumps has oil sheen. Outflow buried.	Verify 1.5" restrictor. Clean structures. Investigate illicit discharge.
112	Fishbone's	est. 2,360	2275	N/A	N/A	N/A	N/A	N/A	triangular	2	2.5	est. 135	est. 35	Dry	6 ft Fenced with barbed wire. Staked sod.	2	Sandy	Tree, Forb	Willow	0	Overgrown, litter, 6' retaining wall at N half, structures buried.	Clean structures, maintain, excavate sediment.
113	Franklin Racquet Club	N/A	2725	N/A	N/A	N/A	N/A	N/A	N/A	N/A	var	N/A	N/A	Dry		Some	Poorly Drained, Ponding	Tree, Shrub		0	Overgrown. Inflow not found - inaccessible. 4' fence, Outflow buried, ponding.	Clean structures.
114	LaFontaine Office Building	est. 3,500	2100	est. 2,470MID	N/A	0.4	N/A	N/A	triangular	6 (4 at inlet and outlet)	4	est. 89 (MID 75)	est. 80 (MID 65)	Dry	Inflow to 6 in perf. underdrain to outflow.	0.5	Sandy	Turf, Tree	No	0	New inflow added - area unvegetated. No 2" restrictor.	Verify restrictor. Stabilize Inflow 1077.
115	DIL	est. 9,660	4275	est. 4200 (MID 6930)	est. 0.5	N/A	N/A	N/A	parallelogram	5	3	est. 138 (MID 122)	est. 70 (MID 55)	Dry	4 ft chain-linked fence.	0.5	Sandy	Turf	No	0	No fence as was noted on plan. Outflow buried.	Verify restrictor. Clean structures.
116	Pavillion Townhouse Condos	28140	19600	0 (est. 21950MID)	1	N/A	N/A	N/A	rectangular		var	MID 254	MID 89	Dry	4 ft chain-linked fence and 10 ft gate.	Approx. 1	Hydric, Sediment	Tree, Shrub	Buckthorn, Phragmites	0	Overgrown. 4' fence. Inflows 277 and 278 not found.	Clean structures.
121	Carson Center - W basin	10100	13700	3900	N/A	N/A	2	3	irregular	est. 5.5	5	est. MID 240	est. MID 45	Wet	Discharges to Basin 469 unrestricted. Qa = 0.2 cfs/ac.	N/A	N/A	Turf	Algae, Phragmites, Purple L.	0	Inflows/Outflow under water. Geese, goose fencing. Flows unrestricted to basin 469.	Nutrient control.
122	Pilots Cove	N/A	2175	N/A	N/A	N/A	N/A	N/A	rectangular	3	4	est. 88 MID	est. 35 MID	Dry	6 ft chain-link fence. Sodded.	1	Type C, Poorly Drained	Turf	No	0	4' fence. Restrictor 6" instead of 4" per plan. Overflow swale not found.	Verify restrictor size.
125	Fountain Park Office Complex	6682	6450	4311	1	N/A	2.27	4	rectangular	6	5	est. 116	est. 85	Wet	Spring fed retention pond with 4 in restrictor in M.H. at south end of pond. Fountain. Pool volume 8200 cft.	Minimal	N/A	Turf	Algae	0	Has fountain, stone edging. Spring fed? Evidence from groundwater rust. Geese droppings.	
126	Fountain View Office	19334	16800	15680 (Median 16703)	1	0.6	6.7	5.5	irregular	4	1	est. 143MID	est. 143MID	Wet	Proposed development combining two lots. 1-yr extended detention with 10-yr storage to primary overflow elev. Pool volume estimated to be 53700 cft.	No	N/A	Unvegetated	No	0	Landscape stones around wet pond with geotextile liner. Basin under construction. Overflow 99 not built yet.	Re-inspect after construction completed and basin stabilized.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	127	Armenian Church	7-21	7	SE	07-477-010	N/A	Giffels-Webster Eng. 11/23/73	y	y	26210 Twelve Mile Rd.	Owner	N/A	Com.	3.6	N/A	N/A	0.6	2.8	2.8	13870	14400	90900
SOC	128	Pine Air Apts.	7-22	7	SE	07-476-059	7-2-009	331; Postiff Co. 9/15/77AB	n	N/A	26100 Twelve Mile Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	11	N/A	58177 in 1972 (enlarged in 1977)	357200
SOC	130	Pine Air Apts.	7-23	7	SE	07-476-057	7-2-009	331; Postiff Co. 9/15/77AB	no details	N/A	26170 Twelve Mile Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.5	N/A	7100	18000
SOC	131	Franklin Hills Apts.	7-24	7	SE	07-476-040	7-2-005	331; Spalding DeDecker rev. 10/5/69	some	N/A	25900 Twelve Mile Rd.	Owner	N/A	Res.	23.5 (18 + 5.5 offsite)	N/A	1.53 avg.	0.6 (0.4 for 5.5 ac. Offsite)	5	N/A	142000	141875	N/A
SOC	132	The Lakes Apts.	8-1	8	SW	08-351-010	N/A	Zeitmet-Wozniak & Assoc. AB 12/16/87; Design calcs 11/11/85 G. W. Peterson	some	N/A	25500 Twelve Mile Rd.	Owner	N/A	Res.	28.6	N/A	0.2	0.55	N/A	3.2	109386	250375	79200
SOC	133	Wellington Place Manor - SW basin	8-2 a	8	SW	08-376-026 thru 140	8-3-005	Nowak & Fraus rev. 3/10/92; Basney & Smith rev. calcs. 9/16/71	plan, calcs	N/A	Wellington West, W. of entrance	Owner	N/A	Res.	N/A	10	3	0.4	2.9	2.3	21456 (basins 133 & 134)	8085	7100
SOC	134	Wellington Place Manor - SE basin	8-2 b	8	SW	08-376-026 thru 140	8-3-005	Nowak & Fraus rev. 3/10/92; Basney & Smith rev. calcs. 9/16/71	plan, calcs	N/A	Wellington East, E. of entrance	Owner	N/A	Res.	N/A	10	N/A	0.4	2.9	N/A	21456 (basins 133 & 134)	14030	N/A
SOC	135	Wellington Place Manor - N basin	8-2 c	8	SW	08-376-026 thru 140	8-3-005	Basney & Smith rev. 10/15/71	plan, no details, no calcs	N/A	Wellington Ct.	Owner	N/A	Res.	N/A	10	1.7	0.4	2.2	5.5	42948	43780	85900
SOC	136	Woodvale Condos	8-3a	8	SW	08-377-005	8-3-001	331; J. E. Hiltz & Assoc. 6/7/72	y - no calcs	y	25116 Woodvale Dr., N basin	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.9	N/A	N/A	N/A
SOC	139	Chanticleer Condos	9-1	9	SW	08-376-005	9-3-011	Zeitmet-Wozniak & Assoc. 6/16/80; Design calcs 4/9/80 G. W. Peterson	y	N/A	29118 Chanticleer Dr.	Owner	N/A	Res.	19.6	10	3.92	0.5	est. 4	3.2	59584	59875	40400
SOC	140	Evergreen Nursing Home	11-1	11	NW	11-101-022	N/A	Nowak & Fraus 8/21/97AB	y	y	30800 Evergreen Rd.	Owner	N/A	Com.	1.63	10	0.667	0.3	3.2	3.7	2872	2900	35600
SOC	141	Cranbrook Place Apts.	11-2	11	NE	11-226-067	N/A	M. L. Brown & Son 3/17/83	y. No details.	N/A	18301 Thirteen Mile Rd.	Owner	N/A	Res.	15.42	10	N/A	0.51	3.25	5.5	53747.17	72290.56	107000
SOC	142	Beacon Hill	11-3	11	NE	11-226-003	11-1-002	256; Postiff Co. 9/25/74AB	no calcs	N/A	18161 Thirteen Mile Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	est. 6.6	3.7	N/A	N/A	13400
SOC	144	Belle Tire	11-5	11	NE	11-226-063	N/A	Boss Engineering 4/02/99	y	N/A	30699 Southfield Rd.	Owner	N/A	Com.	2.38	10	N/A	0.65	4	5.3	11158	10860 (+308 in pipe)	24000
SOC	145	Birmingham Cosmetic Center	11-6	11	NE	11-226-064	N/A	B.F. Thompson 9/4/84	y	y	30603 Southfield Rd.	Owner	N/A	Com.	1.05	10	0.21	0.63	1.92	2.2	4732	4739	5500
SOC	146	Jewish Vocational Center	11-7	11	SE	11-479-068	11-2-010	256; Zeitmet/Wozniak 10/22/87AB	y	N/A	29699 Southfield Rd.	Owner	N/A	Com.	4.41 (incl. 0.82 offsite)	10	0.882	0.7	4.28	2.8	21969	22657	7900
SOC	151	Detroit Medical Center	16-1	16	SE	16-476-050	N/A	Nowak & Fraus 8/15/86Rev.	site plan only - no calcs	N/A	27177 Lahser Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	5.4	5	N/A	30290	25000

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
127	Armenian Church	est. 4815 MID	32450	N/A	est. 1	2	N/A	N/A	irregular	6 to 7	2	est. 107 MID	est. 45 MID	Dry		1	Sandy And Organic	Tree, Herb	Buckt., Phragmites, Purple L	0	4' fence, overgrown.	Clean structures.
128	Pine Air Apts.	N/A	32450	est. 28440MID	1.2	N/A	5.3	N/A	irregular	3	var	est.180	est.158	Dry	4 ft fence. No Inflows. Expanded in 1977.	1 In Outflow Str. Sump	Poorly Drained	Grass, Tree	Snake Grass, Purple L.	0	4' fence, some drainage to the south does not appear to be contained. Site overgrown.	Verify that drainage is detained.
130	Pine Air Apts.	N/A	7200	N/A	N/A	N/A	N/A	N/A	N/A	4	3	88	56	Dry		Minimal	Sandy Loam Type B/C	Turf, Tree	Buckthorn	0	Pipe south to CB buried. Overflow not found, could be buried.	Clean structures, uncover outlet.
131	Franklin Hills Apts.	est. 28375MID	21900	N/A	N/A	N/A	N/A	0.5	L-shaped	3	var	N/A	N/A	Pumped Detention	4 ft fence.	Some	N/A	Tree, Shrub	Buckthorn	0	No Inflow or Outflow pipes found. Files say that the pump is inoperable. 4' fence.	Clean structures. Verify that pump is operating. May need dredging.
132	The Lakes Apts.	N/A	24750	N/A	N/A	N/A	N/A	4	N/A	N/A	3	N/A	N/A	Inline Detention		N/A	Hydric	Tree, Turf, Forb	P. L., Turf, Willow	0	Inlets 407 and 408 not found.	
133	Wellington Place Manor - SW basin	2788	3100	N/A	N/A	N/A	1.5	1.5	rectangular	N/A	1	68	41	Wet	Southwest pond. 4 ft fence.	Minimal	N/A	Turf	Some algae	0	Fountain. No overflow (CB drains to 8"). Inflow 291 not found. Supposed to be connected to basin 134 but no pipe visible.	
134	Wellington Place Manor - SE basin	4838	4250	N/A	N/A	N/A	1.5	2	rectangular	N/A	1.5	118	41	Wet	Southeast pond. 4 ft fence. Flows to Basin 133 unrestricted.	Minimal	N/A	Turf	No	0	Fountain. No overflow. Supposed to be connected to basin 133 but no pipe visible.	CB on north side full of water so need to verify connection to basin 133.
135	Wellington Place Manor - N basin	19900	15600	N/A	N/A	N/A	2.5	2	irregular	1	2	TOP 275	TOP 60	Wet	(4 ft fence. 2 in asphalt bottom, turf sides, check outflow)	0.5	N/A	Turf, Tree	No	0	Blue dye, 3 fountains, west side unvegetated. Restrictor in MH9. Water flows in and out 18".	Stabilize west side.
136	Woodvale Condos	N/A	N/A	est. 4500MID	N/A	N/A	N/A	N/A	triangular	N/A	var	est. 95MID	est. 95MID	Dry	4 ft cl fence. Restrictor in storm sewer.	0.5	N/A	Grass, Shrub	Buckthorn	0	4' fence. 6 or 8" restricted storm at SW corner backs up into basin. Inflow 509 not found.	Clean structures.
139	Chanticleer Condos	24750	12600	0	1	N/A	N/A	N/A	irregular	N/A	2	est. 215	est. 90	Dry		No	Hydric	Sedge, Shrub	Cattail, Purple L.	25	Slope has slump failure. MH upstream of inlet had erosion which was armored with riprap.	Clean structures.
140	Evergreen Nursing Home	est. 10000	9625	N/A	N/A	N/A	N/A	N/A	irregular	N/A	3	est. 200TOP	est. 50TOP	Dry		No	Silty Loam	Turf		0	Spoke with maintenance staff, no prior history of overflow.	
141	Cranbrook Place Apts.	25217	19450	19396	N/A	N/A	N/A	N/A	rectangular	3	2	167TOP; 147BOT	151TOP; 131.5BOT	Dry	6-8 ft high locked fence	1	Poorly Drained	Grass, Tree, Shrub, Forb	Cattail, Buckthorn, Purple L	0	4' fence, overgrown, yard waste dumped at west side.	
142	Beacon Hill	9230 (5270MID)	3600	1309	N/A	N/A	N/A	N/A	rectangular	3	2	130TOP; 77BOT	71TOP; 17BOT	Dry	6 ft fence. No inflows and no overflow. New basin proposed?	N/A	Hydric	Shrub, Forb, Tree	Cattail, Purple L.	0	Site overgrown, can not access easily. No inflows/Outflows found.	Verify structures, may be buried. Clean out vegetation.
144	Belle Tire	6876	4500	2690	1	1	N/A	1	irregular	N/A	2	est. 80MID	est. 50MID	Dry	6 ft gated fence. Storm sewer restricted to 4 in at outlet and backflows into basin when necessary	N/A	Ponding	Turf	Algae	0	Outflow/Inflow blocked and underwater.	Verify restrictor. Clean structures.
145	Birmingham Cosmetic Center	est. 3384MID	2500	N/A	N/A	0.5	N/A	N/A	rectangular	5	4	est. 72MID	est. 47MID	Dry	6 in PVC roof drain	No	Ponding, Poorly Drained	Turf	No	0	Recently fertilized. No restrictor.	Verify restrictor. Clean structures.
146	Jewish Vocational Center	N/A	2800	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	Dry Catchbasin	6 separate storage areas listed.	Minimal	Silty Loam	Turf	No	0	No 4" restrictor. Pipes flow in and out of middle CB.	Verify restrictor.
151	Detroit Medical Center	est. 6864MID	5000	N/A	N/A	N/A	N/A	N/A	rectangular	6	4	est. 156MID	est. 44MID	Dry	Restricted MH outlet backs into basin	No	Hydric	Turf	Phragmites	0	Overflow spillway and Inflow 462 not found. No 6" restrictor.	Verify restrictor. Clean structures.

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Table 8.6A: City of Southfield Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	153	Victor Center Office - Retention Area 1	16-3	16	SW	16-302-031	16-3-035	Giffels-Webster Eng. 7/30/84	some	N/A	27400 Northwestern - S basin	Owner	N/A	Com.	N/A	N/A	0.71	N/A	4 ft	2.9	N/A	17000	12600
SOC	154	Hampton Hotel	17-1	17	SE	17-426-013	N/A	F. B. Weissman Rev. 10/11/84	y	N/A	27500 Northwestern	Owner	N/A	Com.	8.76 paved; 1.8 grass	10 yr, 1 hr	2.112	0.9 paved; 0.4 grass	6.58	7	64828	est. 92100	102400
SOC	158	Franklin River Apts - N basin	17-2 a	17	NE	16-101-016	17-3-002	Zeitmet/Wozniak 3/21/85Rev.	y	N/A	Twelve Mile and Franklin River Dr.	Owner	N/A	Res.	6.5 (plus 6 from Tel-12 Mall and 1.1 from Lancaster Apts)	10	7.2	0.6 (plus 0.9 at Tel-12 Mall and 0.2 at Lancaster Apts)	4.5	4.1	25028	26875	44300
SOC	159	Franklin River Apts - S basin	17-2 b	16	NW	16-101-016	17-3-002	Zeitmet/Wozniak 3/21/85Rev.	y	N/A	Thornapples Dr. and Franklin River Dr.	Owner	N/A	Res.	8.9	10	1.78	0.6	3.5	2.7	34269	34625	19400
SOC	160	Panian Chevrolet	17-3	17	NE	17-201-056	N/A	Roth Engineers 9/13/73 rev.	y - no calcs	y	28111 Telegraph Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	6.36	5.4	N/A	N/A	93700
SOC	161	Galleria Office Park	17-4	17	NW	17-176-009	N/A	Forber-Cohen/Nemer Properties 8/31/81 calcs	no - calcs only	Easement	NW corner of Northwestern and Lockdale	Owner	N/A	Com.	25.71 site	10	5.142 site	0.7	3.1 lower level and 1.6 upper level	5.2	120327 site	(127922 site) 47934 lower level and 58160 upper level	148700
SOC	162	Galleria - NE basin	17-5	17	NW	17-126-044	17-4-004b	334; MCS 6/28/89 AB	no - calcs only	N/A	SW corner of Twelve Mile and Lockdale	Owner	N/A	Com.	28.43 site	N/A	N/A	N/A	5.8	7.9	166729 site	96100	214300
SOC	163	Silver Triangle Office	17-6	17	NW	17-102-037	17-4-005	264; Nowak and Fraus 7/30/84BID and 10/28/96 parking add'n	y	n	25505 Twelve Mile Rd.	Owner	N/A	Com.	8.76	10	1.75	0.7	4	4	44917	N/A	19200
SOC	164	Meade Lexus East	17-7	17	NW	17-102-039	N/A	Spalding DeDecker 2/12/98	y	y	28300 Northwestern	Owner	N/A	Com.	22.04 (incl. 16.58 from Star Theatre)	10	4.41	0.7	4.9	4.3	112936	114773	104200
SOC	166	Homestead Village	17-8 a	17	NW	17-102-039	N/A	Spalding DeDecker 2/12/98 (Calcs - John R. McAdams Co. 5/7/98)	y	y	28500 Northwestern Hwy.	Owner	N/A	Com.	3.07 site (1.37 for Meade Lexus and 1.7 form Homestead Village)	10	0.573	0.95 for 1.65 ac. And 0.30 for 1.42 ac.	N/A	3.9	20069 (5747 Lexus and 14322 Homestead)	20086 (12407 south pond, 5647 north pond, and 2032 underground)	42750
SOC	168	Essex Office Center	17-9	17	NW	17-102-012	17-1-006	264	y	N/A	28400 Northwestern Hwy.	Owner	N/A	Com.	3.79	10	0.75	0.7	3	6.5	19409	19900	35600

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
153	Victor Center Office - Retention Area 1	N/A	4350	N/A	N/A	2.7	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry		2	N/A	Turf, Shrub	Phragmites, Purple L.	0	No restrictor in outflow. Oil at inflows.	Verify restrictor.
154	Hampton Hotel	N/A	14600	est. 14000MID	N/A	2	N/A	N/A	rectangular	N/A	1	est. 200MID	est. 70MID	Dry	It is believed that the other properties (River fts Edge Office, Cooper Canyon Restaurant, Soul Gardens Restaurant) also contribute to this basin. 6 ft gated fence.	Minimal	Hydric	Grass, Forb, Bush, Cattail	Purple L., Phragmite, Buckt	0	Strong odors, toilet paper at inflow 465. Brush dumped at Inflow 464.	Verify restrictor. Clean structures, brush, and sediment. Check for illicit connection.
158	Franklin River Apts - N basin	11000	10800	MID6720	N/A	0.5	N/A	N/A	rectangular	N/A	2	est. 105MID	est. 80MID	Dry	North basin	1	Hydric, Sediment	Tree, Turf, Forb	Purple L., Phragmites, Buckt	0	Hole in the ground above Inflow 466 - pipe may be separated.	Check Inflow pipe 466 for separation. Clean structures.
159	Franklin River Apts - S basin	12250	7200	4720MID	N/A	N/A	N/A	N/A	rectangular	N/A	2	est. 115MID	est. 50MID	Dry	South basin	2	Hydric, Sediment	Turf, Tree, Forb	Phragmites	0	Inflow 469 not found.	Clean structures.
160	Panian Chevrolet	N/A	17400	N/A	N/A	N/A	1.66	N/A	rectangular	3	2	198MID	98MID	Dry	Fenced with gate in NE corner.	0.5	Poorly Drained, Ponding	Turf	Purple L., Cattail, Sedge	50	Inflow 516 not found. No overflow. Truck tracks in basin. Inflow spillway 515 not graded properly (flows around).	Stabilize NW corner and Inflow 515. Clean structures.
161	Galleria Office Park	18275 lower level and 54425 upper level	28600	12650 lower level and 18275 upper level	N/A	N/A	N/A	N/A	triangular lower level and irregular upper level	N/A	2	N/A	N/A	Dry	Two-level basin with conventionally designed lower level and wooded area serving as upper level.	0.5	Hydric	Turf, Tree, Shrub	Buckthorn, Cattail	100	Only one Inflow pipe found.	
162	Galleria - NE basin	19488	27100	13650	N/A	1.9	N/A	N/A	rectangular	N/A	1	147 MID	110.5 MID	Dry	No inflow pipes on Phase IV site plan	0.5	Hydric, Sediment	Grass, Shrub	Cattail, Purple L.	0	Restricted down the storm line - could not verify restrictor size. Side slopes recently mowed. 4' fence.	Verify restrictor size. Repair Outflow 279 end-section.
163	Silver Triangle Office	N/A	4800	N/A	N/A	N/A	5	3	irregular	N/A	2	N/A	N/A	Wet	Two basins hydraulically connected. 4 ft cl fence.	N/A	Poorly Drained	Turf, Forb	Buckthorn, Purple L.	0	North side 50% unvegetated. No restrictor in weir. Offline detention of Pernick Drain. Inflow 517 not found.	Verify restriction. Stabilize north slope.
164	Meade Lexus East	26580	24200	21480	1.6	1	1.7	2	irregular	3	1	est. 300	est. 70MID	Wet	East basin - This basin serves the Lexus site east of the Pernick Creek and the much larger Star Theater site east of Case Road. It is believed that Star Theater also stores in pipes underground on the Star site.	Minimal	Underwater	Shrub	P. L., Buckthorn	0	Has fountain, retaining wall on east side.	
166	Homestead Village	3650 north basin, 3860 south basin	10950	MID1245 north basin, MID1385 south basin	N/A	0.5	1	2	irregular	varies	2	N/A	N/A	Wet	West basin - This basin, in the n.w. corner of the Lexus site west of the Pernick Creek, serves both the Lexus west lot and part of the hotel site. Wetland shelf at 1-yr storm elev. 6 ft fence and retaining wall.	N/A	N/A	Cattail	Algae, Phragmites	0	Expanded 3 pool wet basin with wetland shelf. Middle and S basins connected by four 24" conc. pipes. N basin algae mat.	Nutrient control in north basin.
168	Essex Office Center	N/A	5475	N/A	N/A	N/A	2	3	irregular	5	2	est. 140	est. 30	Wet	2 in asphalt pond bottom. Railing and boulder wall. Only half of site drains to basin.	N/A	Hydric	Turf	Lawn	0	No inlets found, possible underwater. Fountain.	Outlet screen needs cleaning - blocking 50%.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	169	Wyatt Office Plaza	17-10 a	17	NW	17-151-011	N/A	Zeimet-Wozniak 3/22/88	y	N/A	28411 Northwestern Hwy.	Owner	N/A	Com.	8.2	10	1.64	0.7	3.5	3.9	42017	42017 (32880 basin plus 23148 underground)	13000
SOC	170	Embassy Suites	17-10 b	17	NW	17-151-005	18-1-038	335; Zeimet - Wozniak 1/8/86	y	N/A	28100 Franklin Rd.	Owner	N/A	Com.	5.48	N/A	1.1	0.7	3.5 basin (h = 5.75)	2.9	27792	27979 (21239 parking, 5028 pond, and 1712 pipe)	13200
SOC	171	Ameritech	17-11	17	SE	17-451-013	N/A	Jickling & Lyman 6/18/74	y	N/A	24524 Eleven Mile Rd.	Owner	N/A	Com.	2.97	N/A	0.594	0.7	est. 6	7.3	14045	N/A	33400
SOC	173	Southfield Crossing Center	17-13	17	SW	17-352-001	N/A	N/A	y	y	25650 Eleven Mile Rd.	Owner	N/A	Com.	4.566	10	0.2	0.8	2	2.9	27431.175	28122.31	39400
SOC	174	American Commerce Center, basin 2	17-14	17	SW	17-351-016; 18-476-007; 18-476-008	N/A	J&L Consulting 2/23/98 calcs	no	y	25800 Eleven Mile Rd.	Owner	N/A	Com.	12	0.5 in runoff first flush	N/A	N/A	N/A	8	N/A	17000	46500
SOC	175	Country Village Plaza	15-1	15	NE	15-226-033	15-1-014	Summa Eng. 7/8/00AB	y	N/A	20097 W. Twelve Mile Rd.	Owner	N/A	Com.	0.72	10	0.14	0.7	0.5 ft in CB4; 0.3 ft in CB3	N/A	509	599	N/A
SOC	178	Courtyard Office Park	18-1	18	NE	18-276-046	18-1-032	266	n	N/A	28200 Franklin Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4.2	N/A	N/A	24600
SOC	179	Spring Hill Suites	18-2	18	NE	18-276-045	N/A	Environmental Engineers, Inc.	y	N/A	28555 Northwestern Hwy.	Owner	N/A	Com.	1.89	10	N/A	0.7	N/A	4.3	9687	9909	10000
SOC	180	Maple Tree Apts.	18-3	18	NE	18-277-044	18-1-019	265; Postiff 12/6/78	some - No storm sewer	N/A	28545 Franklin Rd.	Owner	N/A	Res.	52.7 acres at restrictor (12 site and 40.7 offsite)	10	10.6	0.53 site and 0.15 offsite	est. 2.86	4	48410	52450	104200
SOC	181	Tyler Estates 2	18-4	18	NE	18-177-049 thru 065; and 18-251 040 thru 059	N/A	Beckman Wehbe Corp.	y	N/A	Senator Cir.	Owner	N/A	Res.	13.19	10	0.2	0.53	4	4.8	32470	33868	27600

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
169	Wyatt Office Plaza	11920	3300	5200	N/A	N/A	5	N/A	triangular	N/A	1.5	N/A	N/A	Wet and Parking	May be eliminated if MDOT install ramp to WB I696. 4 ft fence. Water backs up into pipes when basin is full providing extra storage. Discharges to Peterson Drain	2	N/A	Forb, Tree	Phragmites, Cattail	0	Solid cover on overflow. 4' fence.	Change overflow cover.
170	Embassy Suites	N/A	4550	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	2	est. 243MID	est. 21MID	Dry Catchbasin and Parking		No	Clayey - Type C	Turf	No	0	No 4" restrictor found.	Verify restrictor.
171	Ameritech	N/A	4575	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2	N/A	N/A	Pumped Detention	4 ft fence. Pumped to 6 in line.	Pointbar In Deep Area	Partially Paved, Silt	Forb	Phragmites	0	Basin made up of two cells connected by 18" pipe, one cell is paved - oil sheen observed. Outflow not found.	Verify outlet.
173	Southfield Crossing Center	11695.32	13600	1643.71	N/A	N/A	N/A	N/A	N/A	5	2	N/A	N/A	Dry Catchbasin	Pipes used as storage. Various spillways from parking lot. 2 separate basins connected.	N/A	Poorly Drained	Turf	No	0	Parking lot runoff to 9 gabion spillways. Underdrain. Basin is two basins hydraulically connected by CBs. No 4" restrictor.	Verify restrictor.
174	American Commerce Center, basin 2	est. 12630	5800	N/A	N/A	N/A	N/A	3.5	irregular	N/A	3	N/A	N/A	Wet and Wetland	This basin is part of the American Commerce Center's combined wetland/detention facility. This basin, Basin #2, receives all storm water runoff from parking lots, walks and landscape areas from the Brookdale Senior Housing complex, Barton Mallow, and the . discharges to wetland and storm sewer south at elev. 691.5.	Some	Hydric	Grass, Forb	Algae	100		Nutrient control.
175	Country Village Plaza	2520 at CB4; 1790 at CB3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	Parking	Discharges to small basin on Evergreen frontage in lawn area. Storage due north in entry drive.	N/A	N/A	N/A		0	6" restrictor in field but 3" on plans. 6" roof drain to CB.	Verify restrictor.
178	Courtyard Office Park	N/A	5850	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	Dry		Some At Inlet	Poorly Drained	Shrub, Tree	Buckthorn, Willows	0	Sediment and vegetation blocking inlet.	
179	Spring Hill Suites	N/A	2325	N/A	N/A	N/A	N/A	N/A	irregular	N/A	5	N/A	N/A	Dry Catchbasin	There are both a sodded detention basin and parking lot storage-two outlet structures were identified, an unrestricted one in the sodded detention basin and one in the parking lot CB w/ the 4 in restrictor	N/A	Loamy Silt	Turf	No	0	Cobble bottom. No restrictors. Appears to have more than one Outflow.	Verify restrictor.
180	Maple Tree Apts.	N/A	26050	N/A	N/A	1.6	N/A	N/A	irregular	3 ditch, 5 upper slope	2	est. 445	6 channel bottom	Inline Detention		0.5	Hydric	Forb, Shrub	Buckthorn	0	Sediment a problem at both inlets.	Clean out inlets, unbury inlet 553, clean debris from outlet structure.
181	Tyler Estates 2	15088	5750	1846	1	0.5	N/A	N/A	N/A	5	4	N/A	N/A	Dry	Outlet only	N/A	Hydric	Turf	Cattail, Rush	0	No restrictor on Outflow.	Verify restrictor.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	182	Tyler Estates 4	18-5	18	NE	N/A	N/A	Beckman Wehbe Corp.	y	N/A	Senator and Tyler	Owner	N/A	Res.	5.33	10	0.2	0.53	4	N/A	12785	13418	N/A
SOC	183	Tyler Estates 3	18-6	18	NW	18-178-001 thru 017	N/A	Beckman Wehbe Corp.; AB 7/14/00	y	N/A	26805-26982 Monroe Dr.	Owner	N/A	Res.	7.61	10	0.2	0.5	3	4	19533	20352	14280
SOC	184	Tyler Estates 1	18-7	18	NW	18-176-043 thru 055	N/A	Beckman Wehbe Corp.	y	N/A	Tyler Rd., near Isleworth Ct.	Owner	N/A	Res.	3.82	10	0.2	0.5	4	2.4	9805	9678	23400
SOC	185	Villas of Pebble Creek East	18-8	18	NE	18-177-027 thru 048 and 18-251-021 thru 039	18-4-010	315	y	N/A	26403-26792 Isleworth Pt.	Owner	N/A	Res.	15.43	10	3.09	0.35	N/A	2.2	33326	38652	36700
SOC	186	Villas of Pebble Creek	18-9	18	NW	18-176-029 thru 042	18-4-011	316	some	y	Pebblecreek Pkwy., Castlegate	Owner	N/A	Res.	5.94	N/A	1.19	N/A	N/A	3.9	12830	64477	99800
SOC	187	Pebblecreek Park	18-10	18	NE	18-177-024	N/A	Zeimet Wozniak & Assoc. 6/14/95 Rev.	y	N/A	Tyler and Isleworth	Owner	N/A	Res.	19.6	N/A	3.92	0.55	4	5.5	67474	73500	88800
SOC	188	Walnut Grove Condos	18-11	18	NW	18-126-008 thru 029	18-4-002	267; Professional Engineering Associates 12/17/79 rev.	y	Y	26815-26563 Walnut Grove Ln.	Owner	N/A	Res.	3.2	N/A	0.64	N/A	3.5	4.9	12322	N/A	18600
SOC	190	Pebble Stone Estates	18-13	18	SW	18-327-017 thru 020	N/A	N/A	y	N/A	27017 Pebbestone Ave.	Owner	N/A	Res.	1.71	10	0.34	0.4	N/A	3.1	4389.5	4481	19600
SOC	191	Blue Cross Blue Shield - NE basin	18-14	18	SW	18-351-014	N/A	PT&P 5/25/88 rev.; calcs from Nowak and Fraus	no storm or details	N/A	27000 Eleven Mile Rd.	Owner	N/A	Com.	5.967 site	10	1.19	0.8	5	4.6	35848 site	36446 site	23200
SOC	192	American Commerce Center - basin 1	18-15	18	SE	N/A	N/A	J&L Consulting 2/23/98	some	N/A	26500 American Dr.	Owner	N/A	Com.	N/A	0.5 in runoff first flush	0.125 cfs/ac	N/A	N/A	7.8	N/A	68000	62200
SOC	200	Cumberland Office Center	19-1	19	NW	19-100-221	N/A	OHM 2/21/86Approved	y	N/A	27301 Eleven Mile Rd.	Owner	N/A	Com.	8.66	10	1.73	0.675	4.7	4.3	42497	40475 (plus 2966 pipe storage)	37100
SOC	201	Oxford Estates	19-2	19	SW	19-301-034 thru 047 & 19-351-048 thru 051	N/A	Zeitmet/Wozniak 8/1/01Rev.	y	N/A	27220-27387 Oxford Ct.	Owner	N/A	Res.	10.89	10	2.18	0.41	4	2.3	29734	32080	37950
SOC	202	UPN 50	19-3	19	NW	19-100-222	19-4-004a	337; Austin Co. 6/30/86	y	N/A	26905 Eleven Mile Rd.	Owner	N/A	Com.	8	10	1.6	0.76	4.75	6	46650	46820	73400
SOC	205	Franklin Terrace Apts.	20-1	20	NE	20-201-001	N/A	Basney & Smith 10/21/77AB	site plan and partial calcs	N/A	26962 Eleven Mile Rd.	Owner	N/A	Res.	N/A	N/A	0.44	N/A	4	3.5	14274	16650	15400

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
182	Tyler Estates 4	6160	4500	549	1	N/A	N/A	N/A	rectangular	6	var	N/A	N/A	Dry		Yes	N/A	None	No	25	Under construction. Outflow not built yet.	Clean structures. Stabilize side slopes. Re-inspect when construction complete.
183	Tyler Estates 3	10816	3570	2752	1	6.2	N/A	N/A	rectangular	6	3	N/A	N/A	Dry		N/A	Topsoil	Turf	No	0	Recently constructed. Outflow 50% obstructed by rock.	Verify restrictor.
184	Tyler Estates 1	4491	9750	348	1	1	N/A	N/A	rectangular	6	4	N/A	N/A	Dry Extended Detention		Minimal	Hydric, Ponding	Turf Slopes	Purple L., Cattail, Phragmit	0	Overflow spillway not adequately stabilized.	Stabilize spillway.
185	Villas of Pebble Creek East	20386	16700	5158	1	3	N/A	N/A	irregular	6	4	N/A	N/A	Dry		Minimal	Hydric, Ponding	Turf Slopes	Purple L., Cattail, Willow	75	Vegetation blocking Inflow 927.	Verify restrictor (plan shows 8"). Clean structures.
186	Villas of Pebble Creek	N/A	25600	N/A	N/A	1	N/A	N/A	triangular	N/A	4	N/A	N/A	Dry		Minimal	N/A	Turf	Cattail	0	Fountain is obstructing outflow 223.	Verify restrictor.
187	Pebblecreek Park	29000	16150	9000	N/A	N/A	N/A	9	irregular	N/A	2	est. 310	est. 80	Wet	No outflow shown	Point Bars Observed	Hydric, Ponding	Turf	Lawn	0	Northern slope has toe erosion, slumped in at areas.	May need stabilization.
188	Walnut Grove Condos	N/A	3800	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	Dry Catchbasin		Minimal	N/A	Turf	No	0	4' fence. Storm pipes to and from structure with 12" x 18" openings to basin. 4" roof drain.	Verify restrictor. Remove broken conc. weir and sand bags from structure.
190	Pebble Stone Estates	N/A	6300	N/A	N/A	1	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry		>0.5 of sediment at Inflow	Hydric, Ponding	Tree, Bare Soil	Cattail	0	North bank is bare, recent construction.	Verify restrictor. Stabilize north side.
191	Blue Cross Blue Shield - NE basin	11040	5000	4100	N/A	N/A	N/A	N/A	triangular	N/A	3	est. 140MID	est. 80MID	Dry Catchbasin	Storm sewer drains to a restricted outlet and CB back up into basins for storage. Calcs may be for another site - do not seem to match basins.	Minimal	N/A	Turf, Shrub	No	0	Cobble bottom.	Verify restrictor. Place perf. cover on overflow MH.
192	American Commerce Center - basin 1	est. 25000	8000	N/A	N/A	1	N/A	1	N/A	3	3	N/A	N/A	Wet Extended Detention	This basin is part of the American Commerce Center's combined wetland/detention facility. This basin, Basin #1, receives all storm water runoff from parking lots, walks, and landscape areas from the (7) sites listed here. Water from this basin then drain. Basin has baffle system to lengthen flow route.	2.5	Clayey	Turf, Shrub	Algae, Purple L.	100	Inflow sumps full of sediment.	Clean structures.
200	Cumberland Office Center	12776	8600	7016	0.5	N/A	N/A	1	rectangular	3	2	est.245TOP	est.72TOP	Dry		1	Clayey	Shrub	Buckthorn, Cattail	0	Crushed conc. placed as an access road in basin. Low flow swale cut. Overflow not found. Outflow partially blocked.	Clean structures. Add overflow.
201	Oxford Estates	13216	16500	3280	1	0.2	2	3	oval	N/A	5	est. 185MID	est.50MID	Wet	2 ft. sacrificial storage.	Yes. From Constr. Site	N/A	Turf		0	Area under construction - no erosion controls. Basin flooded. Standpipe clogged.	Clean structures. Remove sediment.
202	UPN 50	18166	12250	5026 (13670MID)	2	1.8	N/A	N/A	irregular	2.5	1.5	est. 195MID	est. 68MID	Dry	West portion of site (est. 1.7 ac.) had existing storm draining south to ditch undetained. Ditch may now be enclosed (11/16/92).	None	Poorly Drained	Tree, Forb	Phragmites, Willow, forb	0		Add grate for overflow structure, clean structures.
205	Franklin Terrace Apts.	6345 (4162MID)	4400	1980	1	N/A	N/A	N/A	irregular	N/A	1.5	N/A	N/A	Dry	4 ft fence. Discharges to Pernick Drain.	2	N/A	Grass, Forb	Purple L., Buckthorn	0	4' fence.	Verify restrictor.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	207	Lakeland Nursing Center - S basin	20-3 a	20	NE	20-201-002	N/A	Finnicum Brownlie 3/10/94	y. No calcs	N/A	26900 Franklin Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	2.2	N/A	N/A	3520
SOC	208	Lakeland Nursing Center - N basin	20-3 b	20	NE	20-201-002	N/A	Edmund London & Assoc. rev. 4/15/03	y	N/A	26900 Franklin Rd.	Owner	N/A	Com.	0.94	10	0.19	0.49	2.45	4	3146	3170	N/A
SOC	209	Irene's Myomassology	20-4	20	NE	20-253-013	N/A	N/A	y	N/A	26061 Franklin Rd.	Owner	N/A	Com.	2.26	10	0.45	0.63	6	4.9	10185.78	10229	10500
SOC	210	Riverside Office Bldg.	20-5	20	SE	20-401-002	20-2-030	339	y	N/A	25925 Telegraph Rd.	Owner	N/A	Com.	9.84	N/A	1.96	N/A	N/A	14	48586	50949	100000
SOC	211	Nippendenso	20-6	20	SW	20-401-003	20-2-026	270	y	y	24777 Denso Dr.	Owner	N/A	Com.	6.04	10	1.21	0.8	N/A	8	33360	N/A	133150
SOC	212	Denso International - W basin	20-7	20	SW	20-326-220	20-2-26a	270; calcs - Nowak & Fraus 6/8/85; Nathan Levine 1/29/88 plan	No. No calcs of expansion.	N/A	24777 Denso Dr.	Owner	N/A	Com.	29	10	Qo = 0.31	0.8 for 21.75 ac. And 0.2 for 7.25 ac.	4	N/A	135758	121917 (106188 basin and 15729 parking)	N/A
SOC	213	Tim Hortons	20-8	20	SE	20-451-002	N/A	N/A	y	N/A	25311 Telegraph Rd.	Owner	N/A	Com.	0.726	10	0.2	0.68	4	4.5	3593.715	5269.75	3650
SOC	214	GE Plastics - N basin	20-9	20	SE	20-426-030	20-2-021	269	some	N/A	25900 Telegraph Rd.	Owner	N/A	Com.	0.3	N/A	0.88	N/A	N/A	1.6	N/A	N/A	1100
SOC	215	Trowbridge Apts.	20-10	20	SE	20-426-029	N/A	N/A	y. No calcs	N/A	24111 Civic Center Dr.	Owner	N/A	Com.	6.3	N/A	N/A	0.5	6	3.5	21424	21861	19600
SOC	216	Oakwood at Southfield Apts.	21-1	21	NW	21-100-137	N/A	Zeimet-Wozniak 2/8/88 calcs	y	N/A	26300 Berg Rd.	Owner	N/A	Res.	29.28	10	5.86	0.6	N/A	4.4	125723	128988 (80000 basin and rest in pipes	59800
SOC	217	Village House Condos	21-2	21	NW	21-100-026 thru 121	21-4-002	272	some calcs	N/A	Berg Rd., E. of Hooper	Owner	N/A	Res.	8.0565	N/A	4.5	N/A	6	5.4	68850	N/A	35100
SOC	218	Woodcreek Apts. - pond 1	21-3 a	21	NW	21-100-127	N/A	S.J. Harris 5/28/85	y	N/A	23630 Civic Center Dr., W. basin	Owner	N/A	Res.	12.029site	N/A	2.28site	0.55	N/A	4.5	43788site	45186site	48700
SOC	219	Woodcreek Apts. - pond 2	21-3 b	21	NW	21-100-127	N/A	S.J. Harris 5/28/85	y	N/A	23550 Civic Center Dr., E. basin	Owner	N/A	Res.	12.029site	N/A	2.28site	0.55	N/A	4.5	43788site	45186site	20100
SOC	220	Park Place Apts.	21-4	21	NW	21-100-128	N/A	S.J. Harb & Assoc. 5/3/85AB	y	N/A	22990 Civic Center Dr., near First Center	Owner	N/A	Res.	5.55 (14.8 site)	N/A	1.11	N/A	N/A	3.2	21279	21300	22100
SOC	221	First Center	21-5	21	NW	21-100-122	N/A	Harley, Ellington, Pierce, Yee Assoc. 10/5/81	utilities plan only	storm easement	26901 Northwestern Hwy.	Owner	N/A	Com.	32.88	10	6.58	0.68	3.57	2.8	148360	155560 (132680 (basin plus 22970 in pipe)	160500
SOC	222	Omni Office	21-6	21	NE	21-202-022	20-1-005	337	y	N/A	26877 Northwestern Service Dr., near First Center	Owner	N/A	Com.	15.392	N/A	3.08	N/A	3.68	6.5	72037	90575.89	91000
SOC	224	Heatherwood Condos	21-8	21	NE	21-202-029	N/A	N/A	y	N/A	22800 Civic Center Dr.	Owner	N/A	Res.	4.62	10	0.41	0.9	4	2.2	15400	20155	15100

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
207	Lakeland Nursing Center - S basin	N/A	1600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	est. 85	est. 45	Dry	South basin at Franklin Road bridge. No restrictor shown.	Minimal	Poorly Drained	Turf	No	0	Small dry basin plus some pipe storage, but no restrictor.	Verify restrictor.
208	Lakeland Nursing Center - N basin	3457	N/A	est. 1027MID	1	N/A	N/A	N/A	irregular	N/A	var	N/A	N/A	Dry	North basin - 'micowetland stormwater filtration system'. 4 in roof drain only	Under constr..	silt, clay	none	No	0	Under construction. Inflows from footing and roof drains only. 6" plastic pipe to Over 151.	Re-inspect in the spring.
209	Irene's Myomassology	N/A	2150	N/A	1	2	N/A	N/A	rectangular	N/A	1.5	82	80	Dry Extended Detention		Minimal	Poorly Drained	Turf	Algae, Phragmites, Cattail	0	4' fence with gate.	
210	Riverside Office Bldg.	N/A	7100	N/A	N/A	N/A	N/A	4	triangular	N/A	1.5	N/A	N/A	Wet		No Pool Depth	N/A	Turf, Tree	Duckweed	0	2 fountains and 3 bottom aerators. No 6" restrictor. Inflows 398 and 399 not found - underwater? Solid cover on overflow MH.	Verify restrictor. Clean structures.
211	Nippendenso	N/A	16600	N/A	N/A	N/A	N/A	N/A	triangular	N/A	2	N/A	N/A	Dry	Detention basin drains into natural wetland/swale	Some At Inflow 401	Poorly Drained	Turf, Tree	Phragmites	0	4' fence. MH closed so there is no overflow. Restrictor at MH.	Clean structures.
212	Denso International - W basin	74213	49750	N/A	N/A	N/A	N/A	N/A	rectangular	3	1	363MID	73MID	Dry	Fenced. Expanded by 17413 sft in Phase II 1/29/88.	Some	Hydric	Tree, Shrub, Forb	Buckthorn, Phragmites	0	6' fence. No outflow or overflow found - buried?	Clean structures. Verify Outflow and overflow.
213	Tim Hortons	N/A	800	N/A	N/A	N/A	N/A	N/A	triangular	4	2	N/A	N/A	Dry Extended Detention		Minimal	Silty Loam	Turf		0	Recently constructed. Perforated riser to 12". No overflow - solid MH cover.	
214	GE Plastics - N basin	N/A	700	N/A	N/A	N/A	N/A	N/A	irregular	N/A	1	N/A	N/A	Dry		Minimal	poorly drained - Type C	Turf	no	0	6" Inflow and Outflow. No 4" restrictor.	Verify restrictor.
215	Trowbridge Apts.	9813	5600	0	1.2	N/A	N/A	N/A	irregular	4	var	N/A	N/A	Dry Extended Detention		10 CYD Dumped By Gazebo	Muck	Tree		100	Excavation from gazebo dumped on to north bank. Outflow buried.	Clean structures. May need to excavate.
216	Oakwood at Southfield Apts.	31250	13600	10750	N/A	0.5	est. 6	4	irregular	6	4	est. 180MID	est. 75MID	Wet	Restrictors in storm leaving structures 39, 41, 42, 43, 45, and 6.	Minimal	N/A	Turf	Algae, Duckweed	0	Fountain, stone edging. No outflow found. Swale draining to basin at SE side. Goose droppings.	Verify restrictor size - no plans or calcs.
217	Village House Condos	10500	6500	4200	N/A	N/A	0	N/A	rectangular	3	2	150	70	Dry	Basin last inspected in 1980.	Minimal	Hydric	Turf	Phragmites, Buckthorn	0	Abandoned pump station. No restrictor found. Not much drains to basin.	Verify restrictor and drainage to basin. Replace outflow bar grate.
218	Woodcreek Apts. - pond 1	N/A	10800	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry Catchbasin	Calcs are based on the total of both ponds.	N/A	Sandy Loam, Type B	Turf	No	0	Basins 218 and 219 are supposed to drain to MH with restrictor - no 8" restrictor.	Verify restrictor. Clean structures.
219	Woodcreek Apts. - pond 2	N/A	4500	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry Catchbasin	Calcs are based on the total of both ponds.	N/A	Sandy, Type B	Turf	No	0	Basins 218 and 219 are supposed to drain to MH with restrictor - no 8" restrictor.	Verify restrictor. Clean structures.
220	Park Place Apts.	N/A	6900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	Dry Catchbasin	Two connected dry basins with one restrictor. 13100 ft3 detention pond, 5450 ft3 detention pond, and 2750 ft3 parking lot storage. High water elev. 684.5	No	N/A	Turf	No	0	Fenced. No inflows.	
221	First Center	37200MID	57300	N/A	N/A	2.8	4	N/A	triangular	N/A	2	est. 290MID	est. 270MID	Dry		Minimal	Poorly Drained	Turf, Bulrush, Buckthorn	Algae, Phrag, Purple L.	0	6" PVC in SW corner. 4' fence.	
222	Omni Office	16500	14000	7700	0.9	N/A	0	N/A	rectangular	3	1.5	150	110	Dry and Parking	Site also has parking areas to provide some storage.	N/A	Inundated, Silty Clay	Tree, Shrub, Forb	Buckthorn, Cattail, Willow	0	Site overgrown, could not find outlet or overflow. Fenced.	Verify outlet, clean if necessary.
224	Heatherwood Condos	7800	6800	2250	N/A	2	0	N/A	irregular	4	2	N/A	N/A	Dry		N/A	Poorly Drained	Cottonwood	Cattail, Willow	0	All structures underwater, water in CBs.	Clean structures. Verify Outflow.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	225	Monticello Apts.	21-9	21	NE	21-202-028	21-1-011	272; Archon Assoc. Inc. 12/12/86Rev.	some calcs. Poor plans no details	N/A	22650 Civic Center, near building 22760	Owner	N/A	Res.	9.07 (storage for 7.42ac. only)	N/A	N/A	0.5	est. 1.8 basin (1 ft wetland)	2.1	52647	55200 Site (15200 Basin)	14900
SOC	226	Willowtree Apartments	21-10	21	SE	21-202-020	21-1-003	271	Partial plans. No calcs.	N/A	22262 Civic Center Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SOC	228	Irvine Rehab Center	22-1	22	SW	22-351-097	N/A	N/A	y	N/A	25700 Lahser	Owner	N/A	Com.	1.68	10	0.33	0.45	3	N/A	5021	5088	N/A
SOC	229	Northwest Detroit Dialysis	22-2	22	SW	22-351-098	N/A	PEA 9/11/03AB	y	n	25664 Lahser	Owner	N/A	Com.	0.3	10	0.06	0.7	1.5	1	1538	2801	650
SOC	230	Oakland Commons - E basin	22-3 a	22	NW	22-201-017	N/A	N/A	y	N/A	20750 Civic Center Dr.	Owner	N/A	Com.	21.73	10	0.2	0.75	7	6.8	118813	130934	74400
SOC	231	Oakland Commons - W basin	22-3 b	22	NW	22-201-017	N/A	N/A	y	N/A	20750 Civic Center Dr.	Owner	N/A	Com.	21.73	10	0.2	0.75	7	6.8	118813	130934	74400
SOC	232	Oakland Town Square	22-4	22	NW	22-176-012	N/A	N/A	y	N/A	26100 Northwestern Hwy.	Owner	N/A	Com.	26.139	10	0.299	0.67	8.5	5.7	127075	127143	62300
SOC	233	Oakland Commons	22-5	22	NE	22-201-017	22-1-002A	Nowak & Fraus 10/19/98	y	N/A	20700 Civic Center Dr.	Owner	N/A	Com.	14.99	10	3	0.75	9	8.7	83420	170740	214750
SOC	234	City Center Office Center	22-6	22	NE	22-226-020	N/A	N/A	no calcs	N/A	26777 Central Park Blvd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4.3	N/A	N/A	22600
SOC	235	Residence Inn	22-7 a	22	NE	22-227-063	22-1-010	275	y	N/A	26700 Central Park Blvd., near I-696 Service Dr.	Owner	N/A	Com.	3.79	10	0.76	0.6	4	2.6	14581	18558	5300
SOC	236	Residence Inn	22-7 b	22	NE	22-227-063	22-1-010	275	y	N/A	26700 Central Park Blvd., near I-696 Service Dr.	Owner	N/A	Com.	1.57	10	0.31	0.6	3.8	2.1	6066	7746	1250
SOC	237	Park Place Town Center	22-8	22	SE	22-428-001 thru ?	N/A	N/A	Plans illegible, partially complete. No details. No indication of restrictor.	y	Boardwalk and Evergreen	Owner	N/A	Res.	N/A	1	0.7	0.62	6.5	1.3	7467	12300	14900
SOC	238	Park Place Town Center	22-9	22	SE	22-426-002 thru ?	N/A	N/A	n	y	Northwestern and Evergreen	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	7.1	N/A	N/A	82300

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
225	Monticello Apts.	est. 8000MID	7100	N/A	N/A	2.1	N/A	3	irregular	N/A	2	est. 135MID	est.. 65MID	Wet	May have calculated detention that discharges into adjacent wetland. No storage provided for 1.65 acre Area B.	Minimal	Hydric	Forb, Aquatic	Phragmites, Cattail, Willow	0	Has fountain. 4' fence.	
226	Willowtree Apartments	N/A	104650	N/A	N/A	N/A	N/A	N/A	N/A	3	var	N/A	10	Wet and Wetland	May have calculated detention that discharges into adjacent wetland.	Muck, Sediment	Hydric	Cattail, Tree	Phragmites, Buckthorn	100	Open drain and wetland area with no storage. Mosquito larvae in water. Possible overflow CB in SE corner full of sediment.	Re-visit site. 12" conc. Inflow on E side is buried with broken end-section.
228	Irvine Rehab Center	6385	54600	360	1	N/A	0	N/A	irregular	6	var	270	40	Wetland		N/A	Hydric	Turf, Grass, Willow	Phragmites. Purple L., Buckt	0	Storm sewers discharge to wetlands to ditch to the south. No spillway or outlet to the south.	Clean structures. Verify restrictor at Outflow 250.
229	Northwest Detroit Dialysis	2052	650	est. 1860MID	0.25	0.25	N/A	N/A	rectangular	4	3	est. 64MID	est. 30MID	Dry Extended Detention	Discharges to wetlands in the rear.	1	Poorly Drained, Ponding	Turf	No	50	6" PVC roof drain E side. Oil sheen.	Excavate to 1550 ft3.
230	Oakland Commons - E basin	30545	10900	853	1	N/A	0	N/A	irregular	5	3	230	100	Dry Extended Detention	Connected with basin 231. Calcs are the same because they are hydraulically connected. Areas differ. Additional capacity provided by nearby wetland.	Minimal	Hydric	Grass, Forb	Algae, Cattail, Bulrush	100	6" PVC tile drain at E side. Outflows to basin 231. Basin partly mowed. Volume for basins 230 and 231.	
231	Oakland Commons - W basin	27962	10900	34	1	N/A	0	N/A	irregular	5	3	170	70	Dry Extended Detention	Connected with basin 230. Calcs are the same because they are hydraulically connected. Areas differ. Additional capacity provided by nearby wetland.	Minimal	Hydric	Grass, Forb	Algae, Cattail, Bulrush	100	Overflow 130 not found. Volume for basins 230 and 231.	
232	Oakland Town Square	24780	10900	5050	N/A	3	4	N/A	rectangular	5	3	180	160	Dry		N/A	N/A	Turf		0		
233	Oakland Commons	N/A	25100	N/A	N/A	1.2	9	N/A	irregular		5	est. 210MID	est. 60MID	Dry	Dry basin with sediment trap at primary inlet and temporary riser. Check if riser removed. Other Inlet to mid-slope, check for erosion.	Minimal	Hydric	Turf	Cattail, Sedge, Forbs	0	Overflow spillway 166 not properly graded. Two cell basin	Nutrient control. Replace bar grate on Inflow 565.
234	City Center Office Center	N/A	5250	N/A	N/A	2	N/A	N/A	N/A	6	4	N/A	N/A	Dry	Used as backflow?	N/A	Silty, Wet	Turf	No	0	No Inflow. Outflow unrestricted with separated end-section. Overflow not found.	Verify restrictor. Repair Outflow 227.
235	Residence Inn	N/A	2050	N/A	N/A	N/A	0	N/A	0	6	3	180	50	Dry		Excessive	N/A	Cattail		0	Overgrown, silted in, inaccessible. Appears to be a buried Inflow pipe on W side. Outflow and Overflow not found (buried).	Verify Outflow. Dredge. Maintain vegetation.
236	Residence Inn	2800	600	75	N/A	3	0	N/A	triangular	6	2	80	70	Dry		N/A	Silty Loam	Turf	No	0	Plan shows Inflow 226 as swale. Basin is bisected by a fence. Overflow off property.	
237	Park Place Town Center	N/A	11500	N/A	N/A	N/A	N/A	5	N/A	6	6	260	80	Wet		N/A	Hydric	Forb, Turf	Algae, Cattail, Rushes	0	Has fountain, did not find inlet, possible underwater.	Verify inlet.
238	Park Place Town Center	N/A	11600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	Dry Extended Detention		Minimal	Hydric, Underwater	Forb	Cattail, Rushes, Phragmites	0		

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	239	Hawthorne Suites	22-10	22	SE	22-426-004	N/A	N/A	y	y	25100 Northwestern Hwy.	Owner	N/A	Com.	3.07	10	0.093	0.7	4.36	4.7	8616.64	18517.2	21400
SOC	240	Lawrence Tech	22-11	22	SW	22-451-003	22-2-004	OHM 5/21/98	y	N/A	21000 W. Ten Mile Rd.	Owner	N/A	Com.	7.383	10	1.477	0.55	2.57	2.5	28250	17772	40100
SOC	242	Meadowcrest Apts.	25-2	25	NW	25-156-002	N/A	Archon Assoc., Rev. 12/1/89	grading and utility plans and calcs	N/A	17380 Mt. Vernon, E. of Lathrup	Owner	N/A	Res.	5.154	10	1.038	0.7	2.7	2.5	26415	26503	12500
SOC	246	Blue Water Productions	26-2	26	SW	26-177-020	N/A	Atwell-Hicks, Inc. Approved plans 4-7-01	y	y	696 Service Dr. and Mt. Vernon	Owner	N/A	Com.	9.86	10	2	0.58	N/A	3.8	40381	44572	56250
SOC	247	Single Family Homes	26-3	26	NW	26-177-024,023,022,&021	N/A	N/A	y	N/A	24653 Lafayette Circle	Owner	N/A	Res.	3.05	10	0.2	0.5	N/A	4.9	10372	13032	13900
SOC	250	MDOT Regional	27-1	27	NE	27-226-014	N/A	N/A	n	N/A	Evergreen and Ten Mile Rds.	Owner	MDOT	Com.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SOC	257	WRIF/WXYZ Studios	27-3	27	NE	27-201-005	N/A	N/A	some	N/A	20777 W. Ten Mile Rd.	Owner	N/A	Com.	3.2	N/A	0.2	0.64	N/A	3.5	6000	5741	16300
SOC	258	Word of Faith - basin A	27-4 a	27	SE	27-426-006 & 008	N/A	Zeimet-Wozniak 3/10/99 calcs	y	y	2000 W. Nine Mile Rd. - E basin	Owner	N/A	Com.	17.2	10	3.44	0.27	2.3	N/A	26109	29171	N/A
SOC	259	Word of Faith - basin B	27-4 b	27	SE	27-426-006 & 008	N/A	Zeimet-Wozniak 3/10/99 calcs	y	y	2000 W. Nine Mile Rd. - N basin	Owner	N/A	Com.	7.8	10	1.56	0.7	3.45	6.3	40142	45442	99800
SOC	260	Meadowbrook Villas	27-5	27	SW	27-303-001 thru 041	27-3-007	346; Seiber, Keast & Assoc. 6/29/95 expansion plan	y	N/A	23474-23574 Lahser Rd.	Owner	N/A	Res.	5.5	10	1.1 (Qo = 0.49)	0.408	3.68	5.1	14496	15264	51000
SOC	261	Southfield Townhomes	27-6	27	SW	27-301-029	N/A	Cantor Eng. 3/23/77 rev.	n	N/A	23580 Lahser Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.5	N/A	N/A	23400
SOC	262	Detroit Federal Credit Union	28-1	28	NE	28-226-002	N/A	N/A	y	N/A	24333 Lahser Rd.	Owner	N/A	Com.	9.9	10	0.67	0.3	5	5.4	5865	17420	18400
SOC	266	Sure Guard Storage	28-5	28	NW	28-151-033	N/A	N/A	y	N/A	24200 Telegraph Rd.	Owner	N/A	Com.	3.16	100	N/A	0.76	3.45	3.8	30308	19184	29100
SOC	269	Autumn Ridge Condos	29-1	29	NE	29-201-018 Thru ?	29-1-016	N/A	y	N/A	24501-24621 Ten Mile Rd.	Owner	N/A	Res.	14.6	N/A	2.92	0.55	6.6	1.3	43648	50261	14600
SOC	270	Riverwood	29-2	29	NE	29-201-006	N/A	Zeimet Wozniak & Assoc. 7/17/87 Rev.	y	N/A	24461-24491 Ten Mile Rd.	Owner	N/A	Res.	4.65	10	0.222	0.9	N/A	N/A	32093	32350	N/A
SOC	272	Gordon Food Service	29-3	29	NE	29-276-054	N/A	omm egineering 4/20/98 rev.	y	N/A	24489 Telegraph Rd.	Owner	N/A	Com.	2.43 site	100	N/A	0.769	2.5	3.3	23161site	24857 site (12349 parking, 7105 front basin, 4760 west basin, and 643 pipe)	8200
SOC	273	Standard Federal Bank	29-4	29	SE	29-476-024	N/A	PEA 4/3/89	y	N/A	23055 Telegraph Rd.	Owner	N/A	Com.	1.2	10	0.52	0.64	0.3	3.7	N/A	N/A	19200
SOC	274	Kristy Woods Condos - W basin	29-5 a	29	SW	29-378-027 thru 037	N/A	N/A	y	y	23004-23174 Nine Mile Rd., W. of Kristy Ln.	Owner	N/A	Res.	2.6	10	0.52	0.5	4	5.4	8841.56	9597	19400
SOC	275	Kristy Woods Condos - E basin	29-5 b	29	SW	29-378-027 thru 037	N/A	N/A	y	y	23004-23174 Nine Mile Rd., E. of Kristy Ln.	Owner	N/A	Res.	2.6	10	0.52	0.5	1	3	8841.56	9597	7900

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
239	Hawthorne Suites	9408	4550	0	N/A	0.5	N/A	N/A	N/A	N/A	6	230	50	Dry		N/A	Silty	Turf	Algae	0	Crushed conc. bottom. Outflow 70% buried.	Clean structures.
240	Lawrence Tech	14720; est. 9000MID	16050	N/A	0	0.2	N/A	N/A	rectangular	6	4	est. 180MID	est. 90MID	Dry Extended Detention		Minimal	Hydric	Turf	Bulrush, Algae	25	Overflow energy dissipator not constructed (nor needed).	Clean structures.
242	Meadowcrest Apts.	N/A	5000	N/A	N/A	N/A	N/A	N/A	irregular	vary	5	est. 105	est. 60	Dry Catchbasin	Pipes to and from CB in the middle of the basin. Storm backs up in to basin. No overflow shown.	Minimal	Clayey, Type C/D	Turf	No	100	CB sump full.	Clean structures.
246	Blue Water Productions	N/A	14800	N/A	1.3	N/A	N/A	3	triangular	N/A	2	N/A	N/A	Wet		Minimal	Hydric	Turf	Lawn	0	Pipe in Outflow structure 256 is angled downward toward sump.	
247	Single Family Homes	N/A	2850	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	1	N/A	N/A	Dry		Minimal	Hydric	Forb	Cattail	0	Did not find Inlet 537, found another overflow structure upland on the NE side, it was covered in erosion fabric.	
250	MDOT Regional	N/A	65200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	var	N/A	N/A	Wetland		N/A	Hydric	Shrub	Cattail, Willows	0	Overgrown. Outflows to creek overland - no Outflow structure.	Verify Outflow.
257	WRIF/WXYZ Studios	N/A	4650	N/A	N/A	1	N/A	N/A	N/A	6	2.5	N/A	N/A	Dry		None	Hydric	Forb	Horsetail, Phragmites, Ctail	100	Basin has swale that contributes most of the flow.	
258	Word of Faith - basin A	41536	N/A	est. 8950MID	0.6	N/A	N/A	N/A	irregular	N/A	var	N/A	N/A	Wetland		N/A	Hydric	Grass, Tree	Phragmites	100	Not a formal basin. Outflow not found.	Stabilize edge of parking lot.
259	Word of Faith - basin B	25825	15800	est. 13500MID	0.8	2.6	N/A	N/A	irregular	6	2.5	N/A	N/A	Dry	Storage elev. 661.8	Some	Some Sand - Type B	Turf	Phragmites	100	6.5' high wood weir in overflow structure with 8" opening.	Stabilize south side at parking lot.
260	Meadowbrook Villas	6488	10000	est. 4490MID	est. 2	N/A	N/A	N/A	irregular	3	3	N/A	N/A	Dry	Expanded in 1995. Fenced.	At Structures	Hydric	Turf, Forb, Tree	Cattail, Willow	0	Two cell basin with berm through middle. Pumped outflow.	Verify pump is working.
261	Southfield Townhomes	N/A	9375	N/A	N/A	N/A	0.92	1	irregular	5	1.5	N/A	N/A	Dry	Fence, fountain	Some At Outflow	Hydric	Turf, Tree	Willow, Algae	0	No restrictor and some erosion/sediment at Outflow 309.	Verify restrictor. Stabilize Outflow or modify structure.
262	Detroit Federal Credit Union	9850	3400	1125	1	2	0	N/A	oval	6	4	110	110	Dry		Minimal	Hydric	Turf	Phragmites, Purple L., Ctail	0		Clean structures.
266	Sure Guard Storage	8892	7650	1828	N/A	0.5	N/A	N/A	N/A	4	2	175	70	Dry	basin was improved?	Minimal	N/A	Turf	Lawn	0		
269	Autumn Ridge Condos	13500	11250	425	N/A	0.2	0	4	irregular	5	3	170	80	Wet		N/A	N/A	Sedge, Cattail	Purple L.	0	Inflow 493 not found - underwater?	Clean structures. Verify restrictor plate.
270	Riverwood	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	Parking		In Receiving Channel	N/A	N/A	N/A	0	CB sump full, stream is aggrading.	Clean Structures.
272	Gordon Food Service	N/A	2500	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	3	N/A	N/A	Dry	Two connected dry basins with parking/pipe storage. No restrictor calcs or outlet detail. Appears to be restricted where the storm leaves the last MH and backs up into basins.	At Outlet	Silty	Turf		0	Inlet for roof drainage at SW corner of basin (12" conc.).	Verify restrictor.
273	Standard Federal Bank	N/A	5200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry	There is parking lot storage as well, w/ a 2 in restrictor in the d/s catch basin	Minimal	Silty Loam	Turf	No	0	Restrictor at CB at Telegraph entrance so it includes parking lot storage. Inflow 496 not found. East basin not built.	
274	Kristy Woods Condos - W basin	3992	3600	130	1	N/A	N/A	N/A	rectangular	N/A	3	N/A	N/A	Dry		Minimal	Silty Loam	Turf	No	0	No 3" restrictor. Inflow 499 not found. Rearyard storms do not drain to basins.	Verify restrictor. Verify detention of rearyard CBs.
275	Kristy Woods Condos - E basin	2332	2600	0	1	N/A	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry	This basin serves as additional storage for Det No. 274	Minimal	Silty Loam	Turf	No	0	No inflowing pipes. Connected to basin 274. Rearyard CBs do not drain to basin.	

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	278	Fire Station 2	32-1	32	NW	32-151-013	32-4-017	N/A	some	N/A	25753 Nine Mile Rd.	Owner	N/A	Com.	2.69	10	0.54	N/A	N/A	4.9	11100	12645	52100
SOC	279	Reid Glass	32-2	32	NE	32-228-017	32-1-020	N/A	y	N/A	22110 Keifer	Owner	N/A	Com.	0.48	10	0.87	0.55	4	3.1	168	367	2400
SOC	281	EZ Link Storage	32-4	32	SE	32-400-014	32-2-028a	N/A	no calcs	N/A	20945 Link Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	5	5.4	N/A	N/A	74925
SOC	285	Page Toyota	33-1	33	SW	33-301-007	33-3-013	Louis Cantor Co. 11/2/81	y	y	21262 Telegraph Rd.	Owner	N/A	Com.	5.26	N/A	1.05	0.69	4.5	9	30363	30456 (22626 basin, 7830 pipe and structures)	34650
SOC	286	Ingersoll	33-2	33	NW	33-151-004	N/A	N/A	y	N/A	22122 Telegraph Rd.	Owner	N/A	Ind.	3.47	10	0.594	0.46	1.5	2.8	12480	15812	22300
SOC	287	New Hope Church	33-3	33	NW	33-101-034	33-4-009	362	y	y	23455 Nine Mile Rd.	Owner	N/A	Com.	3.43	10	0.686	0.9	5	4.4	23671	24330	20200
SOC	288	Sam's Club	33-4	33	SE	33-452-029	33-2-009	360	some	N/A	22500 Eight Mile Rd.	Owner	N/A	Com.	37.9	N/A	N/A	N/A	N/A	4	191167	192600	68300
SOC	293	Plum Hollow Woods	34-2 a	34	NW	34-153-019 thru 047	N/A	N/A	y	N/A	21612-21934 Rose Hollow	Owner	N/A	Res.	7.51	10	0.5	0.4	2	3.4	19277	2648	5900
SOC	294	Plum Hollow Woods	34-2 b	34	NW	34-153-019 thru 047	N/A	N/A	y	N/A	21612-21934 Rose Hollow	Owner	N/A	Res.	7.51	10	0.5	0.4	3	2.6	19277	18322	12500
SOC	295	Plum Hollow Woods	34-2 c	34	SW	34-153-019 thru 047	N/A	N/A	y	N/A	21612-21934 Rose Hollow	Owner	N/A	Res.	7.51	10	0.5	0.4	3	4.3	19277	1723	6550
SOC	296	National Storage	34-3	34	SW	34-353-031	N/A	N/A	some	y	21940 Eight Mile Rd.	Owner	N/A	Com.	2.36	N/A	0.5	N/A	N/A	2	12051	14255	15200
SOC	297	RRRSOC	35-1	35	SW	35-351-036	N/A	N/A	y	y	19200 Eight Mile Rd.	Owner	N/A	Com.	4.16	10	1.027	0.65	3	5	17500	19339	27000
SOC	469	Carson Center	7-15	7	SW	07-351-108	7-3-031	254; Zeitman Wozniak & Assoc. rev. 9/12/86	y	N/A	29333 Northwestern Hwy., E basin	Owner	N/A	Com.	4.73 Site	10	N/A	0.7	4	6.25	24,237 site	10700	17100
SOC	524	Weatherstone N. Townhouses - S basin	7-6	7	SE	07-401-025	7-2-016	331; Warner, Cantrell & Padmos 6/10/86AB	y	N/A	29900 Franklin Rd.	Owner	N/A	Res.	1.43	10	0.286	0.6	2	1	6612	est. 7475	4375
SOC	525	Evergreen Nursing Home	11-1	11	NW	11-101-022	N/A	Nowak & Fraus 8/21/97AB	y	y	Evergreen Nursing Center	Owner	N/A	Com.	6.393	10	0.267	0.75	5	4.1	35569	36200	24500

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft²	MID AREA (Field) ft²	BOTTOM AREA (Plan) ft²	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
278	Fire Station 2	N/A	10625	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	2.5	N/A	N/A	Dry		Minimal	Hydric	Turf, Forb	Purple L., Cattail, Rush	0	Did not find one of the inlets, did not find outlet or overflow structure, overgrown.	Clean out all structures, most are buried or blocked.
279	Reid Glass	N/A	1125	N/A	N/A	N/A	0	N/A	oval	6	4	60	20	Dry	Basin 2	N/A	Sandy Loam	Forb		0	No 4" restrictor.	Verify restrictor.
281	EZ Link Storage	11000	13875	600	N/A	0.5	0	N/A	triangular	6	1.5	200	100	Dry		Minimal	Hydric	Turf, Forb	Purple L., Cattail	0	Unable to verify outgoing pipe from beehive, needs cleaning.	Outlet beehive needs some cleaning.
285	Page Toyota	N/A	3850	N/A	N/A	N/A	N/A	N/A	rectangular	4	1	est. 65MID	est. 60MID	Dry	6 ft fence.	Minimal	Hydric, Underwater	Forb	Wildflowers	0	Basin is deep, some standing water, no end section on any of the structures.	Clean structures.
286	Ingersoll	8400	7950	0	N/A	N/A	0	N/A	rectangular	5	1	210	80	Dry	C factor seems too low.	Minimal	Silt, Hydric	Willow	Buckthorn, Purple L., Phragm	0	Litter. Overgrown.	Needs maintenance of veg., litter.
287	New Hope Church	9900	4600	1260	N/A	0.5	0	1.3	rectangular	5	1.5	210	50	Dry		Minimal	hydric, ponding	turf, forbs	Cattails, sedges	0	site is fenced (4'), second overflow at 9 Mile Rd.	
288	Sam's Club	N/A	17050	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	Dry Extended Detention	Taco Bell's storm sewer connects to Sam's Club's and then onto the Detention Basin	Silt On Bottom	N/A	Forb, Cattail	Purple L., Algae	0	Inflow 480 smells like sewage. Inflows 478 and 482 not found. Oil sheen, discolored discharge.	Investigate illicit connection. Clean structures.
293	Plum Hollow Woods	2831	1750	64	N/A	N/A	0	N/A	irregular	5	3	130	50	Dry	Basin is connected to 2 others (294, 295) on site. Required volume is the sum of all three. C facter seems low.	Minimal	sandy loam	Turf		0	2-4" PVC from sump pumps, restrictor for 293-294, no individual restrictor	Verify restrictor
294	Plum Hollow Woods	N/A	4800	N/A	N/A	N/A	0	N/A	irregular	5	5	220	60	Dry	Basin is connected to 2 others (293, 295) on site. Required volume is the sum of all three. C facter seems low.	Minimal	sandy loam	Turf		0	sump pump to inlet 474, no individual restrictor, restrictor for basins 293-294	Verify restrictor
295	Plum Hollow Woods	N/A	1500	N/A	N/A	1.2	0	N/A	irregular	5	3	45	60	Dry	Basin is connected to 2 others (293, 294) on site. Required volume is the sum of all three. C facter seems low.	Minimal	moderately well drained	Turf		0	no restrictor found	Verify restrictor
296	National Storage	N/A	5250	N/A	N/A	2	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry		None	Poorly Drained	Turf	Lawn	0	Cobble bottom, inlet also serves as outlet.	
297	RRRSOC	N/A	5400	N/A	N/A	N/A	0	N/A	oval	N/A	2	240	6	Dry	Vegetated swale, no inlets on plan. Restriction is over entire outlet pipe as is goes toward evergreen. Pipe size goes fron 18 in RCP to 8 in pvc. Pipe storage included on plan, but not in this review.	1	sandy	grasses, forbs and trees		0	material dumped on south side (has broken glass) poorly graded, no inflows, out 254 backs up to basin	Verify allowable Q
469	Carson Center	4200	5400	1100	N/A	N/A	2	4	irregular	N/A	1.5	est. 92 MID	est. 46 MID	Wet	Connected to Basin 121	Minimal	N/A	turf, groundcover	algae, pondweed	0	boulders, goose fencing, 12" weir across middle, 3ft. above lower pool	Needs nutrient control and structure cleaning
524	Weatherstone N. Townhouses - S basin	N/A	4375	est. 3737MID	1.8	N/A	2.2	N/A	oval	4	var	78	60	Wetland		3	Hydric	Shrub	Buckthorn	50	No spillway or outlet found. Breach in berm at stream.	Dredge. Verify outlet.
525	Evergreen Nursing Home	est. 14000	5975	N/A	N/A	N/A	N/A	1	oval	N/A	3	est. 160TOP	est. 90TOP	Dry		Minimal	Hydric, Underwater	Turf	Cattail	25	Spoke with maintenance staff, no prior history of overflow.	

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Table 8.6A: City of Southfield Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	526	GE Plastics - S basin	20-9	20	SE	20-426-030	20-2-021	269	some	N/A	25900 Telegraph Rd.	Owner	N/A	Com.	0.3	N/A	0.88	N/A	N/A	2	N/A	N/A	3200
SOC	527	Woodvale Condos - NE basin	8-3a	8	SW	08-377-005	8-3-001	331; J. E. Hiltz & Assoc. 6/7/72	y - no calcs	y	25116 Woodvale Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	est. 2.8	2	N/A	N/A	4150
SOC	528	Woodvale Condos - S basin	8-3a	8	SW	08-377-005	8-3-001	331; J. E. Hiltz & Assoc. 6/7/72	y - no calcs	y	25116 Woodvale Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	est. 4.6	5.2	N/A	N/A	33250
SOC	529	Woodvale Condos - E basin	8-3a	8	SW	08-377-005	8-3-001	331; J. E. Hiltz & Assoc. 6/7/72	y - no calcs	y	25116 Woodvale Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	est. 3	2	N/A	N/A	11650
SOC	530	Parkwest Galleries	14-Jul	7	SW	N/A	7-3-020	Eron J. Kleckner Assoc.	incomplete	N/A	Northwestern, near Inkster	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	2	16760	17400	14150
SOC	531	Victor Center Office - Retention Area 2	16-3	16	SW	16-302-031	16-3-035	Giffels-Webster Eng. 7/30/84	incomplete	N/A	27400 Northwestern Hwy. - N parking storage	Owner	N/A	Com.	N/A	N/A	0.21	N/A	6	N/A	N/A	4300	N/A
SOC	532	Victor Center Office - Retention Area 3	16-3	16	SW	16-302-031	16-3-035	Giffels-Webster Eng. 7/30/84	incomplete	N/A	27400 Northwestern Hwy. - SE parking storage	Owner	N/A	Com.	N/A	N/A	0.46	N/A	6	N/A	N/A	11500	N/A
SOC	534	Word of Faith - basin C	27-4 c	27	SE	27-426-006 & 008	N/A	Zeimet-Wozniak 3/10/99 calcs	y	N/A	2000 W. Nine Mile Rd. - W basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	5500
SOC	535	Word of Faith - basin D	27-4 d	27	SE	27-426-006 & 008	N/A	Zeimet Wozniak 3/10/99 clacs; plan 12/22/99 rev.	y	N/A	2000 W. Nine Mile Rd. - NW basin	Owner	N/A	Com.	10.75	10	2.15	0.63	est. 3	N/A	48178	54580	N/A
SOC	536	Reid Glass - Parking Storage	32-2	32	NE	32-228-017	32-1-020	N/A	y	N/A	22110 Kiefer	Owner	N/A	Com.	1.02	10	0.97	0.8	5	N/A	3034	3800	N/A
SOC	538	Country Village Plaza	15-1	15	NE	15-226-033	15-1-014	Summa Eng. 7/8/00AB	y	N/A	20097 W. Twelve Mile Rd.	Owner	N/A	Com.	0.4	10	0.08	0.61	0.4 in CB1	1	174	194	700

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Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
526	GE Plastics - S basin	N/A	1600	N/A	N/A	N/A	N/A	N/A	irregular	N/A	1	N/A	N/A	Dry	This small basin is perched on an unstable woodland slope between the rear parking lot and the Rouge River. The outlet bee hive in this basin is usually plugged with leaves and mud.	1	Hydric, ponding	Trees	Buckthorn	0	Outflow blocked, berm breached, erosion on slope. Wasps at river outfall.	Verify restrictor. Clean structures. Stabilize Overflow.
527	Woodvale Condos - NE basin	N/A	2100	est. 2900MID	N/A	N/A	N/A	N/A	rectangular	N/A	var	est. 145MID	est. 20MID	Dry	4 ft cl fence. Restrictor in storm sewer?	1.5	Hydric, Sediment	Tree, Shrub	Cattail, Buckthorn	0	4' fence. 6 or 8" restrictor at SW corner of site backs up into basin. Pipes buried. Connected to basin 529-berm not found.	Clean structures. Excavate sediment.
528	Woodvale Condos - S basin	N/A	6400	est. 6250MID	N/A	N/A	N/A	N/A	triangular	N/A	var	est. 125MID	est. 100MID	Dry	4 ft cl fence. Restrictor in storm sewer? No inflow pipes	1	Hydric, Sediment	Tree, Shrub	Cattail, Buckthorn	0	4' fence. 6 or 8" restricted storm at SW corner of site backs up into basin.	Clean structures.
529	Woodvale Condos - E basin	N/A	5800	est. 8000MID	N/A	N/A	N/A	N/A	Rectangular	N/A	var	est. 265MID	est. 30MID	Dry	4 ft cl fence. Restrictor in storm sewer?	1.5	Hydric, Sediment	Tree, Shrub	Cattail, Buckthorn	0	4' fence. 6 or 8" restrictor at SW corner of site backs up into basin. Inflows buried. Connected to basin 527-berm not found.	Clean structures. Excavate sediment.
530	Parkwest Galleries	N/A	7075	N/A	N/A	N/A	N/A	3.5	triangular	N/A	4	N/A	N/A	Wet		Minimal	Hydric	Turf	Landscape	0	Has fountain, did not find outlet, did find 6" black plastic in nearby wetland leading toward pond.	Verify outlet structure.
531	Victor Center Office - Retention Area 2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	N/A	N/A	N/A	Parking	Parking lot storage	1	N/A	N/A		0	Several pipes flowing into CB 14 and discharging out through approx. 4" corrugated plastic pipe to river.	
532	Victor Center Office - Retention Area 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	N/A	N/A	N/A	Parking	Parking lot storage	N/A	N/A	N/A		0	Two four-hole restricted CB covers provide parking lot surface storage.	
534	Word of Faith - basin C	N/A	5500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	Dry		Some - Non-uniform	Type B/C	Turf, Tree, Shrub	Cattail, Poison Ivy	100	Inflow not found.	Verify restrictor. Clean structures. Uncover Inflow.
535	Word of Faith - basin D	32600	21000	est. 20500MID	1	N/A	N/A	N/A	irregular	N/A	var	est. 340MID	est. 90MID	Dry	NW basin	Some - Non-uniform	Hydric	Turf, Forb, Sedge	Cattail, Phragmites	100	Outflow and overflow not found. 15" Inflow from MH to the south not found.	Verify outflow. Clean structures. Stabilize east side from parking lot runoff.
536	Reid Glass - Parking Storage	N/A	N/A	N/A	N/A	N/A	0	N/A	irregular	N/A	N/A	N/A	N/A	Parking	parking lot storage, basin 1. Connection to basin 2, basin serves as a back up to basin 2 for overflow events.	N/A	N/A	N/A	N/A	0	Parking lot storage, outlet does have restriction, but need to be cleaned.	Clean out restrictor pipe in CB.
538	Country Village Plaza	463 at CB1	700	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	Dry Catchbasin	Small basin on Evergreen frontage in lawn area. Storage due north in entry drive.	No	Clay Loam	Turf	No	0		

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
SOC	552	Blue Cross Blue Shield	18-14	18	SW	18-351-014	N/A	PT&P 5/25/88 rev.; calcs from Nowak and Fraus	no storm or details. Calcs may be for another site - do not seem to match basins.	N/A	27000 Eleven Mile Rd.	Owner	N/A	Com.	5.967 site	10	1.19	0.8	5	4.8	35848 site	36446 site	5500
SOC	553	Gordon Food Service	29-3	29	NE	29-276-054	N/A	omm egineering 4/20/98 rev.	no details or orifice calcs	N/A	24489 Telegraph Rd.	Owner	N/A	Com.	2.43 site	100	N/A	0.769	2.5	3.5	23161site	24857 site (12349 parking, 7105 SE basin, 4760 SW basin, and 643 pipe)	9450
SOC	699	Franklin Racquet Club - underground	N/A	7	SW	N/A	N/A	N/A	n	N/A	29350 Northwestern Hwy.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SOC	914	Burger King	N/A	11	NE	N/A	N/A	N/A	n	N/A	Southfield and Thirteen Mile Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	3.6	N/A	N/A	12400

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6A: City of Southfield Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
552	Blue Cross Blue Shield	11040	1150	4100	N/A	N/A	N/A	N/A	triangular	N/A	2.5	est. 140MID	est. 80MID	Dry Catchbasin	Storm sewer drains to a restricted outlet and CB back up into basins for storage.	Some W. Side	N/A	Turf	No	0	Construction nearby - CB surrounded by straw bales with geotex. filter. 6" roof dmin.	Verify restrictor after construction. Stabilize W side.
553	Gordon Food Service	N/A	2700	N/A	N/A	N/A	N/A	N/A	triangular	N/A	2.5	N/A	N/A	Dry	Two connected dry basins with parking/pipe storage. Appears to have a restrictor in the storm where it leave the site. No inflows to the basins. No overflow.	Minimal	Silty	Forb, Turf	Cattail	0		Outlet needs cleaning, verify restrictor.
699	Franklin Racquet Club - underground		N/A			N/A		N/A			N/A			Parking		No	N/A	N/A	N/A	0	Underground storage to restricted pipe.	
914	Burger King		3400			N/A		N/A			2			Dry		N/A	Hydric	Cattail, Shrub		0	Fenced, overgrown, structures buried.	Verify outlet. Maintain vegetation, Clean structures. May need to dredge.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.6B: City of Southfield Detention Basin Inflow Data

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	103	236	Storm.	NW corner	NW corner	12	12	Concrete	Concrete	721.3	2" sediment.
SOC	103	237	Storm.	N side	N side	15	15	Concrete	Concrete	721	2" sediment.
SOC	103	238	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	721.37	2" sediment.
SOC	103	239	Storm.	SE corner	SE corner	12	12	Concrete	Concrete	720	2" sediment.
SOC	104	240	Storm.	SW corner	SW corner	12	12	Concrete	Concrete	722.87	5" sediment.
SOC	104	241	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	723.14	OK.
SOC	104	242	Storm.	E side	E side	12	12	Concrete	Concrete	723.92	OK.
SOC	105	243	Storm.	N side	N side to CB	8	8	N/A	N/A	717	OK.
SOC	106	244	Storm to sump.	NE corner	NE corner	18	18	Concrete	Concrete	722	Sump full.
SOC	106	245	Storm to sump.	W side	W side	18	N/A	Concrete	Concrete	722	Underwater, buried.
SOC	107	254	Storm to sump.	SW corner	SW corner	18	18	Concrete	Concrete	730.3AB	Sump full.
SOC	107	255	Storm to sump.	NE corner	NE corner	12	12	Concrete	Concrete	730.55AB	Sump full.
SOC	108	256	Storm.	SW corner	SW corner	12	12	Concrete	Concrete	738.85AB	Underwater.
SOC	108	257	Storm.	NW corner	NW corner	12	12	Concrete	Concrete	737.63AB	Underwater.
SOC	109	378	Poorly defined swale.	S side	S side	180	180	swale	Earthen	est.744	Overgrown.
SOC	110	258	Grass swale to broken concrete	NW corner	NW corner	N/A	N/A	open drain	Turf	est. 740.5	OK.
SOC	110	259		E side to headwall to conc. spillway		12		N/A		headwall INV 745.00AB	
SOC	111	260	Storm from gas pumps.	NW corner	NW corner	4	5	PVC	PVC	INV 737.5	Odor, oil sheen, buried.
SOC	111	261	Storm - Y end-section.	SW corner	SW corner	6	6	Concrete	PVC	INV 736.5	OK.
SOC	111	1075	Storm.		SW corner		6		PVC		OK.
SOC	112	263	Storm.	SE corner	SE corner	12	12	Concrete	RCP	INV 751.00	Buried.
SOC	112	262	Storm.	SW corner	SW corner	12	12	Concrete	RCP	INV 751.00	
SOC	114	264	Storm.	W side	W side	12	12	Concrete	Concrete	INV 772.95	2" sediment.
SOC	114	1077	N/A.		SE corner		8		PVC		Unvegetated around pipe.
SOC	115	265	Storm.	NW corner	NW corner	12	12	Concrete	Concrete	INV 778.30	6" sediment in front of pipe.
SOC	116	1259	Storm.		W half of N side		12		Concrete		4" sediment in front.
SOC	116	279	Storm.	NW corner	NW corner	24	24	N/A	Concrete	INV 754.10	6" sediment, milky water.
SOC	116	277		SW corner		18		N/A		INV 753.50	
SOC	116	278		W side		30		N/A		INV 752.8	
SOC	121	266	Storm.	SW side	S side	18	18	N/A	Concrete	INV 743.75	Underwater.
SOC	121	267	Storm.	NE side	NE corner	18	18	N/A	Concrete	INV 743.98	Underwater.
SOC	121	1079	N/A.		N side		6		PVC		Underwater.
SOC	122	270	N/A.	NW corner	NW corner	N/A	6	swale	Plastic	736.8	2" algae.
SOC	122	269	Storm.	NE corner	NE corner	15	15	Concrete	Concrete	INV 736.50	Buried.
SOC	125	271	Storm.	NW corner	NW corner	12	12	Concrete	RCP	INV 737.89AB	Underwater covered with riprap.
SOC	125	272	Storm.	SW corner	SW corner	12	12	Concrete	RCP	INV 737.78AB	Underwater.
SOC	126	273	Storm.	NW corner	NW corner	15	15	Concrete	Concrete	INV 745est.	OK.
SOC	126	275	Storm.	SW corner	SW corner	21	21	Concrete	Concrete	INV 746est.	OK.
SOC	127	276	Storm.	E side	E side	24	24	Concrete	Concrete	INV 716.32	6" sediment.
SOC	128	1312	Storm.		SW		18		CMP		OK.

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Table 8.6B: City of Southfield Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	130	1313	Storm to sump.		N side		12		Concrete		Sump full of sediment.
SOC	132	1070	Storm.		N end		156		Stream		OK.
SOC	132	407		NE corner		24		N/A		N/A	
SOC	132	408		NW corner		24		N/A		N/A	
SOC	133	292	Storm.	NE corner	NE corner	12	12	N/A	Concrete	INV 708.62	Underwater.
SOC	133	291		E side		18		Concrete		INV 708.3	
SOC	134	290	Storm.	NW corner	NE corner	18	18	N/A	N/A	INV 708.5	Underwater.
SOC	135	289	Storm.	NW corner	NW corner	18	18	Concrete	Concrete	N/A	OK.
SOC	136	509		NW corner		12		N/A		710.6	
SOC	139	380	Storm.	N side	N side	30	30	N/A to gabion mattress	CMP	est. 662	50% underwater.
SOC	140	381	Storm.	from N to CB	N to CB	12	12	Concrete	Concrete	711.08AB	OK.
SOC	141	385	Storm.	NW corner	NW	24	24	Concrete	Concrete	713.75	0.6' sediment.
SOC	141	384	Storm.	NE corner	NE	30	30	Concrete	Concrete	714	OK.
SOC	144	387	Storm.	NE corner	N side	12	12	Concrete	Concrete	621	Underwater - 50% blocked.
SOC	145	388	Storm.	N side	NW form CB	12	12	Concrete	Concrete	722.5	Underwater - blocked.
SOC	146	389	Storm.	NW to CB	from NW to CB	12	12	Concrete	Concrete	N/A	
SOC	146	390	Storm.	W side to CB	from W side to CB	12	12	Concrete	Concrete	N/A	
SOC	151	462		W from CB		27		Concrete		687.64	
SOC	153	411	Storm.	SW corner	SW corner	12	12	Concrete	RCP	665.43	Oil, 12" sediment.
SOC	153	412	Storm.	NW corner	NW corner	15	15	Concrete	RCP	664.3	Oil, underwater, blocked with sediment.
SOC	154	464	Storm.	W corner	W corner	21	21	Concrete	Concrete	84	Cut brush dumped.
SOC	154	465	Storm.	S corner	S corner	21	21	Concrete	Concrete	82.96	Odors, toilet paper.
SOC	154	463	Storm.	NE side	NE side	18	18	Concrete	Concrete	86	OK.
SOC	158	467	Storm.	NE corner	NE corner	12	12	N/A	N/A	63	Buried.
SOC	158	466	Storm.	W side	W side	36	36	N/A	Concrete	64	May be separated above.
SOC	159	468	Storm.	NW corner	NW corner	24	24	N/A	Concrete	76	OK.
SOC	159	469		SE corner		15		N/A		N/A	
SOC	160	515	Asphalt spillway.	SE corner	E side	60	60	asphalt spillway	Asphalt	N/A	Not grade properly. Parking lot flows go around.
SOC	160	513	Storm.	E half of N side	E half of N side	18	18	Concrete	Concrete	691	OK.
SOC	160	514	Storm.	S half of E side	S half of E side	27	27	Concrete	Concrete	690.3	OK.
SOC	160	516		W half of S side		15		Concrete		690.33	
SOC	161	1073	Storm.		NE end		48		Concrete		End-section separated.
SOC	163	519	Storm.	NE corner	NE corner	24	24	Concrete	Concrete	697	End-section separated.
SOC	163	518	Culvert from Pernick Drain.	N side from NW basin	N side	77 x 52	77 x 52	asphalt lined galvanized steel	N/A	697	OK.
SOC	163	517		NW end		42		Concrete		697.5	
SOC	164	542	Storm.	NE corner	NE	18	18	Concrete	Concrete	INV 694.50	OK.
SOC	164	543	Storm.	E side	E	54	54	Concrete	Concrete	692.8	OK.
SOC	164	544	Storm.	S half of E side	E	15	15	Concrete	Concrete	694.5	OK.
SOC	166	547	Parking lot swale.	E side from Lexus	E side	24	24	Concrete swale	Concrete	701.2	50% blocked - sediment/veg.
SOC	166	545	Storm.	N end from underground storage at Homestead	N end	18	18	Concrete	Concrete	700.75	50% underwater.
SOC	166	548	Parking lot swale.	SE corner from Lexus	SE corner	24	24	Concrete swale	Concrete	702.8	75% blocked - sediment/veg.

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Table 8.6B: City of Southfield Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	166	546	Storm.	SW corner from Homestead	SW corner	15	15	Concrete	RCP	702	OK.
SOC	166	1318	Storm.	SW corner of N basin	SW corner	18	18	Concrete	Concrete	701.8	OK.
SOC	169	549	Storm.	W side	W side	36	36	CMP	CMP	693	1" sediment.
SOC	171	550	Storm.	S end	south end	15	15	Concrete	RCP	685.67	Falling apart.
SOC	171	551	Storm.	NE end	NW end	15	15	Concrete	RCP	686	Flows into concrete channel.
SOC	173	416	18" concrete entering beehive.	North End	N end	N/A	18	N/A	Concrete	N/A	
SOC	173	417	Two 15" concrete Entering CB to outflow.	East end	E end	N/A	15	N/A	Concrete	N/A	
SOC	174	575	Storm.	NW	NW corner	36	24	Concrete	CMP	686.5	OK.
SOC	174	1251	Storm.		NW corner		18		CMP		OK.
SOC	175	460	Restricted storm from N to CB4.	N from CB4	from N to CB	12	12 to 6	Concrete	Concrete	703.1	OK.
SOC	178	1116	Storm.		NW corner		24		Concrete		Sediment and vegetation 30% blocking.
SOC	179	420	Unknown.	E side	E side	8	8	N/A	PVC	703.16	50% buried.
SOC	179	419	Unknown.	NE corner	NE corner	8	8	N/A	PVC	N/A	End-section damaged.
SOC	179	418	Storm.	N side	N side	12	12	N/A	Concrete	703.32	OK.
SOC	179	421	Unknown.	E side	E side	8	8	N/A	PVC	N/A	OK.
SOC	179	1060	From overflow 1050.		SW end		12		Concrete		OK.
SOC	180	553	Storm.	SE corner	SE corner	12	12	CMP	CMP	700.3	Almost buried.
SOC	180	552	Storm.	W end	W end	18	36	Two concrete culverts	Concrete	701.08	End-section separated, 1' sediment.
SOC	182	422	Storm.	NW corner	NW corner	N/A	18	N/A	Concrete	N/A	6" sediment.
SOC	183	424	Storm.	W side	W side	N/A	15	N/A	Concrete	N/A	OK.
SOC	184	425	Storm.	N side	N side	18	15	Concrete	Concrete	715.94	1" sediment.
SOC	185	427	Storm.	N side	N side	30	30	Concrete	Concrete	706.99	4" sediment.
SOC	185	428	Storm.	SW corner	SW corner	18	18	Concrete	Concrete	706.9	4" sediment.
SOC	186	430	Storm.	NW corner	NW corner	12	12	Concrete	Concrete	721.84	1" sediment.
SOC	186	431	Storm.	S side	S end	12	12	Concrete	Concrete	721.08	Blocked by vegetation.
SOC	187	555	Storm.	NW corner	NW corner	12	12	N/A	N/A	est. 13	1" sediment.
SOC	187	1108	Storm.		SW corner		42		Concrete		End section separated.
SOC	187	556	Storm.	NE corner	NE corner	21	21	N/A	N/A	est. 13	End-section separated, missing bar grate.
SOC	187	554		SW corner		12		N/A		est. 13	
SOC	187	558		SE corner		N/A		N/A		est. 13	
SOC	188	574	Storm.	from NNW to CB	from NNW to structure	18	18	Concrete	Concrete	725.96	OK.
SOC	190	434	Storm.	N side	N side	N/A	12	N/A	PVC	712	50% blocked with sediment.
SOC	191	559	Roof drain to CB.	W side to CB	W to middle CB	10	10	PVC	PVC	N/A	OK.
SOC	191	560	Roof drain to CB.	S side to CB	S to middle CB	10	10	PVC	PVC	N/A	OK.
SOC	192	577	Storm to sump.	NW corner	NW corner	54	54	N/A	Concrete	N/A	1' sediment.
SOC	192	578	Storm to sump.	NE corner	NE corner	N/A	36	N/A	Concrete	N/A	1' sediment.
SOC	192	576		W side		est. 12		N/A		N/A	
SOC	200	504	Storm.	NE corner	NE corner	18	18	Concrete	Concrete	N/A	Blocked.
SOC	200	502	Storm.	NW corner	NW corner	24	24	Concrete	Concrete	701.2	OK.
SOC	200	503	Storm.	N side	N side	12	12	Concrete	Concrete	N/A	OK.

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Table 8.6B: City of Southfield Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	201	505	Storm.	NE corner	NE corner	24	24	Concrete	Concrete	680.53	Underwater.
SOC	202	507	Storm.	N side	N side	24	24	Concrete	Concrete	685	Blocked by 4" sediment and vegetation.
SOC	202	508	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	685	Overgrown with vegetation.
SOC	205	564	Storm.	SW corner	SW corner	15	15	N/A	Concrete	672.7	50% blocked with sediment.
SOC	205	563	Storm.	NW corner	NW corner	12	N/A	N/A	N/A	672.7	Buried.
SOC	209	395	Storm.	N side	N side	12	12	Concrete	Concrete	670	OK.
SOC	209	396	Storm.	SW corner	SW corner	15	15	Concrete	Concrete	670	OK.
SOC	210	400	Storm.	W side	W side	21	21	Concrete	Concrete	641.8	Grate off.
SOC	210	397	Storm.	NE corner	NE corner	10	12	Concrete	Concrete	646	OK.
SOC	210	1069	Storm.		NE corner		12		Concrete		OK.
SOC	210	398		N side		10		Concrete		642	
SOC	210	399		NW corner		8		N/A		642	
SOC	211	401	Storm.	N side	N side	30	30	Concrete	Concrete	668	4" sediment, silt fence.
SOC	212	579	Storm.	NW corner from north	NW corner from N	24	24	Concrete	Concrete	671.18	2" sediment, 50% underwater.
SOC	212	580	Storm.	NW corner from west	NW corner from W	21	21	Concrete	Concrete	671.51	50% blocked with sediment.
SOC	213	402	Storm.	SW corner	S end	15	15	Concrete	Concrete	669.41	OK.
SOC	214	404	Roof drain.	NW corner	NE corner	8	6	N/A	PVC	655.5	OK.
SOC	215	403	Storm.	E side	E side	21	24	Concrete	Concrete	662	75% underwater.
SOC	216	573	Storm.	NE corner	NE corner	48	36	Concrete	Concrete	679	OK
SOC	217	1071	Storm.		NE corner		144 spillway		Concrete		OK.
SOC	218	1065	Storm.		N side to middle CB		18		Concrete		OK.
SOC	219	1066	Storm.		NE to middle CB		12		Concrete		OK.
SOC	221	449	Storm.	W side	W side	48	48	N/A	Concrete	684.99	OK.
SOC	221	450	Storm.	N corner	NE corner	36	36	N/A	Concrete	685	OK.
SOC	222	520	Storm.	NE corner	NE corner	42	42	Concrete	Concrete	683.39	OK.
SOC	224	521		N end		12		Concrete		681	
SOC	224	522		S end		18		Concrete		680.25	
SOC	225	506	Storm.	NE corner	NE corner	15	15	Concrete with bar grate	RCP	679.15	Covered in vegetation.
SOC	226	1255	Storm.		N end		21		Concrete		2 ft above bottom to 4' deep pool.
SOC	226	585		SE corner		15		Concrete		N/A	
SOC	226	586		E side		12		Concrete		INV 674.7	
SOC	228	454	Curb cut to riprap.		W side		N/A		Riprap		OK.
SOC	228	455	Curb cut to riprap.		SW corner		N/A		Riprap		OK.
SOC	228	1067	Rearyard ditch to 12" CMP.		E side		12		CMP		Pipe separated.
SOC	229	452	Curb cut to riprap.	SE corner	SE corner	75 sft	N/A	riprap spillway	Riprap	est. 668	1" sediment.
SOC	230	438	Storm.	SE corner	SE corner	36	36	Concrete	Concrete	666.07	4" sediment.
SOC	231	439	Storm.	N corner	N side	36	36	Concrete	Concrete	666.02	6" sediment.
SOC	231	440	From basin 230.	SE corner	SE corner	12	12	Concrete	Concrete	666.09	OK.
SOC	232	442	Storm.	N corner	N corner	36	36	Concrete	Concrete	666.05	Algae.
SOC	232	441	Storm.	E corner	NE corner	30	30	Concrete	Concrete	663.66	OK.

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Table 8.6B: City of Southfield Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	232	443	Storm.	W corner	NW corner	12	12	Concrete	Concrete	668	OK.
SOC	233	566	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	668.42	Algae.
SOC	233	565	Storm to riprap sump.	SW corner	SW corner	36	36	Concrete	Concrete	664.71	End-section partially separated, bar grate off.
SOC	235	444	Storm.	W corner	NW corner	18	18	Concrete	Concrete	670.63	50% underwater.
SOC	235	445		N side		60		stone		N/A	
SOC	236	446	Storm.	NW corner	NW corner	N/A	12	swale	Concrete	N/A	OK.
SOC	237	429		NW corner		15		N/A		N/A	
SOC	238	426	Storm.	W side	N side	12	32	N/A	Concrete	665.86	3" sediment.
SOC	239	1322	Storm.		S side		24		Concrete		
SOC	240	1063	Storm.	NE corner	NE corner	24	21	Concrete	Concrete	652	4" sediment.
SOC	242	456	Storm.	N side to CB	N to middle CB	18	18	Concrete	Concrete	672.48	OK.
SOC	242	457	Storm.	NE corner to CB	NE to middle CB	15	15	Concrete	Concrete	672.48	OK.
SOC	246	485	Storm.	W corner	W corner	18	18	Concrete	Concrete	663.08	1" sediment.
SOC	246	484	Storm.	N corner	N corner	30	30	Concrete	Concrete	663.08	OK.
SOC	247	536	Storm.	NW corner	NW corner	12	12	PVC	PVC	667.02	Buried, underwater.
SOC	247	538	Storm.	SE corner	SE corner	12	12	PVC	PVC	668.16	OK.
SOC	247	537		NE corner		12		PVC		667.03	
SOC	250	1114	Storm.		E side		6		PVC		Eroded downstream of discharge.
SOC	250	1110	Storm.		N side		12		CMP		OK.
SOC	250	1112	Storm.		NE corner		4		PVC		OK.
SOC	257	535	Storm.	N side in swale	N side, in swale	12	12	Concrete	Concrete	660.12	OK.
SOC	260	570	Storm.	SE corner	SE corner	N/A	12	ditch	CMP	658.3	25% blocked with sediment/veg.
SOC	260	569	Storm.	SW corner	SW corner	24	24	Concrete	RCP	657.94	OK.
SOC	261	568		E side		18		Concrete		662.8	
SOC	262	498	Storm.	E side	E side	N/A	24	N/A	Concrete	644.25	Blocked with vegetation.
SOC	266	495	Storm.	NE corner	NE corner	12	12	N/A	Concrete	668.92	2" sediment.
SOC	266	494	Storm.	E side	E side	18	18	N/A	Concrete	672.62	OK.
SOC	269	493		E corner		24		Concrete		636.13	
SOC	273	496		S side		12		N/A		666	
SOC	274	501	Pipe from basin 275.	E side	E side	12	12	Concrete	Concrete	665.51	1" sediment.
SOC	274	500	Storm.	NE corner	NE corner	18	18	Concrete	Concrete	663	Part of end-section missing.
SOC	274	499		NW corner		6		perforated PVC		664.76	
SOC	278	532	Storm.	W side	W side	10	12	PVC	Concrete	661.04	90% buried, unable to verify size.
SOC	278	533		S side		15		Concrete		660.3	
SOC	279	447	Storm.	N end	N end	12	12	N/A	N/A	665.95	OK.
SOC	281	448	Storm.	NE corner	NE corner	15	15	Concrete	Concrete	629.42	6" underwater.
SOC	285	567	Storm.	NW corner	NW corner	15	15	Concrete	Concrete	640.06	OK.
SOC	285	1252	Storm.		SW corner		24		Concrete		OK.
SOC	286	470	Storm.	SW corner	SW corner	N/A	10	N/A	Concrete	665.5	OK.
SOC	287	472	Storm with bar grate.	W side	E side	18	18	N/A	Concrete	659.5	2" sediment.

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Table 8.6B: City of Southfield Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	287	471	Storm with bar grate.	NE corner	NE corner	18	18	N/A	Concrete	659.5	3" sediment.
SOC	288	479	N/A.	S side	S side	8	8	PVC	PVC	638.5	N/A.
SOC	288	477	Storm.	N side	N side	36	48	Concrete	Concrete	630	OK.
SOC	288	481	Storm.	S side	S side	36	36	Concrete	Plastic	635.06	OK.
SOC	288	483	Storm.	NE corner	NE corner	N/A	12	N/A	Concrete	632	OK.
SOC	288	480	Storm.	S side	S side	21	21	Concrete	Plastic	636.5	Sewage odor.
SOC	288	478		SE corner		18		Concrete		638.5	
SOC	288	482		S side		12		Concrete		634.9	
SOC	293	473	Storm.	NE corner	NE corner	8	8	PVC	PVC	655	OK.
SOC	294	475	Storm.	E side	E side	8	8	PVC	PVC	653	1" sediment.
SOC	294	474	Storm.	SE corner	NW corner	N/A	12	N/A	CMP	653	75% blocked.
SOC	295	476	Storm.	S side	SE corner	N/A	12	N/A	Concrete	655	25% blocked with leaves and sediment.
SOC	296	534	Storm.	E side	E side	12	12	N/A	N/A	640.09	OK.
SOC	469	268	Pipe from basin 121.	NW end	NW	29 x 42	N/A	CMP	N/A	INV 742.10	Underwater.
SOC	524	379	Storm.	NE corner	NE corner	12	12	Concrete	Concrete	739	Buried, underwater.
SOC	525	383	Storm.	N side	N side	21	21	Concrete	Concrete	711.28	Grass growing in end-section.
SOC	525	382	Storm.	W side	W side	12	12	Concrete	Concrete	712.28AB	OK.
SOC	526	406	Storm.	S side	S side	12	12	N/A	Concrete	661.96	OK.
SOC	526	405	Roof drain.	E side	E side	8	8	N/A	N/A	660	Partly buried.
SOC	527	510		N half of W side		12		N/A		709.8	
SOC	529	511		N end		12		Concrete from basin 527		710.7	
SOC	529	512		SW corner		12		N/A		N/A	
SOC	530	409	Storm.	N side	N side	12	12	Concrete	Concrete	752.06	OK.
SOC	530	410	Storm.	NE corner	NE corner	15	15	Concrete	Concrete	751.04	OK.
SOC	531	1200	Pipe to CB.		from SSE to CB		12		Concrete		2" sediment
SOC	531	1201	Pipe to CB.		from SSE to CB		6		C.I.		OK
SOC	531	1202	Pipe to CB.		from SW to CB		4		Plastic		OK
SOC	531	1203	Pipe to CB.		from NW to CB		4		Plastic		OK
SOC	531	1204	Pipe to CB.		from NW to CB		6		C.I.		OK
SOC	531	413		center of north parking lot		12		Concrete		662	
SOC	532	414		western 4 hole restricted MH grate		21		Concrete		660	
SOC	532	415		eastern 4 hole restricted MH grate		21		Concrete		660	
SOC	534	572		E side		19 x 30		HE-4		INV 657.4	
SOC	535	571	Storm.	from NE to middle CB	E side	12	12	Concrete	Concrete	INV 652.9	OK.
SOC	538	461	Storm.	N from CB2	N from CB2	12	12	Concrete	Concrete	700.2	OK.
SOC	552	561		NW to CB		12		Concrete		N/A	
SOC	552	562		SE to CB		10		PVC		N/A	
SOC	914	1064	Storm.		E side		12		Concrete		Separated end-section found only - pipe buried.

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Table 8.6C: City of Southfield Detention Basin Outflow Data

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	103	128	3.1" restrictor in 18" pipe	18" conc. with 3" restrictor at CB.	S side	S side	3.1	3	Concrete	N/A	720	OK.
SOC	104	129	12" pipe to basin 103	Unrestricted pipe to basin 103.	S side	S side	12	12	Concrete	Concrete	722	Blocked with 4" riprap.
SOC	105	130	10" pipe to 12" with 6" restrictor?	12" to MH to 12".	E side	middle CB to E	6	12	N/A	Concrete	est. 716.80	4" sediment - no restrictor.
SOC	106	131	4' dia.., 2' deep sump to 5" pipe	48" dia. structure to 6" CI to MH.	SE corner	SE corner	5	6	PVC or CI	C.I.	721.3	Blocked, sump full.
SOC	107	136	5" PVC pipe to structure to 18" pipe to ex. ditch	Three 8" PVC pipes to overflow structure.	SE corner	SE corner	5	three 8"	Concrete	PVC	5" INV 730; 18" INV 727.86	Plan says 5" restrictor.
SOC	108	137	12" pipe to structure with 2' sump to suspended 6" PVC T-section pipe at outlet of structure with 4.39" orifice at bottom	12" to structure to 6" PVC T-section.	NE corner	NE corner	4.39	6	Concrete	PVC	6" to 12" outlet INV 736.9	2.5' of sediment in sump - above PVC outlet pipe.
SOC	109	186	12" CMP with 6" restrictor	Supposed to be 6" restrictor in 12" pipe - unverified.	SE corner	SE corner	6	N/A	CMP	N/A	744	Buried - underwater.
SOC	110	138	intake box to 42" to ditch	24" conc. to intake box to 42" to ditch.	SE corner	SE corner	42	24	N/A	Concrete	10-yr WS 745.7	22" of sediment.
SOC	111	139	1.5" restrictor in 6" pipe	Restrictor in 6" pipe.	SE corner	SE corner	1.5	1.5	Concrete	N/A	INV 733.8	Buried - 1.5" restrictor not verified.
SOC	112	140	15" with 4" restrictor	8" clay to CB.	E end	E side	4	8	Concrete	Clay	15" INV 746.70; 4" INV 747.70	Buried.
SOC	113	1257		6" black plastic pipe seen discharging to ditch.		NE corner		6		Plastic		Buried.
SOC	114	141	12" with 2" restrictor	Unrestricted pipe.	E side	E side	2	15	Concrete	Concrete	INV 772.70AB	1" sediment.
SOC	115	142	4" pipe with 2' x 2' silt trap at inlet to CB to swale to 12" culvert	Sump to pipe to CB.	S side	S side	4	N/A	Concrete	N/A	INV 778.0	Pipe buried and sump full of sediment.
SOC	116	149	12" pipe east to ditch		NE corner		12		Concrete		INV 751.30	
SOC	121	143	culvert to basin 469	Unrestricted pipe to basin 469.	SE end	SE corner	29 x 42	29 x 42	CMP	CMP	INV 744.50	Underwater.
SOC	122	145	4" to ditch to 15" CMP	6" PVC - supposed to be 4".	SE corner	SE corner	4	6	CI	PVC	INV 736.44	
SOC	125	146	12" with 4" restrictor at overflow structure	12" to stone swale to 4" restrictor at overflow.	S side	S side	4	4	Concrete	N/A	INV 736.92AB	OK.
SOC	126	147	36" CMP riser with 2' sump at 1-yr elev. with seven 1" holes at WS elev. to 6" CMP to overflow structure	36" perforated CMP riser to 6".	SW corner	SW corner	6	6	CMP	CMP	RIM 749.97; standpipe holes 749.00; 6" INV 747.31	OK.
SOC	127	148	6" pipe to overflow structure to 24" to ditch	8" to overflow structure.	E side	E side	6	8	Concrete	Clay	INV 716.50	50% blocked with sediment.
SOC	128	188	5' dia. structure with 3' deep. sump to pipe - no detail	60" dia. structure to 36" to MH to 40" to MH to 12".	W side	W side	36 to 21 to 12	12	N/A	Concrete	713.5	1' sediment in sump.
SOC	131	317	two pumps (file says inoperable)		to ditch		30" to pump to 8" check valves		N/A		704 pump on; 710 second pump on	
SOC	132	208	lake level control structure	7' weir structure, gabion.	S side	south side		84	N/A	gabion		OK.
SOC	133	152	8" pipe to MH to 12"	8" to overflow to 8".	S side	S side	8	8	N/A	N/A	INV 708.5	OK - CB supposed to drain to 12".
SOC	134	151	18" unrestricted pipe to basin 133		W side		18		Concrete		INV 708.5	
SOC	135	150	18" conc. pipe to MH with 6" restrictor in pipe leaving MH9	6" restrictor to MH 9.	NW corner	NW to W	6	6	Concrete	N/A	M.H. #9 TOP 714.60	Underwater.
SOC	136	273	12" to CB to 6" restrictor in West storm sewer	15" conc. to CB to 12" inverted elbow.	NE corner	NE corner	6	12	N/A	C.I.	709.8	CB sediment buried outflow.
SOC	139	189	12" storm to Rouge River floodplain	12" pipe.	S side	S side to RR	12	12	N/A	N/A	est. 660	50% blocked with sediment/veg.
SOC	140	190	10" pipe with 4" restrictor from CB to SE	10" conc. with 4" restrictor.	middle CB to SE	middle CB	4	4	Concrete	N/A	710.97AB	OK.
SOC	141	192	Outlet filter to 12" restrictor in 24"	12" conc.	SW corner	SW corner	12	12	Concrete	Concrete	TOP 714.75; INV 713.5	OK.
SOC	142	193	unrestricted 15"		NE corner		15		N/A		617.06AB	
SOC	144	195	restricted 12" storm from parking lot CB 1	12" conc. - cannot verify restrictor.	CB1 in NE drive flowing ENE	NE corner	4	N/A	PVC to Concrete	Concrete	N/A	Underwater - 50% blocked.
SOC	145	196	12" pipe with 2.36" restrictor to CB	Unrestricted pipe.	NE corner	NE corner	2.36	12	Concrete	N/A	722.11	50% blocked with vegetation. No 2.36" restrictor.
SOC	146	197	from CB to 15" conc. with 4" restrictor	Unrestricted pipe from middle CB.	middle CB to NE	middle	4	15	Concrete	Concrete	C/L of restrictor 718.72	OK. No 4" restrictor.
SOC	151	243	15" to MH to 27" with 6" restrictor	Unrestricted pipe.	27"E in MH S of basin	S end	6	15	Concrete	N/A	N/A	Some debris. No 6" restrictor.
SOC	153	210	12"	12" to CB.	E side	E side	12	12	Concrete	RCP	664	Phragmites, no restrictor.
SOC	154	245	10" CMP with 5.5" orifice	Unrestricted pipe.	E corner	E corner	5.5	10	CMP	CMP	79	Sewage odor. Pipe rusted out. No 5.5" restrictor.
SOC	158	246	12" CMP to CB	12" CMP to CB.	SE side	SE side	12	12	CMP	CMP	62.5	Some debris.
SOC	159	247	8" CMP to CB	12" CMP to CB.	E side	E side	8	12	CMP	CMP	74.5	OK.
SOC	160	277	8" to 48" MH with 12" sump to 6" spigot end flap valve	MH with 6" pipe flowing in with gate flap to a 24".	SW corner	SW corner - W of wall	6	6	N/A	N/A	690.34	Buried at basin.
SOC	161	278	N/A	8" clay.	N/A	SE end	8	8	N/A	Clay	688.83	End section broken.

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Table 8.6C: City of Southfield Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	162	279	N/A	48" conc.	S side	south side	48	48	Concrete	Concrete	690.88	1" sediment, end section separated.
SOC	163	280	trapezoidal weir	Trapezoidal weir with 9' base and 11.5' top.	SE end	SE end	9' base and 11.5' top	108	Concrete	Concrete	697	OK.
SOC	164	296	standpipe with gravel jacket and 2' sump to 18" pipe with 9" inverted elbow restrictor	Standpipe to9" inv. elbow.	W side to Pernick Creek	W side	9	N/A	N/A	N/A	694.5 Restrictor, 697.5RIM	OK.
SOC	166	297	CMP riser with 6" restrictor	Perforated CMP riser to 6" restrictor - inverted elbow.	E side of middle basin	E side - middle basin	6	6	CMP	PVC	701.5	OK.
SOC	168	298	CB to 3" orifice in 6" iron to pump	15" steel pipe in retaining wall.	SE corner	SE corner	3	15	CI	Steel	INV 694, 695RIM	50% blocked by debris.
SOC	169	299	6" CMP to overflow structure	6" CMP to overflow.	E side	E side	6	6	CMP	CMP	695	2" debris/leaves.
SOC	170	300	4" restrictor in downstream storm before MH1		N/A		4		N/A		N/A	
SOC	171	301	CB to 12" to pump to 6" line		NE end		6		N/A		N/A	
SOC	173	212	pipe with 4" restrictor	Beehive to unrestricted pipe.	SW corner	SW corner	4	est. 15	N/A	Concrete	N/A	OK - no 4" restrictor.
SOC	174	1251		48" x 48" conc. box culvert with grate to 4" CI pipe.		S side		4		C.I.		OK - underwater.
SOC	175	241	12" pipe 3" restrictor	12" conc. with 6" restrictor.	CB3 discharging E to CB2	Discharges E from CB	3	6	PVC to Concrete	Concrete	703	OK - 3" restrictor on plan.
SOC	179	213	12" unrestricted from sodded basin	Unrestricted pipe from basin.	SE corner	NE corner	12	12	N/A	Concrete	702.68	OK.
SOC	179	214	18" to 4" restricted outlet in parking lot CB on eastern end of parking lot	Unrestricted pipe - parking lot storage.	E end of south parking lot	N end	4	18	N/A	N/A	N/A	
SOC	179	1038		Pipe from first cell.		E end of first cell		12		Concrete		OK.
SOC	180	302	12" x 12" opening in overflow weir to 36"	12"x12" opening in overflow structure.	W end	E end	12 x 12	12	Concrete	Concrete	700.22	Partially blocked by debris.
SOC	181	216		Unrestricted pipe.	NE corner	NE corner	N/A	12	N/A	PVC	705.8	25% blocked by turf.
SOC	182	217	18" to 4" restrictor		NE corner		4		PVC		N/A	
SOC	183	218	18" to 4" restrictor	Unrestricted pipe.	S side	SE end	4	18	PVC	Concrete	N/A	50% blocked by rock.
SOC	184	219	4" restrictor?	24" wide beehive riser with 1" holes to 18" pipe.	SE corner	SE corner	4	Perf. riser to 18	N/A	N/A	715.35	OK.
SOC	185	221	8" orifice to 12"	Unrestricted pipe.	E side	E side	8	12	N/A	Concrete	706.22	OK - no 8" restrictor visible.
SOC	186	223	18" to 4" restrictor	Unrestricted pipe.	E side	E end	4	18	N/A	Concrete	721.01	Obstructed by fountain.
SOC	187	303	24" pipe with 8" restrictor	24" pipe.	N/A	SW corner	8	24	N/A	Concrete	N/A	No restrictor, some sediment.
SOC	188	319	3.6" restrictor in bottom of 6" PVC T-section to 18" pipe	Conc. riser structure to 18" conc. with broken conc. weir at bottom.	middle CB to SSE	middle structure to SSE	3.6	18	PVC	Concrete	INV 726	No 3.6" restrictor. Remove conc. weir and sandbags.
SOC	190	226	12" with 4" restrictor	Unrestricted pipe.	W side	W end	4	12	PVC	PVC	710.92	OK - no 4" restrictor visible.
SOC	191	304	10" PVC in middle CB with 6" restrictor	Middle CB to 10" PVC.	N side of CB	middle CB to N	6	10	Concrete	PVC	685.98	OK - no 6" restrictor.
SOC	192	320	no description. Outflow to storm sewer.		N/A		N/A		N/A		693.5	
SOC	192	1253		10" PVC from CMP riser		W side		10		PVC		OK.
SOC	200	268	5.5" dia. Plate restrictor on 12" bell end section	6" concrete pipe.	SE corner	SE corner	5.5	6	Clay	Concrete	N/A	Partially blocked.
SOC	201	269	36" standpipe with 36 - 1" holes to 12" with 6" restrictor at overflow	36" stand pipe.	SW corner	SW corner	6	N/A	Concrete	N/A	RIM 682; resticor INV 678.87	Could not inspect, flooded.
SOC	202	271	5.5" orifice in 48" square drop box structure	5.5" orifice cut at the bottom of 4' tall rectangular structure.	SE corner	SE corner	5.5	N/A	Concrete	Concrete	INV 684.25	OK.
SOC	205	306	3" CI pipe in downstream end of 6" outlet pipe	Unrestricted pipe.	W side to the NW	W side to NW	3	12	CI	Concrete	672.2	OK.
SOC	207	285	10" PVC to 12" to Pernick Drain	9" PVC to CB to 12" conc. to Pernick Drain	E side	E side	10	9	PVC	PVC	INV 671.25	30% blocked with leaves, sediment.
SOC	208	272	36" wide perforated. Riser to 3" restrictor at overflow	36" dia. Riser to 4" restrictor	E side	SE corner	3	4	N/A	N/A	RIM 671; riser holes 669	OK.
SOC	208	284	12" conc. with 3" restrictor	8" pipe	E side	E side	3	8	Concrete	Plastic	671.29	OK.
SOC	209	200	4" restricted 36" standpipe with 9-1" holes and 2' sump	36" dia. perforated riser to 4" inverted elbow to 15".	E side	E side	4	4	Concrete	PVC	669.96	OK.
SOC	210	201	21" restricted to 6"	Unrestricted 21" to MH to 24".	S side	S side	6	21	Concrete	Concrete	636	Debris on bar grate, 4" sediment.
SOC	211	202	12" to 6" restricted MH	12" to 6" restrictor at MH.	E side	E side	6	6	N/A	N/A	N/A	Wood, riprap in front.
SOC	213	203	standpipe with 3-1" holes and min. 4" restrictor	36" dia. perforated CMP riser to 12" conc.	W side	middle to West	N/A	12	Concrete	CMP	673.5	
SOC	214	206	4" outlet to swale to Rouge River	Unrestricted pipe.	S side	S side	4	6	N/A	N/A	651	No 4" restrictor.
SOC	215	204	36" CMP riser with 1' sump and 8-1" holes to 8" CMP with 4 3/8" restrictor	36" CMP riser, w/8 1" holes (buried) to 6" CMP (full of sediment).	W side	W side	4.4	N/A	CMP	CMP	664	No grate.

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Table 8.6C: City of Southfield Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	216	318	24" x 35" arch CMP to MH to 12"	24 x 35 arch pipe, to MH to 12"	S side	S side	12	12	CMP	Arch	79.6	Ok
SOC	217	267	18"	Unrestricted pipe.	W side	W side	18	18	N/A	Concrete	678	Bar grate rusted.
SOC	218	1029		18" unrestricted pipe.		from middle CB to SE		18		Concrete		OK - no restrictor.
SOC	219	1031		15" unrestricted pipe.		middle CB to SW		15		Concrete		OK - no restrictor.
SOC	220	281	restricted pipe	6" CMP from CB.	middle CB to NE	Center CB to NE	6	6	N/A	CMP	INV 675.79	OK.
SOC	221	237	21" pipe with 12.4" plate restrictor to MH	15" with weir structure to overflow.	E side	SE corner	12.4 to 21	15	N/A	Concrete	684.8	OK.
SOC	222	286	8"		E side		8		N/A		683.32	
SOC	224	287	12" RCP, no restriction indicated		SE corner		12		Concrete		680	
SOC	225	270	spillway to wetland - no details	"V" notch in sheet pile that flows to wetland.	SE corner	SE corner	N/A	N/A	N/A	Steel	681.8	
SOC	226	324	48" square drop structure to 66" conc.		SE corner		48		Concrete		673.31	
SOC	226	1259		48" drop structure with bar grate to 66" conc.		SE corner		66		Concrete		Some debris.
SOC	228	250	15" conc. to CB with 4" restrictor	15" to/from basin to CB.	W side	N half of W side	4	15	Concrete	Concrete	665.69	OK - No 4" restrictor in CB.
SOC	229	238	36" wide riser structure with three 1" holes	36" dia. Riser with 3-1" holes two ft below RIM.	NE corner	NE corner	three 1" holes	three 1" holes to 12	Concrete	CMP	667	Buried 1' sediment.
SOC	230	229	12" Flared End Section	12" to basin 231.	NW corner	NW corner	12	12	Concrete	Concrete	666	OK.
SOC	231	230	8" PVC with concrete headwall	42" dia. perforated riser with gravel jacket to 8" PVC.	S corner	S side	8	8	PVC	PVC	666.06	OK.
SOC	232	231	10" PVC, Schedule 40	10" pipe.	S corner	S corner	10	10	PVC	PVC	662.7	OK.
SOC	233	307	6" restrictor in 12" pipe	12" conc. pipe with 6" restrictor.	E side	S side of E basin	6	6	Concrete	PVC	663.66	OK - cattails.
SOC	234	227	24" conc., with 5 inch restrictor	Unrestricted pipe.	S end of basin	S end	5	24	Concrete	Concrete	N/A	End-section separated.
SOC	235	232	12" RCP, no restriction?		E side		12		Concrete		669.83	
SOC	236	1306	12" with 4" restriction	12" conc. with 4" restrictor.	NE corner	NE corner	4	4	N/A	Concrete	668.8	Covered with field stone.
SOC	237	222	N/A	36" dia. perforated riser to 24" CMP, holes 1.2' from top.	South end	S end	N/A	24	N/A	CMP	N/A	OK.
SOC	238	220	12" with 3" restriction		E side		3		N/A		665.86	
SOC	238	233		36" dia. riser with 24" CMP with 6" restrictor.		N side		6		CMP		OK.
SOC	239	220		12" with 3" restrictor.		N side		3		N/A		70% buried.
SOC	240	1027	34 - 1" holes in 24" wide riser to outlet pipe	24" dia. perforated CMP riser to 12" conc.	S side	S side	34 - 1" holes to 12"	12	N/A	CMP	650.93	OK.
SOC	242	239	CB structure with 2' sump to 4"	4" from CB to SW.	middle to SW	middle CB to SW	4	4	ABS	N/A	RIM 675; INV 672.48	OK.
SOC	246	256	12" standpipe	Beehive, out pipe is restricted.	S corner	S corner	12	8	N/A	Clay	663.08	Angled down toward sump.
SOC	247	295	12"	12" PVC, no restriction, connected to over 158.	SE corner	SE corner	12	12	PVC	PVC	667	Connected to over 158.
SOC	247	1104		12" black plastic.		NE corner		12		Plastic		Connected to over 1106. covered.
SOC	257	294	4" pvc	4" PVC.	S side	south side	4	4	PVC	PVC	655	OK.
SOC	258	315	restricted pipe (no details)		discharges north		8		PVC		658.41	
SOC	259	316	restricted pipe (no details)	12" conc. to overflow structure with 8" square opening in weir.	discharges north	E side	10	8	PVC	Wood	657.13	OK.
SOC	260	312	pipe to pump	18" conc. to pump.	NW corner	NW corner	N/A	18	N/A	Concrete	656.62	Vegetation blocking.
SOC	261	309	4" restrictor in 8" pipe		W side		4		CI		662.8	
SOC	262	264	N/A	6" PVC.	N side	N side	N/A	6	N/A	PVC	644	Vegetation in front.
SOC	266	261	riser structure with overflows at 1 year elevation and 100 year elevation		S end		12		Concrete		676	
SOC	266	1100		4" PVC.		south side		4		PVC		OK.
SOC	269	260	2' CB with restrictor plate	24" CB	W corner	W side	12	N/A	Concrete	N/A	634.45	Could not verify restrictor.
SOC	270	244	12" pipe with 4" restrictor	12" with 4" restrictor.	CB3 discharging SE to CB2	S side	4	4	Concrete	N/A	872	OK.
SOC	272	310	12" unrestricted pipe to basin 553 and may be restricted at last MH	12" conc., no restrictor.	N side	N side	12	12	Concrete	Concrete	669.64	No restrictor.

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Table 8.6C: City of Southfield Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	273	262	12" to CB with 2" restrictor	12" to restricted pipe in CB near Telegraph.	E side	E side	2	12 to a restrictor	N/A	Concrete	666.3	No end section. Could not verify restrictor size.
SOC	274	265	3" restrictor to 8" pace	8" PVC.	S side	S end	3	8	N/A	PVC	663	OK.
SOC	275	266	12"	Unrestricted pipe to basin 274.	W side	W side	12	12	Concrete	Concrete	666	25% blocked by turf.
SOC	278	293	4" pvc to 18"		N side		4		PVC		659.9	
SOC	279	234	12" conc. with 4" restriction	Unrestricted pipe.	S end of basin	S end	4	12	Concrete	Concrete	659	End-section separated.
SOC	281	236	10" conc., no restriction	10" conc. leaving beehive structure.	SW corner	SW corner	10	10	Concrete	N/A	628.6	Could not verify 10" pipe. indicated on plan, beehive buried.
SOC	285	308	6" pipe to CB	6" pipe to CB.	W side	W side	6	6	Concrete	Clay	639.95	Blocked by debris.
SOC	286	248	N/A	6" PVC with conc. headwall.	S end of basin	SW end	N/A	6	N/A	PVC	665.5	1" sediment.
SOC	287	249	12" with 4" restrictor	12" conc. with 4" restrictor at overflow.	N end	N side	4	4	N/A	Conc/PVC	659.35	8" sediment.
SOC	288	255	12" restricted pipe	36" dia. riser to 12".	W side	W side	12	12	N/A	PVC	629	Debris blocking.
SOC	293	251	12" concrete with 4" restrictor	12" conc.	S end	SE corner	4	12	Concrete	Concrete	653.74	OK.
SOC	294	252	8" PVC, no restrictor	12" conc.	W side	SE corner	8	12	PVC	Concrete	655.54	OK.
SOC	295	253	12" conc. with 4" restriction	12" concrete pipe.	NW corner	NW corner	4	12	Concrete	Concrete	650.5	OK.
SOC	297	254	18" RCP, no restriction	18" concrete to 15" East.	SW corner	SW corner	18	15	Concrete	Concrete	656.66	25% Blocked by sediment.
SOC	469	144	15" end section to 24"	15" to perf. MH with weir with 1.6' x 0.67' slot.	SE end	SE end	15	19 x 8	N/A	Concrete	INV 741.00	OK.
SOC	524	187	3" restrictor		SW corner		3		N/A		738.2	
SOC	525	191	4" pipe to 48" overflow structure to 15" conc.	4" PVC to overflow structure.	NE corner	NE corner	4	4	N/A	PVC	711.07AB	OK.
SOC	526	207	12" to swale to Rouge River	Pipe to river is 10" at downstream end.	W side	W side	12	10	Concrete	PVC	657.5	Buried at basin - restrictor not verified.
SOC	527	274	12" pipe to basin 529		S side		12		Concrete		710.8	
SOC	528	275	12" pipe to CB - no restrictor in storm sewer?	12" to CB to 12" inverted elbow to 6-8" restrictor in last MH.	SW corner	SW corner	12	6 or 8	N/A	Concrete	709.36	Inverted elbow buried - sediment in CB.
SOC	529	276	12" pipe to CB - no restrictor in storm sewer?	12" conc. to 6-8" restrictor in last MH.	W side	W side	12	6 or 8	N/A	Concrete	N/A	OK - flowing due to broken sprinkler.
SOC	530	209	4" PVC	6" black plastic found in nearby wetland from direction of pond.	S side	S side	4	6	PVC	Plastic	751.1	OK.
SOC	531	1200		Plastic pipe restrictor from CB to river.		from CB to NE		est. 4		Plastic		OK
SOC	532	211	21" headwall		far eastern side of parking lot		21		N/A		N/A	
SOC	532	1201		from CBs with restricted covers East to river.		E side		21		Concrete		OK.
SOC	534	314	restricted pipe (no details)	12" to NNW to MH.	MH to NNW	N side	8	12	PVC	Concrete	INV 655.58	OK - no 8" restrictor.
SOC	535	313	6" restrictor in pipe		South CB		6		N/A		INV 652.2	
SOC	536	235	12" conc. with 4" restriction	12" with 4" restriction.	center of basin	Center of Parking lot	4	4	Concrete	N/A	660.45	Outlet pipe partially blocked.
SOC	538	242	12" pipe 3" restrictor	12" conc. with 3" restrictor.	CB1 discharging SE to ex. storm	middle CB to SE	3	3	PVC to Concrete	Concrete	700.1	OK.
SOC	552	305	12" conc. in middle CB with 4" restrictor		E side of CB		4		Concrete		690.3	
SOC	553	311	12" unrestricted pipe from basin. Storm may be restricted at last MH.	12" conc.	S half of W side	SW corner	12	12	Concrete	Concrete	669.5	Vegetation blocking.
SOC	699	1255		6" restrictor to MH to 18" conc.		E half of S side		6		Concrete		OK.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.6D: City of Southfield Detention Basin Overflow Structure Data

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	103	83	CB to 18" conc. pipe	CB to 18" concrete.	S side	RIM 724.00; INV 719.92	
SOC	104	84	12" overflow pipe to structure	12" concrete to structure.	S side	725	OK.
SOC	104	85	secondary CB to structure	Secondary overflow CB to structure.	S side	RIM 728.75	OK.
SOC	107	91	4' dia. MH to 18" pipe	48" dia. MH to 21" concrete.	SE corner	TOP 735.00	Bar grate off.
SOC	108	92	CB to structure with 2' sump to suspended 6" PVC T-section pipe at outlet of structure with restrictor at bottom			TOP 743; Outlet TOP 742	
SOC	110	1045		Intake box to approx. 42" concrete.	SE end		24" sediment.
SOC	112	93	CB to 15" conc. Pipe	CB to 21" concrete.	E side	RIM 754.50	50% blocked with sediment.
SOC	114	94	CB to 12" pipe	CB to 12" concrete.	E side	RIM 775.50	OK.
SOC	115	1302		CB with sump to MH.	SE corner		Full of sediment.
SOC	116	102	overflow pipe near top of dyke flowing east to ditch			755.5	
SOC	122	96	overflow swale in SE corner			741	
SOC	125	97	CB to structure to 12" pipe	CB to 15" concrete.	S end	RIM 740.86	OK.
SOC	126	98	beehive to primary overflow structure	24" perforated MH cover to pipe.	SW corner	RIM 750.70	Slopes not vegetated.
SOC	126	99	6' x 22' secondary overflow spillway			TOP 751.70	
SOC	127	100	48" overflow structure with 2' sump to 24" conc.	48" dia. structure to 24" concrete.	E side	RIM 720.00	OK. No grate.
SOC	127	101	secondary overflow spillway to ditch			est. 721	
SOC	139	115	gabion mattress on E side	Gabion mattress.	E side	est. 664	OK - grown over.
SOC	140	1058		Beehive CB.	SE corner over berm		OK.
SOC	145	117	CB with 2 ft sump to 12" conc. to ditch	CB with 2' sump to 12" to 15" concrete.	outlets to street	RIM 724	OK.
SOC	151	136	10' wide cobble stone spillway to MH			est. 698.4	
SOC	153	1047		CB to 18" concrete.	E side		OK.
SOC	154	137	24" wide CB to 10" CMP	24" dia. CB to 10" CMP.	E corner	RIM 87	Sewage odor.
SOC	158	138	CB to 30" to Rouge	CB to 30" to Rouge.	SE side	RIM 67	OK.
SOC	159	139	CB to 24" to Rouge	24" wide Overflow structure to >24" concrete pipe.	E side	RIM 80	OK.
SOC	162	1049		Spillway in turf berm.	E side		OK.
SOC	164	160	48" MH with beehive cover and 2' sump to 18" storm	24" overflow to 18", 6" sediment and stone at stream.	West side	RIM699.3	OK.
SOC	164	1255		100' concrete/enkamat.	West side		OK.
SOC	166	161	30' riprap weir at E side of middle basin	30' riprap weir.	E side - middle basin	703.9	OK.
SOC	169	162	48" overflow structure with 2' sump to 28" x 20" arch CMP to ditch	24" MH with solid cover.	E side	RIM 699	Cover should be open grate.
SOC	173	1054		MH cover with holes in lid.	SW corner		OK.
SOC	174	1251		Perf. MH cover to approx. 24" concrete.	S side		OK.
SOC	179	1050		Beehive in center of basin that connects 2 small basins from out 1038.	S end		
SOC	180	163	15.17' long weir to 36" pipe (H = 0.42)	8'x8' concrete box structure, 42" pipe leaving.	E side	703.58	OK.
SOC	181	1048		Beehive to 24".	NE corner		Board in outlet pipe.
SOC	184	1046		Riprap spillway - secondary overflow.	SE corner		Needs more riprap.
SOC	185	1044		Beehive to pipe flowing east.	E side		OK.
SOC	186	1040		Perforated MH cover.	E side		Silt at bottom.
SOC	186	1042		Perforated MH cover, 2.4' above Overflow 1040.	E side		OK.
SOC	191	164	48" dia. structure with 2' sump to 15" conc.	Closed MH cover to 15" to river.	N side	RIM 692.5; 15" INV 685.43	OK - no overflow closed cover.
SOC	192	173	6" deep by 10' wide riprap overflow to wetland			693.5	
SOC	192	1253		Riprap spillway to wetland.	E side		OK.
SOC	200	146	MH to 30"			RIM703.99; 30"S - 694.79	
SOC	201	147	48" overflow structure to 24" conc.	Stand pipe, 36" dia.	SW end	RIM 683; 24" INV 676.25	OK.
SOC	202	148	48" square drop box to 24" conc.	4' square concrete structure, 24" conc. leaving.	SE corner	RIM 690.25; 24" INV 684.1	OK.
SOC	202	149	emergency spillway in earthen berm			691.5	
SOC	208	150	24" primary overflow structure to 12" RCP	24" dia. Structure to 12" conc.	E side	RIM 671.45	OK.
SOC	208	151	secondary overflow spillway	18" conc. secondary overflow spillway.	E side	est. 672.5	OK.
SOC	209	119	4' diameter. MH with beehive cover and 2' sump	48" dia. MH structure to 12".	E side	669.96	OK.
SOC	210	120	10" Overflow?			N/A	
SOC	213	121	4' diameter. Overflow MH			675	

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Table 8.6D: City of Southfield Detention Basin Overflow Structure Data

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
SOC	215	122	20' wide vegetated enkamat spillway with 3 on 1 slopes			665	
SOC	215	1304		Eroded 2'.	E side		Needs repair.
SOC	216	172	60" dia. MH to 12" west	5' grate, 12" enters, 4' leaves, both concrete	SW corner	686RIM	OK
SOC	220	152	emergency overflow in berm	CB to pipe.	from CB on E side to N	684.5	OK.
SOC	221	134	MH to 42" storm	15" outflow to overflow structure to 48" concrete.	SE corner	RIM691.8	OK.
SOC	222	153	Overflow weir			688.1	
SOC	224	154	Overflow Spillway			N/A	
SOC	228	140	2' wide spillway			668.5	
SOC	229	135	36" overflow RCP to 12" RCP to wetland	36" dia. riser to 12" to wetland basin 228.	NE corner	RIM 668.47; INV 665.95	OK.
SOC	231	129	Manhole	48" dia. Overflow structure with grate to 36" concrete.	SW corner	673.1	OK.
SOC	231	130	secondary overflow sodded spillway			673.5	
SOC	233	165	48" dia. overflow structure to 24" pipe			RIM 673; 21" INV 663.35	
SOC	233	166	15' wide riprap secondary spillway	15' grouted riprap spillway to CB.	SE corner	673.5	OK - bottom of spillway not below berm.
SOC	233	1257		48" dia. structure to 24" concrete.	SE corner		OK.
SOC	234	127	catch basin			676	
SOC	235	131	unspecified structure			673.2	
SOC	236	1060	unspecified structure	24" overflow structure to 24" concrete.	NE corner	672.6	OK.
SOC	237	1052		Beehive connected at south end to outflow 222, 0.8' above riser.	S end		OK.
SOC	238	132	Overflow casting	48" conc. standpipe.	N side	667.47	24" pipe connected to outlet, has 6" restrictor.
SOC	239	124		Beehive.	N side		OK.
SOC	240	1035	24" CB to 12" pipe	24" CMP riser to 12" concrete.	S side	RIM653.5; 12" INV 650.93	OK.
SOC	246	1102		Beehive, with 18" conc. leaving.	South end		OK.
SOC	247	158	12" to MH with 4" restrictor	2' grate.	SE corner	666.97	OK.
SOC	247	1106		2' grate, standpipe, covered in geotextile.	NE side		OK.
SOC	258	169	48" dia. overflow structure to 12" RCP	24" perforated MH to pipe.	SW corner	663.1RIM	OK - bees.
SOC	259	170	72" dia. overflow structure to 36" RCP	42" x 42" box opening to structure with 6.5' high wooden weir in it to a 42" concrete.	E side	661.8RIM	OK.
SOC	260	167	12" CMP north to ditch	12" concrete N to ditch.	N	659.57 PROP.	Some veg. blocking.
SOC	262	145	overflow weir	Grass spillway.	N side	650	OK.
SOC	266	144	rip rap stone spillway	Overflow structure with 4' grate, 12" conc. leaving south.	South end	677.3	OK.
SOC	269	143	stone revetment mattress			640	
SOC	278	157	Overflow structure			664	
SOC	279	1100		CB to pipe.	S end		Pipe underwater.
SOC	281	133	10' riprap spillway			634	
SOC	287	1024		24" dia. beehive.	N side		
SOC	293	1051		CB to 15" concrete.	NE corner		OK.
SOC	295	1308		CB to 15" concrete.	NW corner		OK.
SOC	469	95	4' open top manhole to 24" pipe			RIM 743.00	
SOC	469	1305		Perf. MH cover to 24" concrete.	SE end		OK.
SOC	524	114	grass spillway			742	
SOC	525	116	48" structure to 15" conc.			RIM 715.35AB; IE 4" SW 711.07AB; IE 15" 710.94 AB	
SOC	525	1056		30" dia. overflow structure to 15" concrete.	E side		OK.
SOC	534	171	48" dia. overflow structure to 15" RCP	24" perf. MH to 15" RCP.	N side	658.5RIM	OK.
SOC	535	168	48" dia. overflow structure to 12" RCP			658RIM	

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Table 8.7A: City of Troy Detention Basin Data

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
TRC	361	Charnwood Hills 4 - N basin	294	6	NE	N/A	n/a	AB 12/22/76	no details	N/A	Near Beech Rd. and South Blvd, off Ridge	City of Troy	N/A	Res.	27.1	10	N/A	0.36	5	1.8	60,731	N/A	68300
TRC	362	Charnwood Hills 4 - S basin	294	6	NE	N/A	n/a	AB 12/22/76	no details	N/A	Near Beech Rd. and South Blvd, off Ridge	City of Troy	N/A	Res.	4.3	10	N/A	0.34	3.5	0.9	8,945	N/A	8400
TRC	363	Charnwood Hills Sub. 6	335	6	NE	N/A	N/A	no plans; calcs only	no plans	N/A	Tanglewood, near Coolidge	City of Troy	N/A	Res.	45.5	10	N/A	0.28	2.5	5.1	73,200	N/A	20000
TRC	364	Windridge Sub. 2	286	7	SW	N/A	N/A	AB 11/27/74 Nowak & Fraus	no basin details	N/A	Vineyard St., near Adams, N. of Long Lak	City of Troy	N/A	Res.	31	10	N/A	0.36	8.3	3	69,460	approx. 71,000	39000
TRC	365	River Meadow	448	18	SE	N/A	N/A	2/27/90 George Jerome & Co.	y	N/A	Prestwick Ct., near Wattles and Beech	City of Troy	N/A	Res.	1.92	10	N/A	0.32	3	4.6	3,700	3,700	5000
TRC	366	Strawberry Hill Sub.	300	18	NW	N/A	N/A	AB 2/2/78 N. Alix	can't read detail sheet	N/A	Orchard Ridge, near Long Lake and Adam	City of Troy	N/A	Res.	30.6	10	N/A	0.35	4.63	4	53,000	42,442 (plus 11,000 in sewers & structures)	32400
TRC	367	Adams Pointe	457	18	NW	N/A	N/A	Rev. 10/20/97 Professional Engineering Assoc.	y	N/A	Adams Pointe Ct.	City of Troy	N/A	Res.	9.84	10	N/A	0.3	4.15	4.3	17,314	25,648	32700
TRC	369	Elm Court Sub.	459	5	NW	N/A	N/A	AB 2/16/99 Seiber, Keast & Assoc.	some	N/A	Elm Ct., near Coolidge and South Blvd.	City of Troy	N/A	Res.	N/A	N/A	N/A	N/A	2.56	0.8	N/A	N/A	13200
TRC	370	Crescent Ridge Sub. 3	394	5	NE	N/A	N/A	Rev. 7/30/91 MCS Assoc.	y	N/A	N. end of Lorne	City of Troy	N/A	Res.	13.94 ac at 0.64; 62 ac. at 0.32	2 - 100 yr storage elev. Noted	N/A	0.6	2.2	3.4	191,134	est. 358,000	378000
TRC	371	Manchester Woods	376	6	SW	N/A	N/A	Rev. 8/25/88 Giffels-Webster Engineers	no calcs	N/A	Beech Rd., N. of Manchester Ct.	City of Troy	N/A	Res.	N/A	10	N/A	N/A	2.5	2.5	18,635	24,144	17700
TRC	372	Orchard Hills	310	6	NE	N/A	N/A	AB 3/7/79 Hoyem - Basso Assoc.	y	N/A	Coolidge and South Blvd.	City of Troy	N/A	Res.	50	10	N/A	0.3	2	4.6	87,975	100400 (plan detail shows 88,500)	199000
TRC	373	Longview Acres	301	7	SW	N/A	N/A	AB 1/25/78 MCS Assoc.	some	N/A	near Adams and Long Lake, Longview Ct.	City of Troy	N/A	Res.	79.78	N/A	N/A	N/A	6	7.9	N/A	155,936	130000
TRC	374	Forest Creek 1	315	5	NW	N/A	N/A	April, 1978 Giffels-Webster Engineers	y	N/A	Mountain and Apple	City of Troy	N/A	Res.	51.6 (Total 91.52)	10 yr (2 - 100 yr storage elev. 800.60)	N/A	N/A	1.33 (100-yr, 2.1 ft)	1.4	275,780 for 10 yr (426,650 for 100 yr)	203,300 for 10 yr (>790,000 for 2-100 yr)	266000
TRC	375	Forest Creek 2	344	5	NW	N/A	N/A	Rev. 10/16/86 Giffels-Webster Engineers	no calcs or details	N/A	White Birch and Forest Park	City of Troy	N/A	Res.	39.92 (Total 91.52)	N/A	N/A	N/A	N/A	1	N/A	N/A	2075

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Table 8.7A: City of Troy Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
361	Charnwood Hills 4 - N basin	N/A	38000	N/A	N/A	N/A	N/A	N/A	pentagon	6	3	N/A	N/A	Dry Extended Detention		Minimal	N/A	Turf	No	0	Perforated riser to 12".	
362	Charnwood Hills 4 - S basin	N/A	9350	N/A	N/A	N/A	N/A	N/A	square	N/A	2.5	N/A	N/A	Dry Extended Detention		Minimal	N/A	Turf	No	0	Perforated riser to 4".	
363	Charnwood Hills Sub. 6	N/A	3900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry Catchbasin		No Pool Depth	Hydric	Turf	Cattail, Purple L.	0		Outflow may need repair.
364	Windridge Sub. 2	N/A	13000	N/A	N/A	N/A	N/A	N/A	oval	vary	3	N/A	N/A	Dry		N/A	N/A	Grass, Forb	No	25	Beehive overflow to south MH, Inflow 12 not found, turf upper side slopes, bottom has buffer area.	
365	River Meadow	N/A	1080	N/A	1	N/A	N/A	N/A	rect.	6	2	N/A	N/A	Dry		Minimal	N/A	Turf	No	0	Concrete low flow channel.	
366	Strawberry Hill Sub.	13,857	6500	6697 (8,400 avg.)	1.25	N/A	3.91	N/A	square	N/A	1.5	est. 92 at middle	est. 92 at middle	Dry		Minimal	Type B/C	Turf	No	0	Locked fence with barbed wire, concrete culvert.	
367	Adams Pointe	12,800 at 827.00	7600	4,752 at 824.00 (7,210 at middle)	1	3.5	N/A	N/A	rhombus-like	6	3	est. 168 at ELEV. 827 (118 at middle)	est.76 at ELEV. 827 (61 at middle)	Dry		Turbid Water	Poorly Drained	Turf	Bulrush	0	Under construction.	Clean structures.
369	Elm Court Sub.	28,999 (water surface)	16450	N/A	1	N/A	N/A	3	N/A	N/A	N/A	N/A	N/A	Wetland		2	Clayey	Grass, Rush, Willow, Cattail	Purple L., Buckthorn, Algae	75		Nutrient control.
370	Crescent Ridge Sub. 3	94,250 at 804.70	111200	21,250 at 794.70	2.95	1	7.5	8	rectangular	6	5	N/A	N/A	Wet	Pool volume estimated to be 358000 cft.	None Visible	N/A	90% Sedge/Forb, Turf	Algae, Curly-leaf Pondweed	0	Inflow 21 underwater, Natural Way pesticides signs, Inflow 1051 from com. property to north.	Verify restriction and com. discharge allowed, fert/pest/herbicide control.
371	Manchester Woods	N/A	7100	N/A	approx. 2 ft	2.7	N/A	N/A	rectangular	6	3	N/A	N/A	Dry		Minimal	Type B - Sandy Loam	Turf	No	0	Overflow MH should not be solid cover, Inflow 22 larger than plans, second inflow.	Change MH cover to open CB.
372	Orchard Hills	est. 44,250 at middle (vol./depth)	43300	N/A	0.5	N/A	N/A	N/A	irregular	6	3	N/A	N/A	Dry		Minimal	N/A	Turf, Grass		0		
373	Longview Acres	N/A	16400	N/A	3	N/A	6	4	triangular	10 (6 to 1 below normal water level)	3	N/A	N/A	Wet		N/A	N/A	Turf	No	50	Fountain, 6' max. pool depth, geese, ducks.	Verify restrictor.
374	Forest Creek 1	5.75 ac at 797.00 (173,900 at 796.81; 186,300 at 798.0; 196,760 at 799.0)	190000	N/A	1.5	N/A	11	10	square	6	3	N/A	N/A	Retention	drain tiles shown on south end. Volumes from Phase 2 calcs. Pool volume estimated to be 173900 cft.	1-2	Clayey	Turf, Riprap, Tree	Reed, Cattail, Algae, Sedge	0	Goose fencing 50% shore, only 1 stage overflow.	Verify various stages of overflow.
375	Forest Creek 2	N/A	2075	N/A	N/A	3	N/A	1	V-shaped	N/A	2	N/A	N/A	Wetland	May have been a temporary sediment basin.	<1	Clayey, Hydric	Forb, Tree, Shrub	Buckthorn, Purple L, Cattail	25	Triangular wetland, mosquitoes, west properties dumping grass clipping, wood chips on stream bank.	Verify outflow, clean structures.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.7A: City of Troy Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
TRC	660	Cresent Ridge Sub.	321	5	SW	N/A	N/A	MCS 12/13/79AB	no calcs	N/A	Square Lake and Crooks Rds.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	2.25 (8.8 to secondary overflow)	7	351180	408000 to secondary overflow elev.	585200
TRC	661	Estates of Cambridge	N/A	18	SE	N/A	N/A	Fenn & Assoc. 12/2/02	no outlet details	N/A	Ravenwood Ct./Beach and Wattles	Owner	N/A	Res.	5.47	1.5 yr, 25 yr, 100 yr	1.09	0.32	4.25 ft - 1.5 yr, 5 ft - 25 yr, 5.6 ft - 100 yr	5.9	9032 - 1.5 yr, 13734 - 25 yr, 18733 100 yr	9831 - 1.5 yr, 14342 - 25 yr, 18908 - 100 yr	50150
TRC	662	Amhurst on the River	N/A	18	SW	N/A	N/A	Nowak & Fraus 1/16/03	n	N/A	Amhurst Street	Owner	N/A	Res.	2.01	1.5 yr, 25 yr	0.3012	0.35	2.51 ft - 1.5 yr; 3 ft - 10 yr	3	3630 - 1.5 yr; 4342 - 10 yr; 6068 - 25 yr; 8168 - 100 yr	3633 - 1.5 yr; 6300 - 10 yr	9850
TRC	663	Sussex Place	N/A	7	NW	N/A	N/A	N/A	n	N/A	Rabben Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.5	N/A	N/A	14375

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.7A: City of Troy Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
660	Cresent Ridge Sub.	calc. MID46364 (V/D)	83600	N/A	1	0.5	N/A	N/A	rectangular	6	3	N/A	N/A	Dry		Minimal	N/A	Turf		0	Algae at inlet, did not find outlet, could be buried under pea gravel where water seeps into ground.	Find outlets structure and clean if necessary.
661	Estates of Cambridge	5197 - 1.5 yr, 6679 - 25 yr, 8050 - 100 yr	8500	365	N/A	N/A	N/A	1	rectangular	N/A	4	N/A	N/A	Dry Extended Detention		Coming From Construction	Hydric, Underwater	Turf		0	Sediment coming from nearby construction site.	
662	Amhurst on the River	MID1447 - 1.5 yr	3300	MID2100 - 10yr	1	N/A	N/A	N/A	irregular	6	3	N/A	N/A	Dry Extended Detention	Calculation for 3 in restrictor at 10 yr elevation, but detail shows it below 1.5 yr elev. In outlet from standpipe. Calculations for 25-yr and 100-yr storms but storage volume provided for 10-yr storm only.	Minimal	N/A	Turf		25	Recently sodded, site under construction, no 3" restrictor at riser.	Verify restrictor.
663	Sussex Place	N/A	5750	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	Dry		Minimal	N/A	Turf		0		

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.7B: City of Troy Detention Basin Inflow Data

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
TRC	361	8	Storm.	N/A	E side	N/A	27	swale with 6" PVC underdrain	Concrete	N/A	OK.
TRC	362	9	Storm.	N/A	S end	21	24	Concrete	Concrete	836.00	12" sediment.
TRC	363	1044	Storm.		SE corner		36		Concrete		2" sediment.
TRC	364	10	Storm to swale.	to open swale in NW corner	NW corner	24	24	Concrete	Concrete	N/A	OK.
TRC	364	11	Storm.	E side	E side	27	30	Concrete	Concrete	826.02	OK.
TRC	364	12		to manhole SW corner		18		Concrete		818.2	
TRC	365	13	Storm.	E side	E side	12	12	N/A	Concrete	784	Algae.
TRC	365	14	Storm.	S side	S side	N/A	12	N/A	Concrete	784	1" sediment.
TRC	366	15	Storm.	SW corner	SW corner	30	30	Concrete	Concrete	791.3	OK.
TRC	367	16	Storm.	N	N side	12	15	N/A	Concrete	823.2	2" sediment.
TRC	367	17	Storm.	E	E side	18	18	N/A	Concrete	823	3" sediment.
TRC	367	18	Storm.	S	S side	12	12	N/A	Concrete	823.2	OK.
TRC	369	20	Storm.	SE corner	SE corner	21	21	Concrete	Concrete	800.4	OK.
TRC	370	21		E side		42		Concrete		794.7	
TRC	370	1051	Commercial storm.		from N. strip mall		8		PVC		OK.
TRC	371	22	Storm.	S side	SE corner	12	24	Concrete	Concrete	860.28	OK - minor erosion.
TRC	371	1049	Storm.		NE corner		6		PVC		OK.
TRC	372	23	Storm.	N side	N end	18	18	N/A	Concrete	N/A	OK.
TRC	372	24	Storm to 6" underdrain.	S side	S side	24	24	N/A	Concrete	N/A	OK.
TRC	372	25	Storm to 6" underdrain.	W side	W side	18	18	N/A	Concrete	N/A	OK.
TRC	372	26	Storm.	NW corner	NW corner	15	15	N/A	Concrete	N/A	2" sediment, bar grate separated.
TRC	373	27	Storm.	N side	N side	66	66	Concrete	Concrete	806.57 (approx. can't read)	Underwater.
TRC	374	28	From basin 369.	N side	N side	12	12	Concrete	Concrete	798.5	OK.
TRC	374	29		NE corner		30		N/A		N/A	
TRC	374	30	Storm.	S side	S side	12	15	Concrete	Concrete	798.5	OK.
TRC	374	1047	Storm.	SW corner	SW corner	24	24	Concrete	Concrete	796.81	OK.
TRC	375	31	Storm.	N end	N end	12	12	Concrete	Concrete	797.45	Buried - not found, seen from CB.
TRC	375	32	Storm.	SE corner from rear CBs	SE corner	N/A	24	N/A	Concrete	N/A	OK.
TRC	660	581	Storm.	SE corner	SE corner	66	66	Concrete with headwall and bar grate	C.I.	790.3	Has concrete headwall, OK.
TRC	661	582	Storm.	SE corner	SE side	15	15	N/A	Concrete	772	OK.
TRC	661	583	Storm.	SW corner	SW	12	12	N/A	Concrete	772	3" sediment.
TRC	662	584	Storm.	NE corner	E side	12	12	N/A	Concrete	771	OK.
TRC	663	1254	Storm.		N end		18		Concrete		3-4" sediment.
TRC	663	1256	Storm.		SW corner		12		Concrete		OK.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.7C: City of Troy Detention Basin Outflow Data

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
TRC	361	4	N/A	Perforated 24" riser to 12".	SW corner	SW corner	10	Perf. to 12	N/A	N/A	N/A	OK.
TRC	362	5	N/A	Perforated 24" wide riser to 4".	N side	flows N	4	Perf. to 4	N/A	N/A	N/A	OK.
TRC	363	1024		Water flows under beehive rim - pipe may be blocked.		NE corner - basin bottom		24 beehive		Concrete		Pipe underwater, overgrown, may need repair.
TRC	364	6	1.04' high plate restrictor in 30" culvert flowing south in manhole 20; submersible pump during construction.	15" unrestricted pipe to MH to 30".	SW corner	SW corner	30" with 1.04' high plate restrictor	15	Concrete	Concrete	INV 818.2; RIM 826	OK.
TRC	365	7	3" restrictor bulkheaded at inlet of 12" pipe	3" restrictor in 12" pipe.	W side	W side	3	3 to 12	N/A	N/A	783.7	2" sediment.
TRC	366	8	restrictor in overflow structure	Square hole in weir wall in primary overflow structure.	NW corner	NW corner	21	12 x 12	Concrete	Concrete	795.21	OK.
TRC	367	9	no restrictor calcs.	15" conc. with 4" restrictor at overflow structure.	W side	W side	30	4	Concrete	PVC	822.85	OK.
TRC	369	11	restricted pipe to wetlands	8" PVC to CB.	SW corner	SW corner	12	8	CMP	PVC	800.56	OK.
TRC	370	12	18" pipe to overflow structure	21" to 24" - plan says 18".	SW corner	SW corner	18	21	N/A	Concrete	Outflow 802.2 (pipe INV 801.75)	OK.
TRC	371	13	12" pipe with bar screen to 24" and then to 12"	MH to 24" to CB.	NE corner	NE corner	12	24	N/A	Concrete	approx. 859	Solid cover on overflow.
TRC	372	14	two 6" restrictors with flap valve draining east to Sprague Drain	Black plastic 8" restrictor to 12" CMP.	NE and SE corners	NE & SE corners	6, 6	8	PVC	CMP	800.17 (NE); 800.50 (SE)	OK.
TRC	372	1028		12" CMP.		NE corner		12		CMP		OK.
TRC	373	15	steel grate (no restrictor info)	Unrestricted 30" conc. with bar grate.	SE corner	SE corner	30	30	Concrete	Concrete	810.00 outflow (outflow pipe INV 809.6)	Algae.
TRC	374	16	rectangular weir in 48" riser structure	Rectangular weir to Over 13.	E side	E side	18	14 x 17	Concrete	Concrete	18" INV 797.00	OK.
TRC	375	17	8" underdrain to CB and overflow swale		SW corner		N/A		N/A		N/A	
TRC	660	321	6" to overflow structure		SW corner		6		N/A		788.7	
TRC	661	322	Riser structure with four 1" holes at 1.5 yr elev., 3.57" orifice at 25 yr elev., and 3.47" orifice at 100 yr elev.	Riser, 4-1" holes@1.5 year, 3.57" restrictor@ 25 year, 3.47" restrictor @ 100 year.	NW corner	NW	four 1", 3.57", and 3.47"	3.6	N/A	Riser	775.25 - 1.5 yr; 776 - 25 yr; and 776.6 - 100 yr	OK.
TRC	662	323	Standpipe with six - 1" holes at 1.5 yr elev. to 3" restrictor in 12" pipe	36" CMP riser to 12" conc. w/ gravel jacket.	SW corner	W side	3	12	N/A	Riser	771 - 1.5 yr; 773.51RIM	No restrictor.
TRC	663	1252		8" PVC, obstructed by rocks.		SE corner		8		PVC		Rocks obstructing.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.7D: City of Troy Detention Basin Overflow Structure Data

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
TRC	364	1026		Beehive on W side south to MH.	West side		OK.
TRC	365	4	bar grate on overflow inlet to 12" pipe	12" pipe with bar grate.	N/A	RIM 787.0	OK.
TRC	366	5	bar grate on 40" overflow inlet	48" high weir wall (0.6' below overflow) in 60" wide overflow structure to 30" concrete to Over 1022.	NW corner	RIM 804.2 (INV 801.09)	OK.
TRC	366	1022		Pipe to MH; MH also accepts 30" pipe from Overflow 5.	NW corner		OK.
TRC	367	6	overflow structure CB 37	48" wide structure to 12" concrete.	West side	RIM 827.00	OK.
TRC	369	8	24" dia. Manhole	24" CB to 12" concrete to Forest Creek Lake.	SW corner	TOP 801.6	OK.
TRC	370	9	49" x 33" CMP	60" wide structure to 42" x 33" CMP to drain.	SW corner	TOP 804.70 (INV 801.71)	OK.
TRC	371	10	overflow spillway to 24" pipe to 12"			TOP 862.30	
TRC	372	11	20' bituminous overflow swale			TOP 805.00	
TRC	373	12	CB to manhole	Overflows berm to CB near Long Lake.		approx. 816	OK.
TRC	374	13	48" riser structure	48" wide riser to 21" concrete.	E side	TOP 798.0 (10 yr elev)	OK - 1.5' sediment in structure.
TRC	375	1023		5' wide grass swale in berm to stream.	SW corner		OK.
TRC	375	1025		3' wide earthen swale - seems to be built afterwards by others.	N half of W. side		OK - minor erosion.
TRC	660	174	30" x 42" overflow structure to 18" conc. in SW corner	30x42 structure, to 18" concrete.	SW corner	791.2RIM	OK.
TRC	660	175	20' overflow swale on W side	20' grassed overflow swale.	SW corner	797.5	OK.
TRC	661	1252		Beehive.	NW corner		OK.
TRC	662	176	riprap spillway	10' riprap spillway.	West side	774	Not properly graded, no freeboard.

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– If all of the plan review information for an Inflows, Outflows, or Overflows is blank, then there was no plan information available.
– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.8A: West Bloomfield Township Detention Basin Data

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
WBT	393	Aldingbrooke - basin2	N/A	29	NE	N/A	N/A	AB 1/30/80	y	N/A	forest grove and bridgeview	Owner	N/A	Res.	29.9	100	N/A	0.5	2.2	2.15	175842	184950	190920
WBT	394	Amberleigh Sub.	N/A	33	NE	N/A	N/A	AB 9/27/99 Zeimet Wozniak	y	N/A	W. of Brook Hollow Ct. and S. of Beechtree Trail	Owner	OCDC, Ch. 18	Res.	40.2	500	N/A	43	5.4	5.3	197493	206450	245700
WBT	395	CVS Pharmacy	N/A	27	SW	N/A	N/A	AB 8/10/99 Johnson & Anderson	No information provided on plans	N/A	Maple Rd., E. of Farmington, basin in back	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	45000
WBT	396	West Bloomfield Medical Bldg - W basin	N/A	34	NE	N/A	N/A	AB 12/5/88 Johnson and Anderson	some	N/A	W. of Orchard Lake Rd., N. of 14 Mile, in rear	Owner	N/A	Com.	N/A	100	N/A	N/A	N/A	6	N/A	N/A	98500
WBT	397	West Bloomfield Medical Bldg - E basin	N/A	34	NE	N/A	N/A	AB 12/5/88 Johnson and Anderson	some	N/A	W. of Orchard Lake Rd., N. 14 Mile, in front	Owner	N/A	Com.	N/A	100	N/A	N/A	N/A	4.5	N/A	N/A	32600
WBT	399	Jack Cauley Chevrolet - basin A	N/A	34	SE	N/A	N/A	AB 2/27/79 Wolf and Nudel Architects	some	N/A	7100 Orchard Lake Rd., in rear	Owner	N/A	Com.	N/A	N/A	N/A	N/A	8.2	N/A	N/A	N/A	N/A
WBT	400	Jack Cauley Chevrolet - basin C	N/A	34	SE	N/A	N/A	AB 2/27/79 Wolf and Nudel Architects	some	N/A	7100 Orchard Lake Rd., SE basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	4	2.1	N/A	N/A	9200
WBT	401	Jack Cauley Chevrolet - basin B	N/A	34	SE	N/A	N/A	AB 2/27/79 Wolf and Nudel Architects	some	N/A	7100 Orchard Lake Rd., NE basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	3	4.4	N/A	N/A	23200
WBT	402	Gateway Center - basin A	N/A	34	SE	N/A	N/A	AB 9/24/99 Seiber, Keast and Associates	some	N/A	NW of Orchard Lake and 14 Mile Rds. - W basin	Owner	N/A	Com.	26.55	100	N/A	0.44	5	4.5	119533	120706	123750
WBT	403	Gateway Center - basin B	N/A	34	SE	N/A	N/A	AB 9/24/99 Seiber, Keast and Associates	some	N/A	NW of Orchard Lake and 14 Mile Rds. - SE basin	Owner	N/A	Com.	18	100	N/A	0.71	4.4	3	159365	160169	118400
WBT	404	Gateway Center - basin C	N/A	34	SE	N/A	N/A	AB 9/24/99 Seiber, Keast and Associates	some	N/A	NW of Orchard Lake and 14 Mile Rds. - NE basin	Owner	N/A	Com.	8.13	100	N/A	0.71	3.69	3	71953	73081	74500
WBT	405	Jewish Community Center - basin A	N/A	29	SE	N/A	N/A	Addendum No. 2; 9/20/91 Zeimet/Wozniak	some	N/A	6600-6800 W. Maple Rd. - N basin	Owner	N/A	Inst.	9.04	100	N/A	0.55	9.2	3	59477.91	85632	33700
WBT	406	Jewish Community Center - basin B	N/A	29	SE	N/A	N/A	Adendum No. 2; 9/20/91 Zeimet/Wozniak	some	N/A	6600-6800 W. Maple - S basin	Owner	N/A	Inst.	5.16	100	N/A	0.55	N/A	12	26209.3	26904	709700
WBT	407	Maplecreek Condo 2	N/A	34	NW	N/A	N/A	AB 12/12/94 Giffels-Webster	no calcs	N/A	Walnut Creek Circle	Owner	OCDC, Ch. 18	Res.	10.45	100	N/A	0.32	3	2.2	N/A	N/A	46300
WBT	408	J&S Office Center	N/A	35	SW	N/A	N/A	8/13/84 for SESC Permit Bi-Con	Plans Incomplete	N/A	E. of Orchard Lake Rd., N. of Fourteen Mile	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	41600
WBT	409	Maple Creek Condos 4	N/A	34	NW	N/A	N/A	8/16/95 for OCRC Review	some	N/A	Trailview & Maple Creek	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	6	6	N/A	N/A	81100
WBT	412	Maple Farms	N/A	27	SW	N/A	N/A	Schrader-Porter & Assoc.	no calcs	N/A	N. of Maple Rd. & E. of Farmington	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	3100
WBT	413	Michigan Cosmetic Center	N/A	34	NE	18-34-200-227	N/A	J.A.D. Engineering Services, Inc.	some	N/A	N. of Daly Rd.	Owner	N/A	Com.	0.88	100	N/A	N/A	7	7.8	17864.68	18305	35900
WBT	414	Maple Creek Condos 4	N/A	34	SW	N/A	N/A	8/16/95 OCRC Review	some	N/A	Trailridge & Treeline Dr.	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	N/A	5	N/A	N/A	172400
WBT	415	Maple Creek Condos 3	N/A	34	NE	N/A	N/A	AB 9/94 Giffels Webster Engineers	Plan incomplete. No calcs.	N/A	Forestview Dr.	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	7.45	5.3	N/A	N/A	149000
WBT	416	Maple Creek Condos 2	N/A	34	NE	N/A	N/A	AB 9/94 Giffels Webster Engineers	Plan incomplete. No calcs.	N/A	end of Maple Creek Ct.	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	1.47	2.65	N/A	N/A	338550

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.8A: West Bloomfield Township Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
393	Aldingbrooke - basin2	N/A	88800	N/A	N/A	N/A	N/A	8	irregular	5	4	N/A	N/A	Wet		Minimal	N/A	Turf	no	0	No buffer; receiving stream incised (photo); outfall bar grate broken, causing blockage	buffer
394	Amberleigh Sub.	53000	46350	21500	0.5	1	3.6	0.3	triangular	6	4	245	285	Dry	detention basin has forebay with standing water	Basin/Forebays Full	N/A	Sedge And Forb	No	0	Geese, sediment traps full, active construction. No 8" restrictor.	Verify restrictor. Dredge, nutrient control, buffer.
395	CVS Pharmacy	N/A	11250	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.5	N/A	N/A	Dry		1	Sediment; Muck; Poorly Drained	Tree, Turf	Cattail	100	Cattails, litter, sediment, oil sheen.	Litter removal, pre-treatment.
396	West Bloomfield Medical Bldg - W basin	N/A	16400	N/A	N/A	1	N/A	0.5	rectangular	5	3	145	160	Dry		1	N/A	Turf	Cattail	25	Litter, no restrictor.	Verify restrictor, dredge, clean structures.
397	West Bloomfield Medical Bldg - E basin	N/A	7250	N/A	N/A	N/A	N/A	5	triangular	5	2	145	120	Wet		Minimal	N/A	Turf, Gravel Edging	Algae	0	Fountain, blue dye, GEESE.	Buffer.
399	Jack Cauley Chevrolet - basin A	23750	14850	6600	N/A	N/A	N/A	N/A	rectangular	5	2	190	125	Dry		<1	Hydric	Shrub, Sedge, Forb	Cattail, Rushes, Algae	0	Pump stn, new asphalt, workers dumping into CB, car wash and repair bays drain to 3 CBs, grey residue and erosion at Inflow 1025	Investigate illicit discharges, pre-treatment, dredge.
400	Jack Cauley Chevrolet - basin C	10000	4350	3040	N/A	1.3	N/A	N/A	rectangular	N/A	4	120	90	Dry		Minimal	Poorly Drained	Turf	No	100	8" restrictor instead of 6" per plans, <50% storage volume than plans show.	Verify detention requirements.
401	Jack Cauley Chevrolet - basin B	N/A	5300	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2	170	40	Dry		Minimal	V. Poorly Drained	Turf	No	100	Unrestricted basin draining to basin 400.	
402	Gateway Center - basin A	39185	27500	6407	N/A	N/A	N/A	2	irregular	6	2	N/A	N/A	Wet		<1	N/A	Turf, Grass, Conifers	Cattail, Algae	0	Deerflies and larvae; some of East slope slumping; some blue dye.	Clean OUT 46; nutrient control.
403	Gateway Center - basin B	65118	39500	7573	N/A	1.3	N/A	N/A	irregular	6	3	N/A	N/A	Wetland		<1	Hydric	Turf, Shrub, Wetland	Cattail, Some Phragmites	0	2-stage overflow, 2-yr storage depth 1.5', outflow blocked, 25% < required storage.	Clean/modify structures.
404	Gateway Center - basin C	26402	24900	12204	N/A	0.9	N/A	4	rectangular	6	2.5	127	207	Wet		Minimal, No Pool Depth	N/A	Sedge And Forb	Cattail	0	2-stage overflow, good buffer and water quality.	Clean structures, Outflow 50 buried.
405	Jewish Community Center - basin A	18720	11225	2080	N/A	N/A	N/A	N/A	triangular	N/A	N/A	125	185	Dry	This basin is connected to Basin 406 w/ a 24 in pipe	Minimal	N/A	Wetland	Cattail	0	No Inflow/Outflow pipes - dry depression with berm to 3' deep wetland and pond.	Vegetate bottom.
406	Jewish Community Center - basin B	12640	59150	0	N/A	N/A	N/A	12	irregular	N/A	6	100	132	Wet	This basin is connected to Basin 405 w/ a 24 in pipe	Minimal	N/A	Turf, Shrub	Curly Pondweed, Cattail	0	Area from aerial, fountain not on, broken wellhead, outflow not seen, use aerial.	
407	Maplecreek Condo 2	N/A	21000	N/A	0.5	1	N/A	2	irregular	6	4	315	120	Wet		Minimal	N/A	Willow, Forb	Cattail, Duckweed, Bulrushes	25	Fountain - not on.	Verify restrictor, clean structures, nutrient control.
408	J&S Office Center	est. 8100	6900	N/A	N/A	N/A	N/A	N/A	rectangular	6	3	90	90	Dry Catchbasin		<0.5	Poorly Drained	Turf	No	0	Cobble bottom, ponding.	Clean structures.
409	Maple Creek Condos 4	N/A	13500	N/A	1	0.5	1	0.75	oval	6	1.5	112	75	Dry		0.3	N/A	Turf, Grass	Algae, Cattail	0	Outfall to stream OK.	Verify restrictor, clean structures, increase buffer, nutrient control.
412	Maple Farms	N/A	1020	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	3	46	63	Dry Catchbasin		Minimal	Clay And Fill	Turf	No	0	Outflow buried, excessive algae. Inflow underwater.	Nutrient control, clean structures, veg. buffer.
413	Michigan Cosmetic Center	6100	4600	0	1	1	N/A	1	rectangular	N/A	1	120	60	Dry Extended Detention		No Pool Depth	N/A	Landscape	Algae, Rushes	0	Fenced, slumping SW sideslope, 36" riser to 12" to 30" riser to restricted pipe to 30" riser to 12".	Slope stabilization, pretreatment.
414	Maple Creek Condos 4	N/A	34500	N/A	1	N/A	3	2.5	irregular	6	4	220	335	Wet	receives flow from nearby wetland and sediment basin	>1 In Trap, 0.75 Basin	N/A	Turf, Tree	Wetland	0		Buffer.
415	Maple Creek Condos 3	N/A	28100	N/A	N/A	1.7	N/A	0.5	irregular	6	3	N/A	N/A	Dry Extended Detention		>1, No Pool Depth	N/A	Grass, Tree	Sedges, Rushes, Arrowhead	50	Sediment basin riser still in place.	
416	Maple Creek Condos 2	N/A	127750	N/A	1	N/A	2	N/A	irregular	N/A	6	595	250	Dry		Minimal	Hydric	Wetland	Purple L., Some Algae	0	Geese, active construction eroding to Inflow 63.	Verify restrictor, dredge, erosion control, clean structures.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.8A: West Bloomfield Township Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
WBT	417	Townhomes at Maple Creek - E basin	N/A	34	SE	N/A	N/A	AB 8/16/99 Ziemet/Wozniak	Plan incomplete. No calcs.	N/A	Crackling Creek Ct.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	29500
WBT	418	Townhomes at Maple Creek - W basin	N/A	34	SE	N/A	N/A	AB 8/16/99 Ziemet/Wozniak	Plan incomplete. No calcs.	N/A	Hawkswood Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	5.2	N/A	N/A	45800
WBT	419	Maple Place - W basin	N/A	32	NE	N/A	N/A	AB 3/19/87 Zeimet/Wozniak	Plan incomplete. No calcs.	N/A	Maple Lakes	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	N/A	6	N/A	N/A	177000
WBT	420	West Bloomfield Corp. Ctr.	N/A	34	SE	N/A	N/A	AB 11/18/86 Giffels-Webster	Plan incomplete. No calcs.	N/A	W. of Orchard Lake Rd., 14 1/2 Mile	Owner	N/A	Com.	N/A	100	N/A	0.61	5	5.7	N/A	N/A	58000
WBT	422	Maplewoods Sub.	N/A	27	SW	N/A	N/A	Revised AB 12/29/92 Zeimet/Wozniak	plans incomplete	N/A	Peggy St.	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	N/A	2.5	N/A	N/A	41600
WBT	424	Oakbrooke Sub. - north	N/A	23	SE	N/A	N/A	Rev. 4/10/87 Warner, Cantrell and Padmos	plans incomplete	N/A	E. of Middlebelt	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	123400
WBT	425	Oakbrooke Sub. - south	N/A	24	SW	N/A	N/A	Rev. 4/10/87 Warner, Cantrell and Padmos	plans incomplete	N/A	E of Middlebelt	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	10000
WBT	426	Orchard Pine Office Center	N/A	35	SW	N/A	N/A	AB--no date; approvals 3/97 Stenrose Associates, Inc.	plans incomplete	N/A	E. of Orchard Lake Rd., N. of Fourteen Mile	Owner	N/A	Com.	1.375	100	N/A	0.62	3.7	5.3	N/A	15117	17400
WBT	427	Potomac Towne 3 - basin 3	N/A	28	SE	N/A	N/A	AB 11/21/74 Basney and Smith	Plans incomplete	N/A	5274 Potomac Run S.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBT	428	Shenandoah in the Woods	N/A	20	SE	N/A	N/A	AB 10/25/88 Robert H. Laity	Plans partially complete, profiles not included	N/A	N. of Woodpond, W. of Woodrun	Owner	N/A	Res.	46.61	N/A	N/A	0.3	5.1	5	209745	435600	408900
WBT	429	Ridgewood Pt. - S basin	N/A	28	NW	N/A	N/A	Record Drawings 12/6/79 Giffels-Webster	plans incomplete. no calcs	N/A	S. of Pinetree Dr. - S basin	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3.5	N/A	N/A	122850
WBT	430	Simsbury Condos I	N/A	34	SW	N/A	N/A	AB 7/1/94 Warner, Cantrell & Padmos, Inc.	plans incomplete	N/A	Danbury Dr., N. of Fourteen Mile	Owner	N/A	Res.	N/A	100	N/A	N/A	N/A	4.2	N/A	N/A	20300
WBT	431	Simsbury Condos II	N/A	34	SW	N/A	N/A	AB 7/1/94 Warner, Cantrell & Padmos, Inc.	plans incomplete	N/A	Danbury Dr.	Owner	N/A	Res.	N/A	100	N/A	N/A	N/A	2	N/A	N/A	8050
WBT	432	Simsbury Condos	N/A	34	SW	N/A	N/A	AB 7/1/94 Warner, Cantrell & Padmos, Inc.	plans incomplete	N/A	N. of Simsbury Dr.	Owner	N/A	Res.	N/A	100	N/A	N/A	N/A	3.5	N/A	N/A	34300
WBT	433	Simsbury Condos	N/A	34	SW	N/A	N/A	AB 7/1/94 Warner, Cantrell & Padmos, Inc.	plans incomplete	N/A	Fourteen Mile and Farmington	Owner	N/A	Res.	N/A	100	N/A	N/A	N/A	6.2	N/A	N/A	53100
WBT	437	Stonebridge Sub.	N/A	33	NE	N/A	N/A	AB 9/24/88 Zeimet Wozniak Assoc.	plans incomplete	N/A	Maple and Farmington	Owner	N/A	Res.	N/A	100	N/A	0.35	N/A	4	N/A	N/A	258100
WBT	438	Stonebridge Sub.	N/A	33	NE	N/A	N/A	AB 9/24/88 Zeimet Wozniak Assoc.	plans incomplete	N/A	Maple and Farmington	Owner	N/A	Res.	N/A	100	N/A	0.35	N/A	1.9	N/A	N/A	33400
WBT	440	Tam-O-Shanter - basin A	N/A	23	SW	N/A	N/A	AB 9/2/03 Raymond Hearn Golf Designs	plans incomplete	N/A	N. of Walnut Lake, middle basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1.2	N/A	N/A	62700
WBT	441	Tam-O-Shanter - basin C	N/A	23	SW	N/A	N/A	AB 9/2/03 Raymond Hearn Golf Designs	plans incomplete	N/A	N. of Walnut Lake, SW basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	15800
WBT	442	Tam-O-Shanter - basin D	N/A	23	NE	N/A	N/A	AB 9/2/03 Raymond Hearn Golf Designs	plans incomplete	N/A	N. of Walnut Lake, NE basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1.5	N/A	N/A	16600
WBT	443	West Bloomfield Twp. Offices - SE basin	N/A	22	SW	N/A	N/A	9/26/88 Giffels-Webster	y	N/A	Walnut Lake Rd.	Owner	N/A	Com.	7.4	2x100	N/A	0.65	1.4	N/A	158730	159600	N/A
WBT	444	West Bloomfield Twp. Offices - SW basin	N/A	22	SW	N/A	N/A	2/5/88 Giffels-Webster	y	N/A	Walnut Lake Rd.	Owner	N/A	Com.	7.2	2x100	N/A	0.65	2.5	N/A	154440	157625	N/A

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.8A: West Bloomfield Township Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
417	Townhomes at Maple Creek - E basin	N/A	9850	N/A	N/A	0.6	3.5	2	N/A	6	2.5	N/A	N/A	Wet		0.5	N/A	Turf, Fine Rushes	Algae			
418	Townhomes at Maple Creek - W basin	N/A	8800	N/A	N/A	0.9	N/A	2	irregular	N/A	3	N/A	N/A	Wet		<1	N/A	Turf, Tree, Forb	Algae, Cattail	50		Clean structures, nutrient control.
419	Maple Place - W basin	N/A	29500	N/A	N/A	N/A	N/A	7	irregular	5	2.5	N/A	N/A	Wet		1	N/A	Turf	Some Attached Algae	0	Algaecide application posted; drains unrestricted to basin 903; inflows underwater; fountain. Goose droppings.	Veg. buffer. Goose and nutrient control. Use as sediment trap for second basin.
420	West Bloomfield Corp. Ctr.	N/A	10200	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	2	75	782	Dry		<1	Hydric	Turf	Cattail	0		Clean structures.
422	Maplewoods Sub.	N/A	16650	N/A	N/A	N/A	N/A	N/A	irregular	N/A	5.5	N/A	N/A	Dry		Minimal	N/A	Turf	No	0	Backyard depression, pipes to and from CB structures.	Area used by residents - retrofit may be discouraged.
424	Oakbrooke Sub. - north	N/A	30850	N/A	N/A	N/A	N/A	2.5	irregular	6	4	N/A	N/A	Wet		1	N/A	Grass, Tree, Shrub, Turf	Cattail, Reed Canary Grass	0	Some buffer provided, 2 fountains not operating.	
425	Oakbrooke Sub. - south	N/A	3400	N/A	N/A	N/A	N/A	2	irregular	N/A	6	N/A	N/A	Wet		Minimal	N/A	Turf		0	Asphalt lined pool, fountain, water feature, detention provided?	
426	Orchard Pine Office Center	N/A	3300	N/A	N/A	N/A	N/A	1	rectangular	5	1.5	86	50	Dry		1	N/A	Turf, Shrub	Cattail, Algae	0		Dredge, nutrient control.
427	Potomac Towne 3 - basin 3	N/A	12000	N/A	N/A	N/A	N/A	5	irregular	N/A	5	N/A	N/A	Wet		Minimal	N/A	Turf, Tree	Curly Pondweed	0	Outflow not seen, turbid water.	Buffer.
428	Shenandoah in the Woods	N/A	81800	N/A	N/A	0.5	N/A	6	irregular	N/A	4	N/A	N/A	Wet		some at in 1035	N/A	Turf, Cattail	Algae, Cattail, Purple L.	0	Appears to outlet to N. swale at golf course - no structure; half of lake has no buffer, litter, possible S. and E. inflows.	Buffer, nutrient control, clean CB sumps, investigate Outlet and sedimentation.
429	Ridgewood Pt. - S basin	N/A	35100	N/A	N/A	N/A	N/A	4	irregular	N/A	3	N/A	N/A	Wet	North and south basins connected.	Minimal	N/A	Turf, Tree		0	Copper sulfate algaecide applied, 2 fountains, 3 tile drains, drains to north basin.	Buffer.
430	Simsbury Condos I	N/A	4850	N/A	N/A	N/A	N/A	0.75	rectangular	N/A	2.5	175	130	Dry	four separate basins	2	Hydric	Turf	Purple L., Cattail, Algae	0	Inflow 164 not found, pondweed, 4' buffer, drain east, overflows south?	Expand buffer, no overflow.
431	Simsbury Condos II	N/A	4025	N/A	N/A	2	N/A	0.5	triangular	N/A	2	100	80	Dry	four separate basins	Some	N/A	Turf, Grass	Cattail, Purple L., Reed	0	Inflow 165 not found, turbid, algae, duckweed, 5' buffer, willows.	Dredge.
432	Simsbury Condos	N/A	9800	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	Dry	four separate basins	2.5	Hydric	Turf Upper Half Slope	Cattail, Willows	50		Buffer, dredge.
433	Simsbury Condos	N/A	8550	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2.5	190	135	Dry	four separate basins	0.5	Hydric	Shrub, Forb	Willows, Algae	0	Flows East to drain.	
437	Stonebridge Sub.	N/A	64500	N/A	N/A	1	4	0.5	irregular	6	3	N/A	N/A	Dry	two separate basins	3	V. Poorly Drained	Turf, Shrub	Cattail, Algae, Purple L.	0		Buffer, dredge.
438	Stonebridge Sub.	N/A	17600	N/A	N/A	N/A	N/A	5	rectangular	6	3	N/A	N/A	Wet	two separate basins	2	N/A	Turf	Algae	25	Whitish discharge at Inflow 1031. Turtle trapped in Overflow.	Clean MH sump, nutrient controls.
440	Tam-O-Shanter - basin A	N/A	52200	N/A	N/A	2	N/A	7	irregular	N/A	3	N/A	N/A	Wet	Basin A and B connected 8 in to a 12 in pipe	None Visible - No Pool Depth	N/A	Turf	Sedges	0	Fountain, blue dye, geese droppings.	Buffer.
441	Tam-O-Shanter - basin C	N/A	15800	N/A	N/A	2	N/A	9	irregular	N/A	3.5	N/A	N/A	Wet		None Visible - No Pool Depth	N/A	Turf	Lily Pad, Fine Rush	0	Blue dye, 36" riser not functioning as overflow.	Check outflow/overflow structure.
442	Tam-O-Shanter - basin D	N/A	11100	N/A	N/A	2	N/A	2	irregular	N/A	3	N/A	N/A	Wet		None Visible - No Pool Depth	Hydric	Turf	Purple L., Cattail, Algae	0	Lily, duckweed, discharges to wetland/lake, blue dye.	Outlet riser holes blocked.
443	West Bloomfield Twp. Offices - SE basin	N/A	102300	N/A	N/A	N/A	N/A	N/A	irregular	N/A	N/A	N/A	N/A	Retention	Wetland A	N/A	N/A	tree, shrub	buckthorn, phragmites, algae	0	no outlet found	
444	West Bloomfield Twp. Offices - SW basin	N/A	91450	N/A	N/A	N/A	N/A	N/A	irregular	N/A	N/A	N/A	N/A	Retention	Wetland B--no inlets on plans--looks like drainage swales	N/A	N/A	Tree, shrub, forbs	phragmites, buckthorn, ctail	0	no outlet found	

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.8A: West Bloomfield Township Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
WBT	446	West Bloomfield Twp. Police HQ	N/A	22	SW	N/A	N/A	9/26/88 Giffels-Webster	Plan incomplete. No calcs.	N/A	4530 Walnut Lake Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	5.4	N/A	N/A	20700
WBT	447	West Bloomfield Nursing Home - N basin	N/A	33	NW	N/A	N/A	AB 1/29/88 Nowak and Fraus	Plan incomplete. No calcs.	N/A	6445 W. Maple Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	2	3.8	N/A	N/A	23700
WBT	448	West Bloomfield Nursing Home - S basin	N/A	33	NW	N/A	N/A	AB 1/29/88 Nowak and Fraus	Plan incomplete. No calcs.	N/A	6445 W. Maple Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	4	3.8	N/A	N/A	83600
WBT	449	Weisman Cleaners	N/A	34	NE	N/A	N/A	AB 11/4/04 Nowak and Fraus	Plan incomplete. No calcs.	N/A	5737 W. Maple Rd.	Owner	N/A	Com.	N/A	100	N/A	N/A	3	2.1	4950	5000	2725
WBT	450	Westfield Office Center	N/A	35	SW	N/A	N/A	AB 10/20/84 Donnolly and Associates	Plan incomplete. No calcs.	N/A	E. of Orchard Lake Rd., N. of Fourteen Mile	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4.8	N/A	N/A	86200
WBT	451	The Sports Club of W. Bloomfield - North	N/A	27	SW	N/A	N/A	REV 12/24/02 Gillet and Associates	Plan incomplete. No calcs.	N/A	E. of Farmington, N. of Maple - N basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	44100
WBT	452	The Sports Club of W. Bloomfield - South	N/A	27	SW	N/A	N/A	REV 12/24/02 Gillet and Associates	Plan incomplete. No calcs.	N/A	E. of Farmington, N. of Maple - S basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	2.7	N/A	N/A	15100
WBT	453	Barwick Park	N/A	33	NE	N/A	N/A	REV 12/1/87 OCDC Giffells Websters	Calcs are included on plan, but crossed out. Included them on the database, possibly incorrect.	N/A	W. of Farmington, S. of Maple	Owner	N/A	Res.	11.08	100	N/A	0.55	4.1	8	72890	80438	140300
WBT	454	Westwood Office Center	N/A	35	SW	N/A	N/A	12/17/86 Kaipio Survey	y	N/A	E. of Orchard Lake Rd., N. of Fourteen Mile	Owner	OCDC, Ch. 18	Com.	2.07	100	0.42	0.63	4	3.8	14626	16558	20500
WBT	455	HCR Manor Care	N/A	33	NE	18-33-200-038	N/A	REV 2/22/89 Donnolly and Associates	Mortgage Survey, no calcs, not complete	N/A	6950 Farmington Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	7	N/A	N/A	137500
WBT	456	Dunhams - Parking	N/A	35	SW	N/A	N/A	REV 4/12/76 Basney and Smith	Some calcs, plans incomplete	N/A	33086 Northwestern Hwy.	Owner	N/A	Com.	2.23	N/A	N/A	0.3	2.4	N/A	N/A	9835	N/A
WBT	457	Dunhams	N/A	35	SW	N/A	N/A	REV 9/24/83 Basney and Smith	Plans incomplete	N/A	33086 Northwestern Hwy.	Owner	N/A	Com.	4	100	N/A	0.3	N/A	N/A	39039	40024	N/A
WBT	458	Sephardic Church	N/A	22	SE	18-22-426-007	N/A	AB 12/8/03 Mickalich and Associates	y	N/A	S. of Orchard Lake Rd. & W. of Walnut Lake	Owner	N/A	Com.	1.44	100	N/A	0.49	3.83	3.4	8261	8308	13350
WBT	459	Lark Country Inn Restaurant	N/A	28	SE	N/A	N/A	REV 7/27/78 Alan Granader	Plans partially complete	N/A	6420-6430 Farmington Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	1.1	1.5	4665	15400	5000
WBT	460	Potomac Towne 1 - basin 1	N/A	28	SE	N/A	N/A	REV 4/9/73 Basney and Smith	Plans partially complete, bad scan	N/A	Richard Run and Potomac Cir.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	4	2.2	51502	56840	40850
WBT	461	Potomac Towne 1 - basin 2	N/A	28	SE	N/A	N/A	REV 4/9/73 Basney and Smith	Plans partially complete, bad scan	N/A	Potomac Run E. and Brett	Owner	N/A	Res.	N/A	N/A	N/A	N/A	6.5	3.7	140219	142919	67900
WBT	462	Potomac Towne 2	N/A	28	SE	N/A	N/A	REV 6/21/73 Basney and Smith	Plans partially complete, bad scan,	N/A	5231 Wright Way S.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	9.75	N/A	326272	326381	N/A
WBT	463	Potomac Village 3	N/A	28	SE	N/A	N/A	ACC 10/23/72 Basney and Smith	plans incomplete, no calcs	N/A	Cedarhurst Dr. and Kingsfield Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3.7	N/A	N/A	53300
WBT	464	Potomac Village 1	N/A	27	NW	N/A	N/A	REV 1/19/71 Basney and Smith	plans incomplete, some calcs	N/A	SW of Farmington and Patrick	Owner	N/A	Res.	312	N/A	N/A	0.25	11	N/A	714394	723107	N/A
WBT	465	Temple Israel	N/A	28	NW	N/A	7717	APP 11/27/77 TMP and Associates	plans incomplete, no calcs	N/A	5725 Walnut	Owner	N/A	Com.		N/A	N/A	N/A	N/A	2.6	N/A	N/A	185000
WBT	487	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	S. of Applewood	Owner	OCDC Ch. 18	Res.	13.1	100	2.5	0.5	7	5.8	77689	77975	82900
WBT	500	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	E of Chimney Hill Dr. - N basin	Owner	OCDC Ch. 18	Res.	24.7	10	4.94	0.5	1.2	N/A	51147	52630	N/A
WBT	501	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	some calcs missing	N/A	E of Chimney Hill Dr. - W basin	Owner	OCDC Ch. 18	Res.	N/A	N/A	N/A	0.5	3	3.7	N/A	N/A	11700

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.8A: West Bloomfield Township Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
446	West Bloomfield Twp. Police HQ	N/A	3800	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	3	N/A	N/A	Dry		Yes. Basin Not Stabilized	Poorly Drained	Tree, Cattail	Cattail	0	Three 8" PVC roof drains.	Verify restrictor. Stabilize slopes and excavate sediment.
447	West Bloomfield Nursing Home - N basin	6050 est	6250	1250 est	N/A	N/A	N/A	1	triangular	N/A	5	N/A	N/A	Wet		Yes. No Pool Depth	N/A	Turf	Algae	0	Aerials for sizing - no outflow visible, expanded since original design, some inflows overgrown.	Unblock pipes, confirm outlet.
448	West Bloomfield Nursing Home - S basin	16800 est	22000	6050 est	N/A	0.4	N/A	3	rectangular	N/A	4	N/A	N/A	Wet		N/A	N/A	Forb, Grasses	Phragmites	0	Smaller basin to the west. Erosion at Inflow 183.	Stabilize W side.
449	Weisman Cleaners	3000	1300	300	N/A	N/A	N/A	N/A	irregular	N/A	2.5	N/A	N/A	Dry Extended Detention		1	Poorly Drained	Turf	Cattail	75	White residue in CB sump to Inflow 184 - maybe from concrete at Discount Tire.	Clean structures.
450	Westfield Office Center	N/A	18000	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2	N/A	N/A	Dry		<1	Poorly Drained, <0.5' Ponding	Turf, Shrub	Cattail	0	Overflows south to stream.	Clean structures.
451	The Sports Club of W. Bloomfield - North	N/A	11025	N/A	N/A	N/A	N/A	N/A	irregular	N/A	3	N/A	N/A	Dry		<1	Poorly Drained, Wetland Plants	Turf, Tree	Buckthorn, Cattail, Phrag.	0	Unrestricted, minor erosion/sediment.	Check restriction req'ts.
452	The Sports Club of W. Bloomfield - South	N/A	5600	N/A	N/A	N/A	N/A	1	irregular	N/A	4	N/A	N/A	Dry		< 1	Poorly Drained, Wetland Plants	Tree, Grass	Cattail	25	CB structure to Inflow 188 needs repair.	
453	Barwick Park	26050	17500	13430	N/A	N/A	N/A	5	irregular	N/A	2	N/A	N/A	Wet		2	N/A	Turf	Algae	25	Litter, geese, 4" sump pump IN, fountain.	Buffer, nutrient control, check for restrictor.
454	Westwood Office Center	6578	5400	735	N/A	N/A	0	N/A	irregular	N/A	3	N/A	N/A	Dry Catchbasin	pipe sloped toward basin serves as outlet? Has 3 in restrictor.	<0.5	Poorly Drained	Turf	No	0	CB blocked, inflows submerged, ponding.	Clean structures.
455	HCR Manor Care	N/A	19500	N/A	N/A	N/A	0	2	irregular	N/A	6	N/A	N/A	Wet Extended Detention		Some, No Pool Depth	Poorly Drained	Turf, Willow	Cattail	0		Clean structures.
456	Dunhams - Parking	5037.5	N/A	2100	N/A	N/A	N/A	N/A	irregular	5	N/A	N/A	N/A	Parking	Basin is a series of 2 smaller basins connected by a 18 in pipe	N/A	N/A	N/A	N/A	0	MH full of water - pump does not appear to be working.	Inspect pump.
457	Dunhams	22692 est.	16300	15768 est.	N/A	N/A	N/A	N/A	rectangular	N/A	2	N/A	N/A	Dry		N/A	N/A	Tree, Cattail, Willow	Willows, Cattail	0	Overgrown, outlet no visible, fenced.	Clean out, clean CB sumps, pre-treat.
458	Sephardic Church	5427	3900	397	1	0.5	0	N/A	oval	N/A	2	N/A	N/A	Dry		Minimal	Poorly Drained	Turf	No	0	Recently stabilized, 6" roof drain.	
459	Lark Country Inn Restaurant	22440	3350	12920	N/A	N/A	0	0.5	rectangular	6	6	N/A	N/A	Wet		3	N/A	Turf, Tree	Algae	75	Sediment, pipes blocked, inflows buried, geese, litter.	Dredge, buffer.
460	Potomac Towne 1 - basin 1	N/A	18550	N/A	1.5	N/A	2	3.5	irregular	5	6	N/A	N/A	Wet		Minimal	N/A	Turf, Shrub, Re	Curly Pondweed, Algae	25	Shading dye, fountain, basin modified in shape, depth, outflow; road crossing; four 4" drains.	Buffer, fertilizer control.
461	Potomac Towne 1 - basin 2	N/A	18350	N/A	2	N/A	3	0.5	irregular	5	3	N/A	N/A	Wet	rip rap overflow from backwater pond.	2	N/A	Grass, Cattail	No	100	Sediment, some algae.	Dredging, uncover pipes; check outflow.
462	Potomac Towne 2	33475 avg	29000	N/A	1	N/A	1	5	irregular	5	3	N/A	N/A	Wet Pumped Detention	outlet pipe to pump station to swale to retention pond 2	Minimal	N/A	Turf, Small Tree	Yes	0	Curly pondweed, geese, some algae; three 4" PVC drains; pump stn.	Buffer.
463	Potomac Village 3	N/A	14500	N/A	N/A	1	N/A	N/A	rectangular		2	N/A	N/A	Dry		1	Poorly Drained	Shrub, Grass	Yes	100	Cattails, overgrown; pipes covered.	Clear cut bottom, clean outflow.
464	Potomac Village 1	N/A	13400	N/A	N/A	N/A	N/A	N/A	rectangular	5	N/A	N/A	N/A	Dry		Minimal	N/A	Turf	No	0	No longer providing detention; electrical boxes; playgrounds.	Clean CB sump.
465	Temple Israel	N/A	71000	N/A	N/A	N/A	5.8	6	irregular		1.5	N/A	N/A	Wet		None Visible - No Pool Depth	N/A	Turf	No	0	Sediment at inflows.	Clean structures, riser pipe to 12" CMP.
487	Chimney Hills Apt.	N/A	14300	N/A	0.5	N/A	N/A	N/A	irregular	5	2	N/A	N/A	Dry		N/A	N/A	Turf	No	0	Storm sewer restricted and backs up into basin. Sand dumped on E bank.	Clean structures, remove stockpile.
500	Chimney Hills Apt.	N/A	15500	N/A	N/A	N/A	N/A	N/A	irregular	5	2	N/A	N/A	Dry	basin 498 also drains to outlet structure	N/A	Hydric	Turf	Purple L., Cattail, Willow	0	Storm sewer restricted and backs up into basin.	Verify restrictor, clean structures.
501	Chimney Hills Apt.	3300	3150	400	N/A	N/A	N/A	N/A	triangular	5	2	110	60	Dry	drains to basin 502 where restrictor is located.	N/A	Hydric, Type C/D	Turf	Cattail, Purple L.	0	Storm sewer restricted and backs up into basin. small basin with no overflow so depth could not be determined.	Verify restrictor.

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.8A: West Bloomfield Township Detention Basin Data (continued)

CVT	BASIN ID	SITENAME	CVT REF	SEC	QTR SEC	SIDWELL	FILE INFO	PLAN INFO	PLAN AVAIL	MAINT AGREE - MENT	LOCATION	ASSET MAINT	ASSET OWNER	LAND USE	CONTRIBUTING ACREAGE (Plan) ac	DESIGN STORM (Plan) yr	ALLOWABLE DISCHARGE (Plan) cfs	RUNOFF COEFF (Plan)	STORE DEPTH (Plan) ft	STORE DEPTH (Field) ft	STORE REQD (Plan) ft^3	STORE PROVD (Plan) ft^3	STORE PROVD (Field) ft^3
WBT	502	Chimney Hills Apt.	N/A	34	NE	N/A	N/A	Ziement and Wozniak BID 4/8/87	y	N/A	E of Chimney Hill Dr. - S basin	Owner	OCDC Ch. 18	Res.	1.767	100	12.14	0.5	3	5.1	35476	36430	46000
WBT	503	Woodcliff on the Lake	N/A	22	NW	N/A	N/A	Herman Frankel AB 8/31/90	Calcs no complete. Some of plans unreadable.	N/A	Panorama Cir., near Orchard Lake and Pontiac Trail	Owner	OCDC, Ch. 18	Res.	N/A	100	N/A	N/A	N/A	3	94546	95370	53000
WBT	514	Perrytown Estates	N/A	28	SE	N/A	N/A	S.J Harb & Assoc. AB 11-26-85	incomplete	N/A	Cedarhurst Dr.	Owner	OCDC, Ch. 18	Res.	4.63	N/A	N/A	0.3	N/A	N/A	8248.75	N/A	N/A
WBT	521	Village Square	N/A	33	SE	N/A	N/A	Ziement and Wozniak AB1-16-98	some	N/A	Village Square Ct.	Owner	OCDC, Ch. 18	Res.	66.58	100	N/A	N/A	N/A	3	N/A	817500	208800
WBT	523	Autumn Ridge Estates	N/A	22	SE	N/A	N/A	Giffels Webster - AB 4/18/88	No calcs	N/A	Autumn Ridge Dr.	Owner	OCDC Ch. 18	Res.	40.36	N/A	N/A	N/A	N/A	6.5	N/A	N/A	80600
WBT	664	Lone Pine Estates	N/A	14	SE	N/A	N/A	N/A	n	N/A	Barcroft Street, near Orchard Lake and Long Lake	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	6.8	N/A	N/A	140350
WBT	666	Bloomfield on the Lake Park	N/A	23	NE	N/A	N/A	N/A	n	N/A	Bloomfield Shore Dr.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	47600
WBT	668	Franklin Oaks 1	N/A	36	SE	N/A	N/A	N/A	n	N/A	7040 Tenhill	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	0.5	N/A	N/A	12500
WBT	670	Franklin Colony Club	N/A	36	SE	N/A	N/A	N/A	n	N/A	Colony Dr.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	2.2	N/A	N/A	73700
WBT	691	Compuware	N/A	34	SW	N/A	N/A	N/A	n	N/A	33200 Maple Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	3.5	N/A	N/A	100100
WBT	692	Hidden Creek	N/A	33	SE	N/A	N/A	N/A	n	N/A	W. of Farmington Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	3.4	N/A	N/A	9200
WBT	693	Brookfield Academy	N/A	25	NW	N/A	N/A	N/A	n	N/A	SE of Middlebelt and Walnut Lake	Owner	N/A	Inst.	N/A	N/A	N/A	N/A	N/A	3.75	N/A	N/A	11250
WBT	694	Middlebelt Estates - E basin	N/A	13	SW	N/A	N/A	N/A	n	N/A	W. of Middlebelt, N. of Stoddard	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	1.4	N/A	N/A	297200
WBT	695	Middlebelt Estates - NW basin	N/A	13	SW	N/A	N/A	N/A	n	N/A	N. of Brentwood Rd.	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	0.5	N/A	N/A	94150
WBT	696	Middlebelt Estates - S basin	N/A	13	SW	N/A	N/A	N/A	n	N/A	S. of Stoddard, W. of Middlebelt	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	273000
WBT	697	Orchard Crest Sub.	N/A	27	NE	N/A	N/A	N/A	n	N/A	NW of Orchard Lake Rd. and Orchard Crest	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	5	N/A	N/A	112100
WBT	698	West Bloomfield Twp. Public Library	N/A	22	SW	N/A	N/A	N/A	n	N/A	Farmington/Walnut Lake Rd.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	3.5	N/A	N/A	15250
WBT	701	Exclusive Fitness	N/A	35	SW	N/A	N/A	N/A	n	N/A	33010 Northwestern Hwy.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	3.2	N/A	N/A	5100
WBT	703	Pizza Hut	N/A	35	SW	N/A	N/A	N/A	n	N/A	33000 Northwestern Hwy.	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	2.1	N/A	N/A	1300
WBT	901	Ridgewood Pt. - N basin	N/A	28	NW	N/A	N/A	Record Drawings 12/6/79 Giffels-Webster	plans incomplete. no calcs	N/A	Pinetree Dr. - N pond	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	2.6	N/A	N/A	26200
WBT	902	Brynmawr Condo	N/A	34	SE	N/A	N/A	N/A	n	N/A	Fourteen Mile and Orchard	Owner	N/A	Res.	N/A	N/A	N/A	N/A	N/A	4.9	N/A	N/A	72000
WBT	903	Maple Place - E basin	N/A	32	NE	N/A	N/A	N/A	Plan incomplete. No calcs.	N/A	Maple Lakes	Owner	OCDC, Ch. 18	Res.	N/A	N/A	N/A	N/A	N/A	3.8	N/A	N/A	120900
WBT	909	Tam-O-Shanter - basin B	N/A	23	SW	N/A	N/A	N/A	n	N/A	N. of Walnut Lake, SE basin	Owner	N/A	Com.	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	13700

– If all of the plan review information for a basin is blank, then there was no plan information available.

Table 8.8A: West Bloomfield Township Detention Basin Data (continued)

BASIN ID	SITENAME	TOP AREA (Plan) ft^2	MID AREA (Field) ft^2	BOTTOM AREA (Plan) ft^2	FREE BOARD (Plan) ft	FREE BOARD (Field) ft	POOL DEPTH (Plan) ft	POOL DEPTH (Field) ft	BASIN SHAPE (Plan)	SIDE SLOPE (Plan) (H : 1)	SIDE SLOPE (Field) (H : 1)	LENGTH (Plan) ft	WIDTH (Plan) ft	BASIN TYPE (Field)	COMMENTS (Plan)	SEDIMENT (Field) ft	SOILS (Field)	VEG CLASS (Field)	VEG INDICATOR (Field)	EXP CAP (Field) %	COMMENTS (Field)	RECOMMENDATIONS (Field)
502	Chimney Hills Apt.	N/A	9000	N/A	N/A	N/A	N/A	N/A	irregular	5	2	N/A	N/A	Dry	last basin in series. All basin connected to this basin.	N/A	Hydric	Turf	Cattail, Purple L., Willow	0	Storm sewer restricted and backs up into basin. Restrictor installed at beehive.	
503	Woodcliff on the Lake	N/A	17650	N/A	N/A	1	N/A	1	irregular	6	2.5	N/A	N/A	Dry		Erosion At Inflow 334	N/A	Wetland	Cattail, Purple L.	0	Flows bypass restrictor - not grouted in, Inflow 333 buried.	Repair end section Inflow 334, clean structures, Grout restrictor in place.
514	Perrytown Estates	N/A	21300	N/A	N/A	N/A	N/A	N/A	rectangular	N/A	N/A	N/A	N/A	Wetland		N/A	N/A	Wetland, Grass		0	Overgrown. No outflow on plans and none found. Site inaccessible.	Clean structures. Verify storage.
521	Village Square	N/A	69600	N/A	N/A	2	N/A	3.5	irregular	N/A	3	N/A	N/A	Wet		N/A	N/A	Turf	Purple L.	0	No Outflow found. Five geese killed.	Verify Outflow. Clean structures.
523	Autumn Ridge Estates	N/A	12400	N/A	N/A	N/A	N/A	N/A	irregular	N/A	2	N/A	N/A	Wetland		N/A	N/A	N/A		0	No outlet found. Inflows 374 and 375 not found. Area from aerial.	Verify outflow/restrictor, Repair end section Inflow 371. Clean structures.
664	Lone Pine Estates		20650			N/A		N/A			3			Dry		Some At Outflow	Underwater, Hydric	Turf, Tree, Forb	Cattail, Willows	0	Outlet structure has settled, completely obstructed by debris, ES separated, no restriction, erosion around outlet, pond aerated	Verify restrictor, rebuild outlet.
666	Bloomfield on the Lake Park		47600			1		N/A			2			Wet		N/A	Underwater, Hydric	Turf, Tree	Algae	0	Stream downstream of weir is badly eroded.	Fix west side inlet, receiving stream will need stabilization treatment.
668	Franklin Oaks 1		25000			N/A		3			4			Wet		N/A	N/A	Turf, Shrub, Tree		0	Fountain. No inflows, outlet weir needs repair.	Repair outlet weir. Verify that there are no inflow pipes - if so, unbury.
670	Franklin Colony Club		33500			1		5			5			Wet		Some at structures	N/A	Turf	no	0	Fountain.	Verify restrictor. Clean structures.
691	Compuware		28600			N/A		N/A			var			Dry		Est. 0.5	Poorly Drained	Turf	Cattail, Phragmites	0	Strong odor of decay organics and oil sheen at Inflow 1289 from Kroger grease bin. Litter.	Investigate illicit discharge.
692	Hidden Creek		2700			N/A		N/A			var			Dry Extended Detention		N/A	Some Sand - Type B	Hydroseed	No	0	Recently constructed - hydroseeded.	
693	Brookfield Academy		3000			N/A		N/A			var			Dry		Minimal	Poorly Drained, Ponding	Turf, Tree	Cattail	100	W. side unvegetated but seeded.	
694	Middlebelt Estates - E basin		212250			N/A		3			var			Wet		3	N/A	Turf, Tree, Forb	Cattail	0	Natural pond. Rectangular weir Outflow to drop box structure.	Clean structures.
695	Middlebelt Estates - NW basin		188300			N/A		0.5			var			Wetland		Yes	N/A	Turf, Tree	Cattail, Phragmites	0	Natural wetland.	Clean structures.
696	Middlebelt Estates - S basin		136500			N/A		3			var			Wet		No Pool Depth	N/A	Turf, Shrub	Phragmites	0	Opening at bottom of drop box structure acts as restrictor.	
697	Orchard Crest Sub.		22400			N/A		3			var			Wet		No Pool Depth	N/A	Turf, Tree	Algae, Cattail	0	Fountain. 4' fence.	Verify restrictor. Add vegetative buffer.
698	West Bloomfield Twp. Public Library		4350			0.9		2			var			Wet Extended Detention		Est. 0.5'	N/A	Sedge, forbs, turf	canary grass, cattail, algae	0	Algae.	Verify restrictor.
701	Exclusive Fitness		1600			N/A		N/A			var			Dry		1	Poorly Drained	Turf		0		Clean structures.
703	Pizza Hut		620			1		N/A			var			Dry		0.5	Type B/C	Turf	No	0	No restrictor. No plans/calcs.	Verify restrictor.
901	Ridgewood Pt. - N basin	N/A	10100	N/A	N/A	N/A	N/A	3	irregular	N/A	5	N/A	N/A	Wet	North and south basins connected.	Minimal	N/A	Turf		25	Copper sulfate algaecide applied, 8" board in outflow, permit for new stone shoreline and day lilies.	Buffer.
902	Brynmawr Condo		14700			1.2		2			2			Wet		N/A	N/A	Turf	Algae, Excessive Aquatics	0	Fountain.	Verify restrictor, buffer.
903	Maple Place - E basin	N/A	31800	N/A	N/A	N/A	N/A	8	irregular	5	2.3	N/A	N/A	Wet		N/A	N/A	Turf	Some Algae	0	Algaecide applied; fountain; connected unrestricted to basin 419. Goose droppings.	Veg. buffer. Goose and nutrient control.
909	Tam-O-Shanter - basin B		13700			1		7			3			Wet		None Visible	N/A	Turf	No	0	Blue dye.	Buffer.

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Table 8.8B: West Bloomfield Township Detention Basin Inflow Data

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	393	58	High water elev.	SW corner	SW corner	24	6	Concrete	Concrete	968	24" conc. not visible.
WBT	393	59		SE corner		24		Concrete		967.5	
WBT	393	60	High water elev.	NE corner	NE corner	18	N/A	Concrete	Concrete	968.6	Under water.
WBT	393	61		W side		15		Concrete		967.5	
WBT	394	62	Storm.	NW corner	NW corner	N/A	N/A	N/A	Concrete	N/A	Sediment.
WBT	394	63	Storm.	NE corner	NE corner	N/A	48	N/A	Concrete	N/A	Sediment.
WBT	395	65	Storm.	SW corner	SW corner	12	12	N/A	CMP	942.35	Good structurally, litter, sediment.
WBT	395	1004	N/A		NW corner		6		PVC		Good.
WBT	396	67	Storm.	N side	N side	N/A	27	Concrete	Concrete	896.86	OK.
WBT	397	68	Storm.	N side	N side	N/A	12	Concrete	Concrete	901.08	OK.
WBT	397	69	Storm.	S side	S side	N/A	15	Concrete	Concrete	900.54	2" sediment.
WBT	397	70	Storm.	NW corner	NW side	N/A	12	ductile iron? (roof drain)	Concrete	901.85	OK.
WBT	399	72	Storm.	East	E side	24	24	Concrete	Concrete	886.55	OK.
WBT	399	1025	Storm.		E part of S. side		6		PVC		Erosion, residue, drains car repair/wash.
WBT	400	77	Unrestricted pipe from basin 401.	N end	N side	12	12	Concrete	CMP	890.1	OK.
WBT	400	1022	Stone swale.		SW corner		N/A		Stone		Black residue from asphalt sealant.
WBT	400	1023	Storm.		SE corner		8		RCP		OK.
WBT	401	78		NW corner		12		Concrete		891	
WBT	402	79		NW corner		N/A		N/A		886.05	
WBT	402	80	Storm.	East	NE corner	N/A	18	N/A	Concrete	886.5	8" sediment.
WBT	402	81	Storm.	NE corner	NE corner	N/A	18	N/A	Concrete	886.77	OK.
WBT	402	82	Storm.	NW corner	N end	27	27	N/A	Concrete	885.7	1' sediment.
WBT	402	1029	Riprap spillway.		SW corner		96 wide		Riprap		OK.
WBT	402	1030	Storm.		SW corner		21		Concrete		4" sediment.
WBT	403	83	Storm.	N end	N side	N/A	36	N/A	Concrete	881.81	OK.
WBT	403	84	Storm from wetland.	SW corner	SW corner	N/A	15	N/A	Concrete	883.59	OK.
WBT	404	1028	Storm.		SW corner		24		Concrete		50% underwater.
WBT	405	85		NW corner		30		N/A		N/A	
WBT	405	1012	Swale.		SW corner		60 wide		Grass		OK.
WBT	406	86		NW corner		15		N/A		967.68	
WBT	406	1011	Swale.		SW corner		60 wide		Grass		OK.
WBT	407	87	Storm.	NW corner	SW corner	12	12	Concrete	Concrete	932.03	OK.
WBT	407	88	Storm.	SW corner	SE corner	12	12	Concrete	Concrete	931.87	6" sediment, veg.
WBT	407	89	Storm.	NE corner	N side	12	12	Concrete	Concrete	931.65	OK.
WBT	408	90	Storm.	NE corner	N side	15	15	Concrete	Concrete	880.5	Half submerged.
WBT	408	91		SE corner		12		Concrete		881	
WBT	409	92	Storm.	W side	SW corner	24	24	Concrete	Concrete	922.04	OK.
WBT	409	93	Storm.	S side	W side	21	21	Concrete	Concrete	919.69	OK.
WBT	412	99	Storm to CB.	from NW corner	from NW to middle	15	N/A	N/A	Concrete	945.5	OK.
WBT	412	100	Storm to CB.	from NE corner	from SW to middle	12	12	N/A	Concrete	945.5	2" sediment.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.8B: West Bloomfield Township Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	413	104	Storm.	NW corner	NW corner	12	12	Concrete	Concrete	896.71	OK.
WBT	413	1027	Storm.		E side		12		Concrete		1" x 3" stone eroded.
WBT	414	114	Storm.	E side (e6)	E side	12	12	Concrete	Concrete	911.5	OK.
WBT	414	115	Storm.	E in sediment basin upstream (es14)	S of sediment trap	27	18	Concrete	Concrete	917.75	OK.
WBT	414	116	Storm.	N end of the sediment basin upstream (es3)	N side of sediment trap	18	18	Concrete	Concrete	919	OK.
WBT	415	130	Storm.	NW corner (es6)	NW corner	12	12	Concrete	Concrete	919.97	Blocked.
WBT	415	131	Storm.	W side (es7)	W side	21	21	Concrete	Concrete	918.02	4" sediment.
WBT	415	132	Storm.	N end of basin (es5)	N side	N/A	18	N/A	Concrete	920.1	6" sediment.
WBT	416	135	Storm.	SW corner (es3)	SW corner	18	18	Concrete	Concrete	924.9	OK.
WBT	416	136	Storm.	W side (es2)	W side	18	18	Concrete	Concrete	925.1	OK.
WBT	417	137	Storm.	SW corner	SW corner	24	24	N/A	Concrete	894.63	OK.
WBT	417	138	Storm.	NW corner	NW corner	15	15	N/A	Concrete	894.61	OK.
WBT	418	139		NW corner		15		N/A		N/A	
WBT	418	140		S side		12		N/A		902	
WBT	419	143	Storm.	S end, N pond	SW corner	15	N/A	N/A	N/A	N/A	Underwater.
WBT	419	144		W end, N pond		24		N/A		N/A	
WBT	420	145	Storm.	W end	W side	24	24	N/A	Concrete	895.68	2" sediment.
WBT	420	146	Storm.	E end	E side	12	12	N/A	N/A	895.42	5" sediment/cattails.
WBT	422	151	Pipe to West beehive.	NW corner	NW corner	18	18	Concrete	Concrete	RIM 48.47	OK.
WBT	422	1013	Pipe to East beehive.	NE corner	NE corner	12	12	Concrete	Concrete	RIM 45.8	OK.
WBT	424	154	N/A	S side	NE corner	18	18	CMP	CMP	882.5	Rusty deposits - groundwater?
WBT	424	1018	N/A		SE corner		12		Concrete		Buried.
WBT	424	1019	N/A		SW corner		12		Concrete		Overgrown.
WBT	425	157		SW corner				swale		N/A	
WBT	426	155		NE corner		8		PVC		890.66	
WBT	426	156	Storm.	SE Corner	SE corner	12	12	Concrete	Concrete	890.77	Half buried.
WBT	427	158		S side		48		N/A		N/A	
WBT	427	1009	Swale from basin 462.		NW corner		96 wide		Stone		
WBT	428	1035	Storm.		NW side		27		Concrete		6" sediment, whitish discharge.
WBT	429	159		N side		18		N/A		977.5	
WBT	429	160	Pipe.	E side	E side	12	12	N/A	Concrete	978	OK.
WBT	430	162	Storm.	N side	N side	12	12	N/A	Concrete	904.66	OK.
WBT	430	163	Storm.	W side	NW corner	18	24	N/A	Concrete	905.12	OK.
WBT	430	164		SW corner		N/A		N/A		905.37	
WBT	431	165		SW corner		12		N/A		910.89	
WBT	431	166	Storm.	NW corner	NW corner	12	15	N/A	Concrete	911.23	5" sediment.
WBT	432	167	Storm.	S end	S side	N/A	21	N/A	Concrete	907.28	10" sediment.
WBT	432	168		N end		12		N/A		907.83	
WBT	433	169	Storm.	NW end	NW side	12	12	N/A	Concrete	904	Some algae.
WBT	433	170	Storm.	SW end	SW side	12	12	N/A	Concrete	904.1	OK.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.8B: West Bloomfield Township Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	433	171	Storm.	E end	E side	N/A	21	N/A	Concrete	902.32	OK.
WBT	437	172	Storm.	N side	N side	42	42	N/A	Concrete	925.45	6" sediment.
WBT	437	173	Storm.	W side	W side	24	24	Concrete	Concrete	INV 926.35	Underwater.
WBT	438	1031	Storm.	W side	W side	24	N/A	Concrete	N/A	INV 924.4	Underwater.
WBT	440	1055	Not on plan.		NE corner		8		HDPE		OK.
WBT	441	177	Storm.	N side	N side	24	24	N/A	HDPE	894.89	OK.
WBT	442	178	Storm.	W side	W side	12	12	N/A	Concrete	878.15	OK.
WBT	442	179	Storm.	SW corner	SW corner	30	30	N/A	HDPE	878.16	OK.
WBT	443	283		SW corner		12		N/A		959.89	
WBT	443	284		NW corner		15		N/A		960.09	
WBT	443	288		Northern NW corner		15		N/A		959.45	
WBT	443	1269	Storm.		SW side		12		CMP		OK
WBT	443	1271	Storm.		W side		60		Concrete		some curb out, erosion
WBT	444	1263	Storm.		N side		15		Concrete		Underwater - vegetation blocking
WBT	444	1265	Storm.		N Side		6		Plastic		OK
WBT	444	1267	Storm.		SE Side		12		CMP		erosion above and at bottom
WBT	446	286	Storm.	SW corner	NW corner	12	15	N/A	Concrete	963.08	Half buried.
WBT	447	180		NW corner				swale		N/A	
WBT	447	181	Storm.	SW corner	SW corner	15	N/A	Concrete	N/A	945.5	Underwater.
WBT	448	182		NW corner		15		Concrete		947.45	
WBT	448	183	Pipe from small basin to the west.	E side	W side	15	36	Concrete	Concrete	947.82	Separated end-section due to slope erosion.
WBT	449	184	Storm.	N side	N side	12	12	Concrete	Concrete	902.76	8" sediment.
WBT	450	185	Storm.	W side	SW corner	15	15	Concrete	Concrete	883	25% blocked.
WBT	450	186	Storm.	E Side	E side	21	21	Concrete	Concrete	883.3	4" sediment.
WBT	451	187		NW corner		6		N/A		N/A	
WBT	451	1015	Short swale from parking lot.		E side		24		Gravel		Minor erosion.
WBT	451	1017	Inflow.		W half of S side		30		Concrete		12" sediment.
WBT	452	188	Pipe to headwall.	SW corner	SE corner	12	12	Concrete	Concrete	946.06	6" sediment.
WBT	452	189	Pipe to headwall.	SW Corner	SE corner	12	12	Concrete	Concrete	946.21	2" sediment.
WBT	452	1014	N/A		NE corner		12		Concrete		OK.
WBT	453	190	Storm.	NW corner (es1)	NW corner	15	12	Concrete	CMP	928.9	Bottom rusted.
WBT	453	191	Storm.	NE corner (es2)	NE corner	12	N/A	Concrete	N/A	928.7	Underwater.
WBT	453	192	Storm.	SW corner (es3)	SW corner	15	N/A	Concrete	N/A	929.45	Underwater.
WBT	454	193		E corner		12		Concrete		884.4	
WBT	454	194		NW corner		12		Concrete		884.5	
WBT	455	195	Storm.	N. Corner	N side	15	N/A	Concrete	N/A	917.4	Buried.
WBT	455	196	Storm.	E corner	E side	12	24	Concrete	Concrete	916.58	7" sediment.
WBT	457	197	Storm.	W side	W side	18	18	Concrete	CMP	887.5	OK.
WBT	458	198	Storm.	SW corner	SW corner	12	12	Concrete	Concrete	926.43	OK.
WBT	459	199		E side		15		Concrete		947.22	

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Table 8.8B: West Bloomfield Township Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	459	200		NW corner		12		Concrete		947.5	
WBT	459	1010	Buried.		S side		12		CMP		Sediment covered.
WBT	460	201		NE corner		12		Concrete		948.27	
WBT	460	202	Smaller pipe than design from 1 CB.	NE side	NE side	15	4	Concrete	PVC	949.03	15" outfall not visible.
WBT	460	203		SE side		12		Concrete		949.07	
WBT	460	1005	Spillway.		N side		96 wide		Asphalt		Minor erosion.
WBT	460	1006	Spillway.		NE side		96 wide		Concrete		New, minor erosion.
WBT	460	1020	Discharges to top of bank.		NW corner		6		PVC		Minor erosion.
WBT	461	204		N side		24		Concrete		943.58	
WBT	461	205		S side		12		Concrete		943.72	
WBT	461	206	Pipe appears to be outflow - unconfirmed.	SW corner	SW corner	15	12	Concrete	Concrete	894.4	Sediment.
WBT	461	207		SE corner		12		Concrete		944.5	
WBT	461	208	Pipe.	NW corner	NW corner	N/A	12	swale	Concrete	N/A	Sediment, plans show spillway.
WBT	461	1007	Pipe not on plan.		E side		15		Concrete		Sediment.
WBT	462	209		NW corner		30		Concrete		N/A	
WBT	463	210	Swale (18" pipe not seen).	NW corner	NW side	N/A	96 wide	swale	Turf	N/A	OK.
WBT	464	211		W side		24		swale		N/A	
WBT	464	1008	Pipe to CB.		Center		15		Concrete		OK.
WBT	465	212	Storm.	NW	NE corner	27	N/A	Concrete	N/A	977	Underwater.
WBT	465	213	Storm.	SW corner	NE corner	N/A	N/A	Concrete	N/A	977.5	Underwater.
WBT	465	214	Storm.	E side	SW corner	12	N/A	Concrete	N/A	977.5	Underwater.
WBT	503	333	Storm.	SE corner	SE corner	12	12	Concrete	Concrete	N/A	Completely buried.
WBT	503	334	Storm.	NE corner	W side	24	24	Concrete	Concrete	957.85	End-section separated.
WBT	503	335	Storm.	N end	N end	18	24	Concrete	Concrete	N/A	50% underwater.
WBT	514	338	Pipe from CB.	S end	S corner	12	12	N/A	Concrete	969.4	Not found at basin.
WBT	521	367		S side		8		Concrete		N/A	
WBT	521	368		SW corner		N/A		Concrete		N/A	
WBT	521	369		W side		N/A		Concrete		N/A	
WBT	521	370		NW corner		8		Concrete		N/A	
WBT	523	371	Storm.	NE Corner	NE corner	12	12	Concrete	Concrete	908.14	End-section separated.
WBT	523	372	Storm.	W side	W side	12	12	N/A	Concrete	N/A	End-section eroded.
WBT	523	373	Storm.	S side	S side	12	12	Concrete	Concrete	901.54	1" sediment.
WBT	523	374		SE Corner		12		Concrete		901.96	
WBT	523	375		NW corner		12		Concrete		904.05	
WBT	523	376	Storm.	S side	S side	15	15	Concrete	Concrete	904.58	1" sediment.
WBT	523	377	Storm.	SW side	SW corner	18	18	Concrete	Concrete	907.27	6" sediment.
WBT	664	1257	Swale.		N end		N/A		N/A		OK.
WBT	666	1258	Storm.		NE side		18		Plastic		25% blocked by sod. Connected to roadside ditch. Verify connection to nearby lake.
WBT	666	1320	Storm.		W side		12		Concrete		Separated, needs repair.
WBT	670	1260	Storm.		N end		30		CMP		75% blocked with sediment.
WBT	691	1287	Storm.		SW corner		32		Concrete		Algae.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.8B: West Bloomfield Township Detention Basin Inflow Data (continued)

CVT	BASINID	INFLOWID	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	691	1289	Storm.		NW corner from Kroger		18		Concrete		ODOR, algae, 2" sediment, oil sheen.
WBT	691	1291	Storm.		W half of N side		24		Concrete		6" sediment.
WBT	692	1285	Storm.		NE corner		18		Concrete		25% blocked with sediment.
WBT	693	1283	Storm.		W side		15		RCP		OK.
WBT	694	1277	Storm.		W side		36		Concrete		Buried.
WBT	694	1279	Storm.		N end		24		CMP		25% blocked.
WBT	694	1281	Storm.		S side		15		Concrete		2" sediment.
WBT	695	1275	Storm.		N end		N/A		CMP		Buried.
WBT	696	1273	Storm.		W side		24		Concrete		OK, end-section separated.
WBT	697	1321	Storm.		W side		24		CMP		OK.
WBT	698	1261	Riprap		N. Side		36		Riprap		OK
WBT	698	1319	Storm.		N. Side		27		Concrete		OK
WBT	701	1293	Asphalt spillway.		NW corner		48		Asphalt		OK.
WBT	701	1295	Storm.		NE corner		12		Concrete		Buried.
WBT	901	161	Pipe to stone channel.	W side	W side	18	15	N/A	Concrete	975.98	OK, pipe to stone swale.
WBT	902	1021	Storm.		E side		N/A		Concrete		Underwater.
WBT	903	141	Storm.	SW end	E side	15	N/A	N/A	N/A	N/A	Underwater.
WBT	903	142	Storm.	S end	S side	18	est. 21-24	N/A	Concrete	N/A	Underwater.
WBT	903	1301	Culvert from basin 419.	SE corner from basin 419	NW corner	24	96 x 72 arch culvert	CMP	CMP	954.3	OK.
WBT	909	1053	Storm from basin 440.		NW corner		12		HDPE		OK.

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– If all of the field assessment information for an Inflow, Outflow, or Overflow is blank, then it was not found in the field.

Table 8.8C: West Bloomfield Township Detention Basin Outflow Data

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	393	34	15" CMP	12" riser to 15" PVC to overflow structure.	S side	S side	15	12	CMP	HDPE	970	OK. 6" sediment at standpipe.
WBT	394	1008	15" - 8" restrictor	Unrestricted pipe to overflow structure.	SE corner	SE corner	8	15	Concrete	Concrete	N/A	OK.
WBT	395	1001	N/A	12" unrestricted.	SE corner	SE corner	12	12	N/A	CMP	INV 942.29	Good.
WBT	396	35	10" conc. with 4.23" steel restrictor	Pipe to MH.	W side	NW corner	4.23	36	Concrete	Concrete	896.96	50% blocked.
WBT	397	36	8" conc. with 3.39" steel restrictor	8" restrictor in 15" conc.	NW side	NW side	3.39	8	Concrete	Concrete	901.51	OK.
WBT	399	41	12" conc. pumped to grade and discarded to stream at 400 cfs max.	18" to pump stn to 12" PVC to ditch.	SW corner	W side	12	12	Concrete	Concrete	884.5	Separated pipe, unrestricted.
WBT	400	44	12" pipe with 6" restrictor	12" CMP with 8" restrictor.	S side	S side	6	8	CMP	CMP	889.3	OK.
WBT	401	45	12" pipe		S side		12		Concrete		890.5	
WBT	402	46	4" perforated drain under riprap	4" PVC to 2.5' x 2.5' overflow to OVER 31.	SE corner	SE corner	4	4	N/A	PVC	885.39	Partially blocked.
WBT	403	47	8" perforated drain under rip rap	Riprap covered pipe to overflow structure.	SW corner	SW corner	8	8	N/A	PVC	881.7	50% blocked.
WBT	404	50	4" perforated drain under riprap		NE corner		8		N/A		884.95	
WBT	405	48	12" outlet pipe with 6" orifice		S corner		6		N/A		963.87	
WBT	406	49	24" outlet pipe with no restriction to Basin 405		NW corner		24		N/A		967.68	
WBT	407	51	18" concrete pipe with 4" restrictor d/s of outlet ES	Unrestricted pipe.	SE corner	N side	4	18	Concrete	Concrete	930.51	Inlet partly covered by 8" board.
WBT	408	52	12" concrete with no restrictor. Possible that restrictor is located in d/s manhole structure	CB to pipe.	NW corner	middle	12	N/A	Concrete	N/A	880	Blocked.
WBT	409	53	24" conc. with 8" restrictor	Unrestricted pipe.	E side	NE corner	8	24	Concrete	Concrete	919.45	OK.
WBT	412	61	6" pipe	6" pipe.	NE corner	S side	6	6	N/A	N/A	945.5	OK.
WBT	413	64	3" temp. restrictor to be replaced appropriate vortex flow regulator	36" wide riser to 12" conc. to Outflow 1011.	E side	E side	3	12	Concrete	Concrete	896.22	OK.
WBT	413	1011	riser structure	30" riser to restricted 12" pipe to Overflow 44.	NE corner	NE corner	N/A	N/A	N/A	Concrete	RIM 903.52AB, INV 896.22AB	OK.
WBT	414	70	15" outlet with 6" restrictor	Unrestricted pipe.	SE side	SE corner	6	15	Concrete	Concrete	910.9	OK.
WBT	415	78	Outflow is a 36" CMP riser pipe at south end of basin. Recorded elevation is located at top of bar grate?	Three 8" slits in 4' high, 36" wide CMP riser to 15".	S end	S side	36	15	CMP	HDPW	917.49	Partly silted gravel jacket.
WBT	416	84	ES3, 12" pipe with 4" restrictor	Unrestricted pipe.	SE side	SE side	4	12	Concrete	Concrete	924.9	OK - no 4" restrictor.
WBT	417	85	24" pipe at East side, no restrictor on plans	15" pipe with 6" restrictor to overflow.	E. side	E side	12	6	N/A	N/A	894.76	OK.
WBT	418	86	12" pipe at SE. No indication of restrictor on plans		SE corner		12		N/A		901.68	
WBT	419	87	unrestricted culvert to basin 903	8' wide by 6' CMP arch culvert to basin 903.	SE corner	SE corner	24	96 x 72	CMP	CMP	954.3	1-2' sediment and riprap.
WBT	420	88	6" V.C.P.	6" pipe.	SE corner	SE corner	6	6	Clay	Clay	895.56	Bell broken off.
WBT	422	90	12" conc. to CB structure with two inflows. CBs backup into basin.	12" pipe with 6" restrictor where it leaves W beehive.	W side	W side	12	6	Concrete	Concrete	N/A	OK.
WBT	424	92	two 18" CMPs to wetland?	Unrestricted pipe.	NW corner	S side	two 18	18	CMP	CMP	879.8	OK.
WBT	425	1007		Riser in center.		Center		est. 4		PVC		OK.
WBT	426	93	2.5"	12" conc. with 4" restrictor.	SW corner	SW corner	2.5	4	PVC	Concrete	890.78	OK.
WBT	429	1004		Pipe to north pond.		NE corner		15		Concrete		OK.
WBT	430	94		8" restrictor in 21" conc.	SE corner	NE corner	N/A	8	N/A	Concrete	904.08	OK.
WBT	431	1023		12" CMP to overflow structure, 4" restrictor at structure.		SW corner		4		PVC		OK.
WBT	432	1014		Two 3" PVC restrictors to 15" conc.	N end	N side	12	two 3"	N/A	Concrete	907.83	OK.
WBT	433	95		6" PVC and 3" PVC restrictors.	E side	E side	N/A	6 and 3	N/A	Concrete	901.05	OK.
WBT	437	96	12"	Unrestricted 12" CMP to overflow structure.	SE corner	SE corner	12	12	Concrete	CMP	927.04	OK.
WBT	438	97	6" CMP	6" CMP to overflow structure.	N end	N side	6	6	CMP	CMP	925.4	Buried.
WBT	440	99	Outflow is a perforated 36" CMP riser pipe that leads to a 12" pipe	Nine 1" holes in 36" wide CMP riser.	south end	E side	12	9 x 1	N/A	CMP	900.18	Holes blocked.
WBT	441	100	Outflow is a perforated 36" CMP riser pipe that leads to a 12" pipe	12" riser in CMP riser, appears to have hole downstream of riser.	SW corner	E side	12	12	N/A	HDPE	894.43	Unrestricted.
WBT	442	101	Outflow is a 36" perforated 36" CMP riser pipe that leads to 15" pipe	1" hole in CMP riser to 12" HDPE.	E side	E side	15	12	Concrete	CMP	877.87	Holes blocked or too few.
WBT	447	102	3" PVC?		SE side		3		PVC		945.18	
WBT	448	103	4" PVC		NE side		4		PVC		946.65	
WBT	449	104	4" PVC	4" PVC in 3.2' wide riser.	SE side	SE corner	4	4	PVC	PVC	902.85	OK.
WBT	450	105	6"	6" pipe to MH.	SW corner	SW corner	6	6	N/A	N/A	882.5	Buried.
WBT	451	1006		Unrestricted pipe to county drain.		SW corner		N/A		Concrete		6" sediment, debris, cattails.
WBT	452	106	12" conc.	Unrestricted pipe.	S corner	SE corner	12	12	Concrete	Concrete	945.55	OK.
WBT	453	107	24" conc., restrictor located at CB 2 on plans. 12" restrictor	27" to structure.	SE corner	SE corner	12	N/A	Concrete	N/A	927.5	Underwater; unrestricted?
WBT	454	108	Outlet pipe to Orchard Lake Road. 12" pipe slope toward basin, with 3" restrictor in downstream manhole	CB to pipe.	NW corner	middle	3	N/A	Concrete	N/A	884.4	Blocked.
WBT	455	109	42" dia. CMP outlet structure with to 12" CMP	42" dia. riser to 12" CMP.	S side	S side	12	12	CMP	CMP	915.52	OK.
WBT	456	1263		Pump in MH.		SW corner of site in ROW		N/A		N/A		Underwater - does not appear to work.
WBT	458	110	12" CMP in middle of basin, riser pipe	12" CMP with 3" restrictor.	S end of basin	SE corner	12	3	CMP	N/A	923.39	OK.

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Table 8.8C: West Bloomfield Township Detention Basin Outflow Data (continued)

CVT	BASIN ID	OUTFLOW ID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Plan)	LOCATION (Field)	DIAMETER (Plan) in	DIAMETER (Field) in	MATERIAL (Plan)	MATERIAL (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	459	111	12" pipe with a 2" restriction	Pipe to overflow CB.	SW corner	SW corner	2	5	Concrete	C.I.	947	Buried.
WBT	460	112	12" pipe leads to a manhole with a 2' sump with a pump	Riser pipe.	SE corner	SE corner	12	8	Concrete	PVC	947	OK.
WBT	462	113	12" pipe to pump station	Pump station.	SE corner	SE corner	12	N/A	Concrete	N/A	950	Pipe under water.
WBT	463	114	pipe to another retention basin off site	Pipe to aquatic center basin.	SE corner	SE end	6	N/A	Concrete	Concrete	954	Buried.
WBT	464	115	22" CMP with pump		E side		22		CMP		946.6	
WBT	464	1002		Pipe from CB.		Center		15		Concrete		OK.
WBT	465	116	Pipe to Walnut Lake Road, can't determine if its outflow from illegible plans	PVC riser to ditch.	SE side	NW corner	N/A	6	N/A	PVC	977	OK.
WBT	487	165	CB structure, same as inlet, entire structure overflows to basin. 6" restrictor in 12"	Unrestricted pipe.	N side	N side	6	24	Concrete	Concrete	900.87	50% blocked with sediment.
WBT	498	176	15" conc. pipe with 6 or 8" restrictor	Unrestricted pipe.	SE corner	SE corner	8	15	Concrete	Concrete	894.83	50% blocked, end section separated.
WBT	500	178	12" conc. pipe with 8" VCP restrictor	Unrestricted pipe.	SW corner	SW corner	8	12	Concrete	Concrete	893.56	Need to remove veg.
WBT	501	179	12" conc., no restrictor (located downstream)	Unrestricted pipe.	E side	E side	12	12	Concrete	Concrete	893.82	OK.
WBT	502	180	24" conc., with 12" grouted restrictor @ manhole 6 (see plan)	24" pipe to beehive with 4" restrictor at beehive.	S end	S side	12	4	Concrete	Concrete	892.55	OK.
WBT	503	181	24" conc., restrictor located at downstream manhole	24" pipe with 8" restrictor.	S end	S end	24	8	Concrete	PVC/Conc	N/A	Restrictor not grouted in - flows bypassing.
WBT	521	185	12"		SE corner		12		Concrete		N/A	
WBT	664	1254		24" conc.		E side		24		Concrete		ES separated, obstructed.
WBT	666	1256		Notch concrete weir, 40", 1' freeboard.		SE corner		N/A		Concrete		Eroded badly downstream.
WBT	668	1258		6" x 48" opening in wooden weir structure.		SE end		6 x 48		Wood		Rotting - needs repair.
WBT	670	1260		18" CMP.		SW corner		18		CMP		50% Blocked.
WBT	691	1275		15" conc. to 8" PVC at MH.		SE corner		8		PVC		Algae.
WBT	692	1273		36" dia. Perforated riser to 4" restrictor.		SE corner		4		CMP		OK.
WBT	693	1271		6" CMP to ditch.		N end		6		CMP		OK.
WBT	694	1269		16" x 8" opening in in rect. weir to drop box to 12" conc.		SE corner		16 x 8		Concrete		OK.
WBT	695	1267		1.5' x 0.5' opening in 48" rect. conc. weir to drop box to 30" conc.		SE corner		18 x 6		Concrete		OK.
WBT	696	1305		Opening at base of box drop structure with 1.3' x 0.7' opening at top weir.		E side		4 x 5		Concrete		OK.
WBT	697	1265		21" conc. to MH to 21".		SE corner		21		Concrete		75% blocked due to fence in front, no restrictor.
WBT	698	1261		36" CMP, perforated riser to 15" CMP to overflow		S Side		15		CMP		OK
WBT	701	1277		6" CI pipe.		SW corner		6		C.I.		OK.
WBT	703	1279		12" CMP to CB.		SW corner		12		CMP		OK.
WBT	901	1005		Pipe with 8" board to raise water.		N side		15		Concrete		OK.
WBT	902	1009		Est. 36" to MH.		S side		N/A		N/A		Underwater; unrestricted?
WBT	903	1012		4" PVC riser to CB.		E side		4		PVC		OK.
WBT	909	1303		36" CMP riser with gravel and thirteen 1" holes.		S end		thirteen 1"		CMP		OK.

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Table 8.8D: West Bloomfield Township Detention Basin Overflow Structure Data

CVT	BASINID	OVERFLOWID	DESCRIPTION (Plan)	DESCRIPTION (Field)	LOCATION (Field)	ELEVATION (Plan)	CONDITION (Field)
WBT	393	1001		2' wide beehive to structure.	S side		Good.
WBT	394	29	Spillway	7' wide structure to 27" concrete.	SE corner	924.5	OK.
WBT	396	30	Spillway	Grass spillway in berm.	NW corner	903.23?	OK.
WBT	402	31	overflow structure is a 3x3 foot grate at 100yr elevation	Primary 2 yr - 2.5' x 2.5' overflow structure to 12" to OVER 1013.	SE corner	890.5	OK - angled grate cover.
WBT	402	1013		Secondary 10 yr - 12" to 2.5' x 2.5' overflow structure to 21" concrete.	SE corner		OK.
WBT	403	32	overflow structure is a 3x3 foot grate at 100yr elevation	2-yr overflow - 36" x 36" structure to 15" to Overflow 1012.	SW corner	886.2	OK.
WBT	403	1012		10-yr secondary - 36" x 36" structure to 24" concrete.	SW corner		OK.
WBT	404	34	100 year overflow structure is a 3x3 ft grate.	2-yr overflow - 36" x 36" structure to 6" to Overflow 1011.	NE corner	888.8	OK.
WBT	404	1011		10-yr secondary - 36" x 36" structure to 27" concrete.	NE corner		OK.
WBT	405	33	CB at 973.2 serves as overflow?			973.2	
WBT	407	35	grassed spillway			936	
WBT	407	1064		48" wide structure to approx. 30" pipe.	N side		OK.
WBT	408	36	Emergency concrete spillway with end wall			887	
WBT	409	37	Spillway, grassed and ripraps	48" wide structure to 24" concrete to stream.	NE corner	925	OK.
WBT	413	44	concrete Overflow structure	30" riser 0.9' above Outflow 1011 to 12" concrete.	NE corner	904.52	OK.
WBT	414	46	Rip rap overflow spreader on SE side	48" structure to 21" concrete.	SE corner	918	OK.
WBT	415	51	sodded overflow	36" wide CMP riser with gravel jacket to 15" HDPE.	S side	N/A	OK.
WBT	416	54	overflow structure is a 12 pipe a foot above 100 year elevation	48" wide structure to 18" pipe.	SE side	926.47	OK.
WBT	417	1005		60" wide structure to 24" pipe.	E side		Sump filled with sediment.
WBT	431	57	overflow structure below 100 year elevation	24" wide structure to 12" concrete.	SW corner	912.92	OK.
WBT	432	1014		15" to 21" structure to 12" concrete.	N side		OK.
WBT	433	58	N/A	21" structure to 15" concrete.	E side	908.48	OK.
WBT	437	61	Overflows into wetland/stream	24" overflow structure to 48" CMP.	SE corner	926.13	6" sediment.
WBT	438	62	Overflow discharges into stream	6" CMP to 27" structure to 18".	N side	923.45	OK.
WBT	440	64	Riser pipe, 36" CMP with grate	36" CMP riser to 12".	E side	901.33	OK.
WBT	441	65	Riser pipe, 36" CMP with grate	36" wide CMP riser not functioning as overflow, 12" HDPE riser inside.	E side	896.58	No restrictor visible.
WBT	442	66	Riser pipe, 36" CMP with grate	36" wide CMP riser to 12" HDPE to lake/wetland.	E side	879.5	OK.
WBT	453	1008		Swale to 6' wide structure to 36" concrete.	SE corner		OK.
WBT	454	1009		Pipe to MH.	NW corner		Half buried.
WBT	457	67	Nothing but elevation on plans			891.5	
WBT	458	68	36" Riser Pipe			927.22	
WBT	458	1010	riprap spillway at NE corner	Riprap spillway.	NE corner	927.56AB	OK.
WBT	459	1003		Beehive to 12 in.	SW corner		Litter, debris.
WBT	487	108	Beehive at SE corner.	Beehive to 12" concrete.	N side	908	OK.
WBT	502	110	CB to ditch	Beehive to pipe.	S end	894.95	OK.
WBT	503	111	sod overflow	Perforated manhole lid - outflowing pipe underwater.	S end	N/A	OK.
WBT	521	113	5' diameter. MH			N/A	
WBT	691	1265		CB to 15" pipe.	SE corner		OK.
WBT	692	1263		48" dia. riser to 18" concrete.	SE corner		OK.
WBT	696	1306		3' x 3.3' concrete box drop structure to 21" CMP.	E side		OK.
WBT	698	1261		36" CMP riser to a 15" conc.	S side		OK
WBT	703	1267		CB to 15" CMP.	SW corner		OK.
WBT	902	1007		36" to 18" x 24" CB to 15" concrete.	S side		Unrestricted?
WBT	909	1307		36" wide CMP riser to 12" HDPE south.	S side		OK.

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Section 9
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Rouge Main 1-2 Streambank Erosion Inventory and Site Prioritization Report

Prepared for:

Oakland County Drain Commissioner's Office
Beverly Hills
Bingham Farms
Birmingham
Bloomfield Hills
Bloomfield Township
Farmington Hills
Rochester Hills
Southfield
Troy
West Bloomfield Township

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PROJECT SUMMARY

INTRODUCTION

The Rouge River Watershed is under pressure from urbanization, making it vulnerable to heavy loading of non-point source pollutants. One such pollutant is excessive sediment. Although sediment loading is a natural part of a river system, excessive loading can degrade fish and wildlife habitat, destroy wetlands, and reduce the recreational and aesthetic appeal of the river system. In addition, substances such as oils, salts, and nutrients can enter the system attached to sediment particles causing eutrophication and a general decrease in water quality in hydraulically connected lakes and ponds.

The purpose of this project was to identify and prioritize stream bank erosion sites in the Rouge Main 1-2 Subwatershed (excluding the Franklin Branch) and to develop conceptual designs to address streambank erosion at priority sites in order to demonstrate how erosion problems can be mitigated. This project was completed under the direction of the Oakland County Drain Commissioner's office and was supported by a USEPA grant under the Rouge River National Wet Weather Demonstration Project and by ten participating communities. The following communities participated in this study by committing time and resources:

- Village of Beverly Hills
- Village of Bingham Farms
- City of Birmingham
- City of Bloomfield Hills
- Bloomfield Township
- City of Farmington Hills
- City of Rochester Hills
- City of Southfield
- City of Troy
- West Bloomfield Township

KEY PROJECT ELEMENTS

This project involved three key elements: streambank erosion inventory; scoring, ranking, and prioritization of erosion sites; and development of conceptual designs for erosion mitigation. Each of these elements is briefly described below and presented in more detail in subsequent sections of this report.

- **Streambank Erosion Inventory** – Approximately 90 miles of the Rouge River and its tributaries in the Main 1-2 subwatershed were inventoried in this

study. The inventory involved deployment of a two-person crew that traversed every mile of these waterways, by foot or by canoe. The crew recorded information on streambank condition using a standardized form, digitally photographed nearly every site where data were entered, and recorded the position of the field observations using global positioning system (GPS) technology. More than 2,200 reaches and individual erosion sites were inventoried in this manner. All data was compiled in an electronic database and a GIS interface was developed to allow participating communities to search and review the inventory data.

- **Scoring, Ranking, and Prioritization** – After completion of the inventory, each reach and erosion site was scored using a standardized system based on the type of information recorded in the inventory. Because of the urban nature of the study area, priority was given to sites where erosion posed a threat to public safety or infrastructure. However, because all data were compiled in an electronic database, in the future interested parties may rescore or reprioritize the sites using different criteria.

- **Conceptual Designs for Erosion Mitigation** – After reviewing the results of the inventory and site ranking with the participating communities, twelve sites were selected for development of conceptual designs for erosion mitigation. The selected sites represent a range of erosion problems in the Main 1-2 subwatershed and should be useful to the participating communities in the future.

PRODUCTS AND DELIVERABLES

This project yielded several deliverables that will be useful in addressing streambank erosion in the Rouge Main 1-2 subwatershed:

- **Electronic Database** – The electronic database that was compiled from this project contains inventory data and identifies associated digital photographs of the sites. It is expected that this information will be useful to the participating communities as they continue to manage their respective portions of the Rouge River.

- **Data Viewer** – The electronic data viewer enables interested parties to more easily review the inventory data using GIS technology. With the proper GIS platform, the user is able to view data and digital photography by using a simple “point-and-click” approach.

- **Project Report –** The project report documents the inventory and will likely be a useful reference in the future, as work continues to address streambank erosion in the Main 1-2 subwatershed. In addition, it is hoped that the approach used here will inform similar inventory studies elsewhere.

- **Conceptual Designs** – Conceptual designs were developed for 12 sites. These designs will not only help communities understand what can be done to mitigate erosion at those specific sites, but it is hoped that they will also demonstrate various approaches that might be applied elsewhere.

REPORT ORGANIZATION

Following this summary, this report is organized into three major sections:

- Part 1 provides a detailed description of the Rouge Main 1-2 Streambank Erosion Inventory and Prioritization Project.

- Part 2 contains community-specific summaries of the streambank inventory for each of the 10 participating communities.

- Part 3 contains conceptual designs for 12 priority erosion sites.

PART I:
STREAMBANK EROSION INVENTORY AND SITE PRIORITIZATION SUMMARY REPORT

1. INTRODUCTION

Part 1 of this report presents a summary of the Streambank Inventory and Site Prioritization for stream and river reaches in the Main 1-2 Subwatershed of the Rouge River. Limno-Tech, Inc. (LTI) conducted the inventory and prioritization in 2004.

Part I is organized into the following major sections:

Section 1	Introduction
Section 2	Inventory Scope
Section 3	Inventory and Scoring Methodology
Section 4	Inventory and Site Prioritization Results

The following sections in this Introduction present a description of the project and the specific project objectives.

1.1 PROJECT OVERVIEW

As a requirement for voluntary stormwater permitting which preceded the Phase II stormwater program, the Main 1-2 Subwatershed Group developed the Main 1-2 Rouge River Subwatershed Management Plan in 2001. One of the plan's seven long-term goals is to "minimize the amount of soil erosion and sedimentation" in the Main 1-2 subwatershed. A specific short-term objective for this goal specified in the plan is to:

> "Identify areas along the river with highly eroding banks and evaluate alternatives to address public and private sites contributing significant sediment to the river."

This goal was established because increased imperviousness due to urbanization of the subwatershed has led to flow variability and increased velocities in the Rouge River and its tributaries. These flow alterations have led to streambank erosion and sedimentation throughout the watershed. In addition to negatively affecting habitat, eroding streambanks can be safety hazards and cause loss of property.

This project is designed to address the objective in the Subwatershed Management Plan. It was funded in part through a grant from U.S. Environmental Protection Agency as part of the Rouge River National Wet Weather Demonstration Project. The following participating partners contributed additional project funds:

- Oakland County Drain Commissioner's Office
- Village of Beverly Hills
- Village of Bingham Farms
- City of Birmingham
- City of Bloomfield Hills
- Bloomfield Township
- City of Farmington Hills
- City of Rochester Hills

- City of Southfield
- City of Troy
- West Bloomfield Township

1.2 PROJECT OBJECTIVES

The purpose of this project is to identify and prioritize streambank erosion sites in the Rouge Main 1-2 Subwatershed. The results of the inventory and site prioritization will be used in later stages of the project to make recommendations that will incorporate best management practices to decrease sediment loading to the river.

The specific objectives of the Streambank Inventory and Site Prioritization are as follows:

- Inventory erosion conditions of stream and river reaches in the Main 1-2 Subwatershed, including documenting sites with Global Positioning System (GPS) coordinates and photographs

- Develop a database of inventory results linked to a Geographic Information System (GIS) for mapping purposes

- Score and rank sites based on erosion severity

- Identify priority sites within each partner community for which conceptual streambank restoration designs will be developed

2. INVENTORY SCOPE

The scope of the streambank inventory, including the process used to identify streams to be inventoried and the final study area, is described in this section.

2.1 STREAM IDENTIFICATION AND SCREENING

The Oakland County Drain Commissioner's Office (OCDC) developed an initial estimate of the length of stream reaches to be inventoried for the project. This original estimate was based on U.S. EPA's Reach File Version 3. Using updated hydrographic data from OCDC and the more detailed National Hydrography Dataset stream reach classification from U.S. EPA and U.S. Geological Society, LTI updated OCDC's estimate.

Maps of the proposed inventory reaches were provided to each community who then had an opportunity to revise the suggested inventory reaches. The final length of stream reaches for the inventory was 89.2 miles. Table 2-1 indicates the final stream miles inventoried in each of the partner communities in the Main 1-2 Subwatershed.

Table 2-1: Length of Inventory Reaches in Each Partner Community

Community	Inventory Stream Length (miles)
Beverly Hills, Village of	3.7
Bingham Farms, Village of	1.4
Birmingham, City of	3.9
Bloomfield Hills, City of	9.1
Bloomfield Township	9.4
Farmington Hills, City of	21.2
Rochester Hills, City of	1.8
Southfield, City of	28.1
Troy, City of	6.4
West Bloomfield Township	4.3
Total Length	**89.2**

2.2 FINAL STUDY AREA

The Streambank Inventory study area, shown in Figure 2-1, is generally defined by on the north and west by the main stream of the Rouge River from its origin in the City of Rochester Hills and includes most of the major tributaries, with the exception of Franklin Branch, that enter the river north of Eleven Mile Road. The western extent is defined by the origin of Pebble Creek in Farmington Hills. Named tributaries in the study area include: Sprague Branch, Sunken Bridge Drain, Pebble Creek, and Pernick Creek.

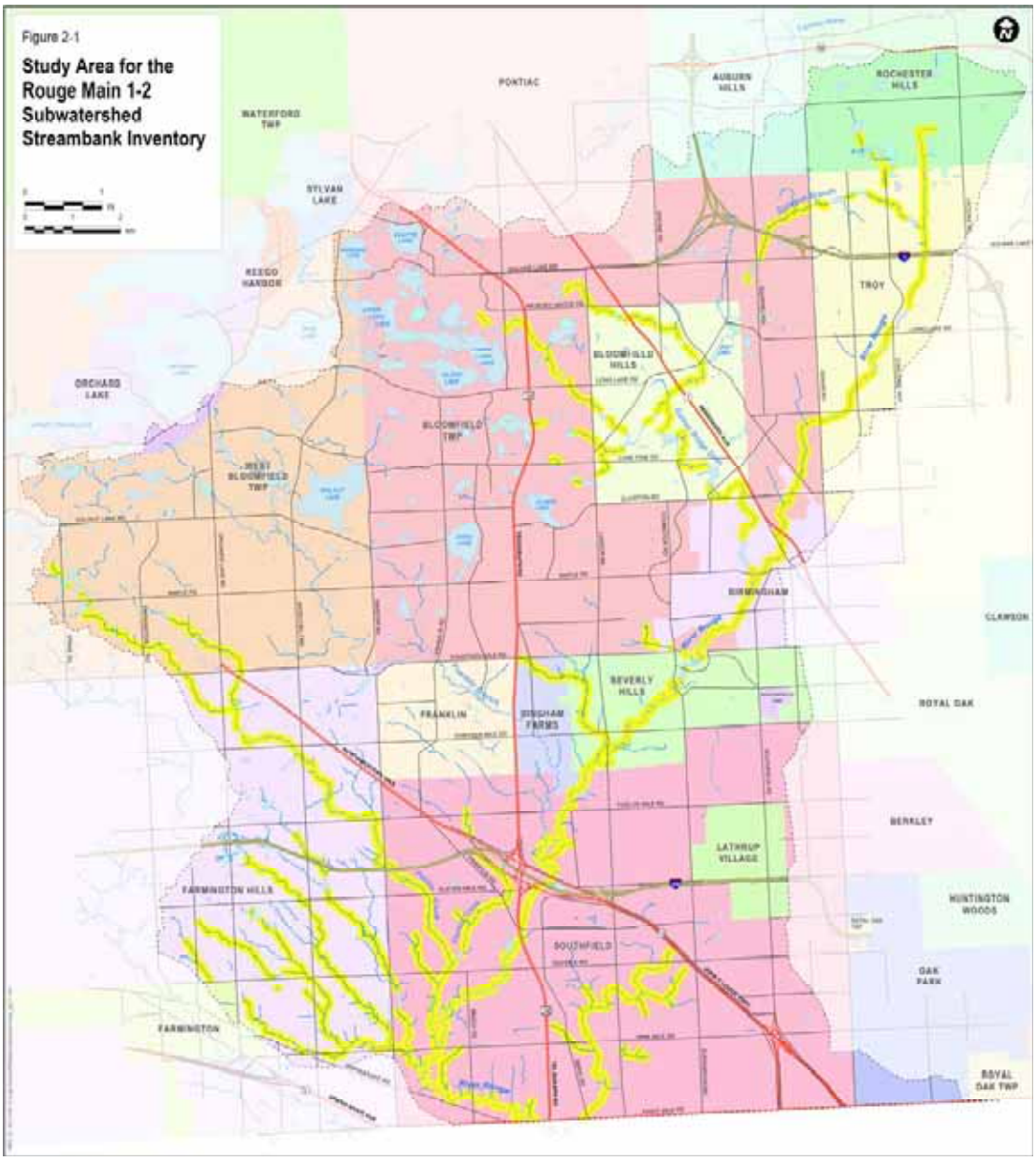


Figure 2-1: Study Area for the Rouge Main 1-2 Streambank Erosion Inventory

3. INVENTORY AND SCORING METHODOLOGY

The methodology used for the stream inventory and site scoring used to prioritize sites based on their erosion severity are presented in this section.

3.1 STREAMBANK INVENTORY METHODOLOGY

This section describes the basis of the streambank inventory and the data collection methods for the inventory.

3.1.1 Basis of Inventory

The inventory system used for this project was based on the streambank inventory system developed for use in the Mitchell Creek, Au Sable River, and Clinton River watersheds in Northwest Michigan. Because of the highly developed conditions present in most of the Rouge Main 1-2 Subwatershed, additional information was added to the inventory regarding the presence of structures (outfalls, sewer crossings, roadway culverts, etc) and the potential impact of streambank erosion on those structures. In addition, information was added to record log jams present in the inventory reaches.

Based on the project-specific modifications, three different types of "sites" were recorded:

- Reaches – lengths of stream where no structures were present
- Stations – structure(s) present or severely eroding streambank locations (relative to other reaches in the vicinity)
- Log jams

The following categories of information were recorded for each station and reach:

- Location
- Bank characteristics
- Condition of bank
- Causes of erosion
- Length of erosion
- Structures present (if applicable)

Figure 3-1 presents the detailed information collected at each station and reach. For log jams, locations (GPS coordinates) and extents (full or partial stream obstruction) were recorded throughout the study area. Digital photographs were taken at each reach, station, and log jam recorded.

Date _____ **Recorder's Name** _____

(*)Community _____ **(*)Stream or River** _____

Location

(*) Station (GPS location): _____

(*) Reach (starting GPS location):_____ (ending GPS location):_____

Location of Erosion

1. Left bank (looking upstream)
2. Right bank (looking upstream)
3. Both banks

Condition of Bank

1. Streambank is stable
2. Toe is undercutting; upper bank stable
3. Toe is stable; upper bank eroding
4. Toe and upper bank both eroding

Condition Trend

1. Stable – no apparent trend
2. Erosion severity is decreasing
3. Erosion severity is increasing

Bank Vegetation

1. 0% - 10% cover
2. 10% - 50% cover
3. 50% - 100% cover

Primary Cause of Erosion

1. Obstruction in river
2. Bend in river
3. Bank Seepage
4. Gullying of bank from side channels or outfall
5. Foot traffic
6. General erosion around structure
7. General erosion, no structure observed
8. Human encroachment on slope (buildings, utilities, etc.)
9. Other_____

Secondary Cause of Erosion

1. Obstruction in river
2. Bend in river
3. Bank Seepage
4. Gullying of bank from side channels or outfall
5. Foot traffic
6. General erosion around structure
7. General erosion, no structure observed
8. Human encroachment on slope (buildings, utilities, etc.)
9. Other_____

Bank slope

1. 4:1 or flatter
2. 3:1
3. 2:1
4. 1:1 or steeper

Bank Height

1. 0 – 5 ft.
2. 6 – 10 ft.
3. 11 – 20 ft.
4. 21 – 50 ft.
5. > 50 ft.

Length of Eroded Bank

1. 0 – 20 ft.
2. 21 – 50 ft.
3. > 50 ft.

Soil Texture

1. Clay
2. Loam
3. Silt
4. Stratified
5. Gravel
6. Sand

Structures

1. No critical structure present
2. Some erosion at structure but no imminent danger
3. Erosion near structure, future potential exposure
4. Structure exposed by erosion or other imminent danger
5. Structure failed due to erosion

Estimated distance from current erosion to structure_____

Type of structure (if present)_____

_____

Notes_____

_____

(*) Data is automatically recorded or is available within the ARCPAD files.

Figure 3-1: Streambank Inventory Data Collection Form for Stations and Reaches

3.1.2 Data Collection Method

Inventory data was recorded in the field using a Trimble GeoXT submeter GPS unit with ArcPad. Streambank inventory data collection forms (see Figure 3-1) were created using the ArcPad software package and loaded onto the Trimble to allow for easy electronic recording of field data for stations, reaches, and log jams. The following GIS layers obtained from Oakland County and the partner municipalities were also included on the Trimble to help guide the field teams:

- Municipal boundaries
- Hydrography
- Storm and sanitary sewer network
- Storm and sanitary sewer manholes and outfalls
- Roads

Two-person LTI crews completed the streambank inventory using the Trimble GPS unit. Every mile of the study area was walked or canoed, logged, and photo-documented.

Where readily visible, each road crossing, outfall, sewer or water line crossing, and manhole shown in the GIS within the immediate vicinity of the streams in the study area was visually inspected and documented.

The data collected in the field surveys was downloaded daily from the Trimble GPS unit. A relational database of site characteristics was created in MS Access, and recorded GPS site locations were imported into the project GIS.

The results of the field survey of erosion sites are presented in Section 4.

3.2 SITE SCORING METHODOLOGY

In order to rank the severity of erosion at each of the recorded reaches and stations, a scoring system was developed to accompany the information collected in the inventory data collection forms. Table 2-1 shows the scores assigned to each possible characteristic selection on the inventory data form shown in Figure 3-1. Higher values indicate increased severity. Note that not all information collected at each site was assigned a score (such as locations, types of structure present, and notes).

For each site, individual scores were assigned to each field. The total site score was calculated as the sum of these individual scores.

The results of the site scoring and prioritization are described in Section 4.

Table 3-1: Site Scoring for Streambank Inventory Data Inventory and Prioritization Results

Field	Selection	Score
Location of Erosion	Left bank	1
	Right bank	1
	Both banks	4
Condition of Bank	Streambank is stable	0
	Toe is undercutting; upper bank is stable	1
	Toe is stable; upper bank eroding	2
	Toe and upper bank both eroding	3
Condition Trend	Stable - no apparent trend	1
	Erosion severity decreasing	1
	Erosion severity increasing	5
Bank Vegetation	0% - 10% cover	1
	10% - 50% cover	3
	50% - 100% cover	5
Primary Cause of Erosion	Obstruction in river	1
	Bend in river	2
	Bank seepage	1
	Gullying from side channels or outfall	2
	Foot traffic	1
	General erosion around structure	4
	General erosion, no structure observed	3
	Human encroachment (buildings, utilities, etc.)	5
Bank Slope	4:1 or flatter	1
	3:1	2
	2:1	2
	1:1 or steeper	5
Bank Height	0 - 5 ft	1
	5 - 10 ft	3
	10 - 20 ft	5
	20 - 50 ft	7
	> 50 ft	10
Length of Eroded Bank	0 - 20 ft.	1
	20 - 50 ft.	3
	>50 ft.	5
Soil Texture	Clay	1
	Loam	1
	Silt	2
	Stratified	2
	Gravel	3
	Sand	3
Structures	No critical structure present	0
	Some erosion, but no imminent danger	5
	Erosion near structure, future potential danger	10
	Structure exposed by erosion or other imminent danger	20
	Structure failed due to erosion	30

4. INVENTORY AND SITE PRIORITIZATION RESULTS

A summary of inventory field observations, site scoring results, and the most severe erosion sites resulting from the site prioritization are presented in this section.

4.1 INVENTORY SUMMARY

LTI completed the field data collection for the streambank inventory in the Rouge Main 1-2 Subwatershed between March 19 and May 18, 2004. The streambank inventory covered 89.2 miles, and streambank conditions were logged and photo-documented for more than 2,200 stations and reaches and almost 600 log jams.

Table 4-1 presents the miles of streams inventoried, as well as the number of reaches, stations, and log jams recorded, sorted by participating community. Figure 4-1 shows the location of these sites within in the study area.

Table 4-1: Distribution of Streambank Inventory Among Participating Communities

Community	Mileage of Streams & Rivers Inventoried	No. of Reaches	No. of Stations	No. of Log Jams
Beverly Hills, Village of	3.7	47	35	22
Bingham Farms, Village of	1.4	13	6	12
Birmingham, City of	3.9	58	59	22
Bloomfield Hills, City of	9.1	101	121	0
Bloomfield Township	9.4	98	126	10
Farmington Hills, City of	21.2	274	397	213
Rochester Hills, City of	1.8	11	20	1
Southfield, City of	28.1	275	327	276
Troy, City of	6.4	55	69	3
West Bloomfield Township	4.3	57	77	34
Total	**89.2**	**989**	**1237**	**593**

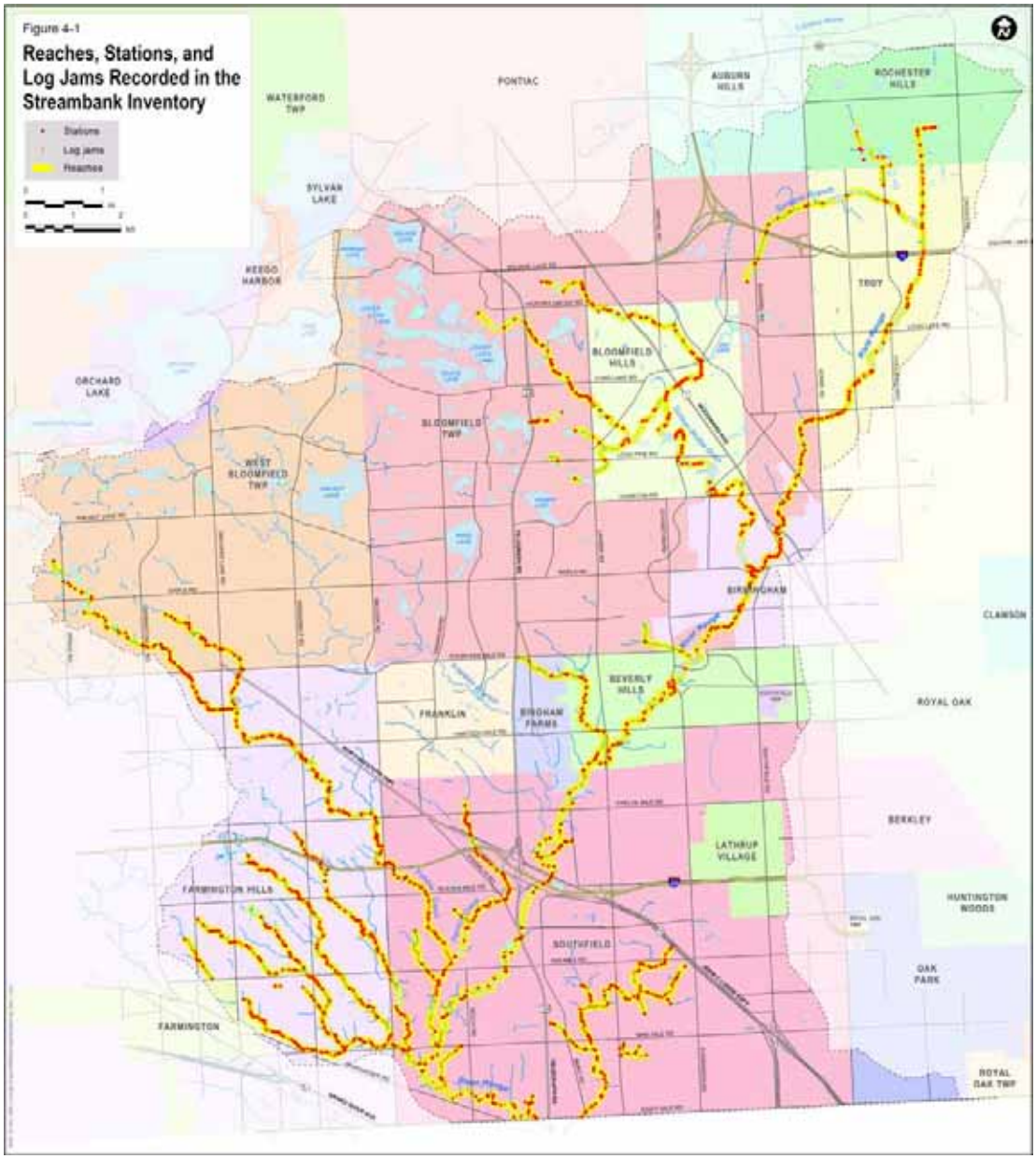


Figure 4-1: Reaches, Stations, and Log Jams Recorded in the Streambank Inventory

4.2 SITE SCORING SUMMARY

The site scoring system described in Section 3.2 was applied to the database of field observations collected during the streambank inventory. As mentioned above, over 2,200 stations and reaches were logged in the field. Figure 4-2 shows the distribution of scores for these sites. The lowest (least severe) site score was 7, and the highest (most severe) site score was 68.

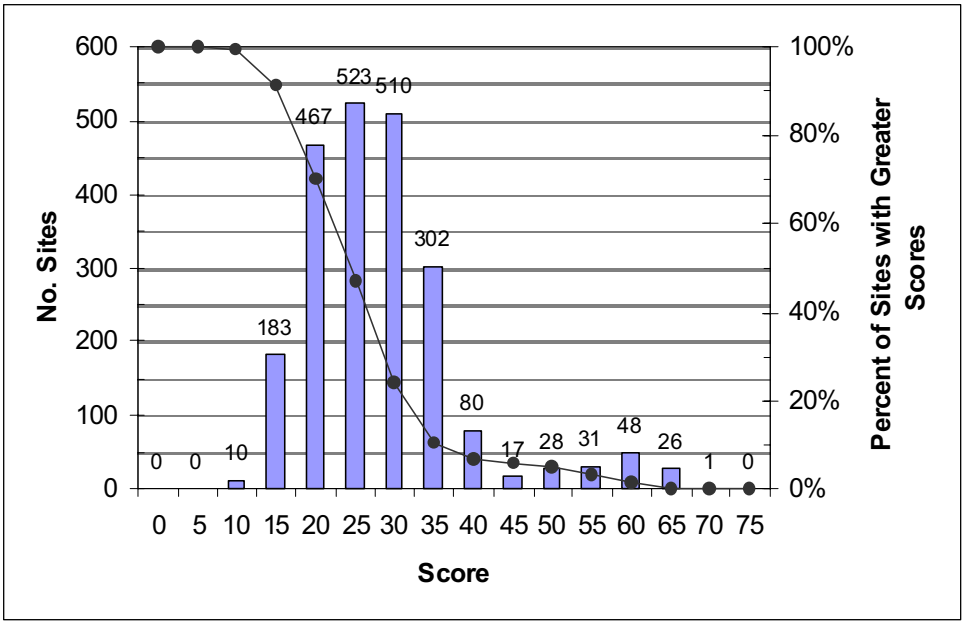


Figure 4-2: Distribution of Streambank Erosion Site Scores for the Rouge Main 1-2 Subwatershed Study Area

As indicated in Figure 4-2, there are 231 sites with scores higher than 35, and there is no clear break in the distribution of scores between "severe" and "not severe" in this group of high scoring sites. Table 4-2 presents a summary of site scores by partner community.

Table 4-2: Summary Statistics of Site Scores by Partner Community

Community	Station and Reach Scores			No. Sites
	Average	Minimum	Maximum	
Beverly Hills, Village of	28	13	65	82
Bingham Farms, Village of	21	15	43	19
Birmingham, City of	27	11	63	117
Bloomfield Hills, City of	25	11	60	222
Bloomfield Township	22	10	59	224
Farmington Hills, City of	26	11	65	671
Rochester Hills, City of	22	15	40	31
Southfield, City of	30	9	68	602
Troy, City of	23	7	60	124
West Bloomfield Township	21	10	48	134
Total	**26**	**7**	**68**	**2226**

4.3 MOST SEVERE SITES

The scoring results presented in Section 4.2 were examined in detail to identify a convenient and logical place to separate "severe" from "not severe" sites, but no clear dividing point was apparent due to the prevalence of high-scoring sites that have failed and failing or imminently failing structures. Based on this outcome, an alternate approach for identifying severe sites was used.

Upon inspection of the highest-scoring sites, it was apparent that relative comparisons of erosion severity required some judgment, and that input from the OCDC and the participating communities would be important to insure appropriate prioritization of sites. To organize the highest-ranking sites, the sites were sorted in ascending order and a cut-off was made at the lowest scoring site that had been logged with the description "Structure Exposed by Erosion or Other Immediate Danger". This cut-off resulted in 177 sites that were deemed most severe because of failing, imminently failing, or failed structures. A map showing the location of these 177 sites in the Rouge Main 1-2 Subwatershed study area is presented in Figure 4-3.

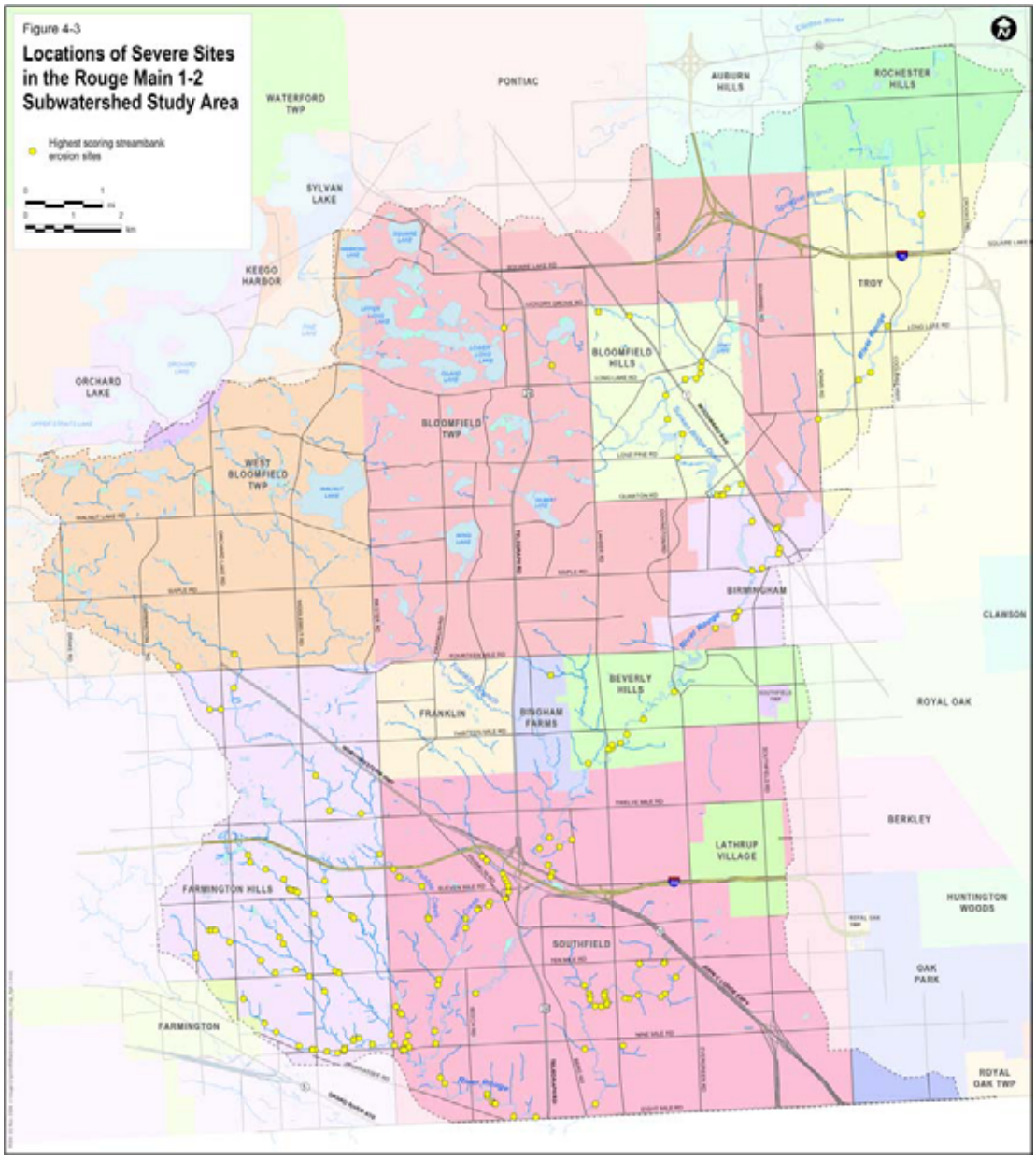


Figure 4-3: Locations of Severe Sites in the Rouge Main 1-2 Subwatershed Study Area

To clearly present information on the most severe sites of streambank erosion to OCDC and the participating communities, the 177 most severe sites were divided into the following five categories:

- No critical structure present: 25 sites
- Some erosion at structure, no imminent danger: 6 sites
- Erosion near structure, future potential exposure: 1 site
- Structure exposed by erosion or other imminent danger: 82 sites
- Structure failed due to erosion: 63 sites

Table 4-3 summarizes the number of sites in each of the five categories by partner community.

Table 4-3: Distribution of the Severe (Highest Scoring) Streambank Erosion Sites by Partner Community

Community	No critical structure present	Some erosion at structure, no imminent danger	Erosion near structure, future potential exposure	Structure exposed by erosion or other imminent danger	Structure failed due to erosion
Beverly Hills, Village of	4	0	0	2	2
Bingham Farms, Village of	0	0	0	0	1
Birmingham, City of	0	3	0	3	3
Bloomfield Hills, City of	0	0	0	10	7
Bloomfield Township	0	0	0	2	2
Farmington Hills, City of	4	0	1	33	18
Rochester Hills, City of	0	0	0	0	0
Southfield, City of	17	3	0	29	26
Troy, City of	0	0	0	2	3
West Bloomfield Township	0	0	0	1	1

Each partner community was provided with a summary of the highest scoring ("severe") sites in their jurisdiction. The process for selection of priority sites for development of conceptual site restoration designs is described in Section 5. Community-specific summaries are provided in Part II of this report.

4.4 DATA VIEWER FOR INVENTORY RESULTS

LTI developed a data viewing application in ArcGIS that allows partner communities to view the results of the Streambank Inventory and Site Prioritization.

The Rouge River data viewer tool, shown in Figure 4-4, consists of an ArcGIS ArcMap document with associated code written in Visual Basic for applications. The data viewer allows the user to interactively select a station and/or reach from a list or from the map and display site characteristics documented in the field and site scores. In addition, the viewer allows the user to view photograph thumbnails associated with a selected site and optionally generate a full-size view of each photograph.

The following sections describe the options for selecting reaches and stations and the functionality available on the viewer's data display form.

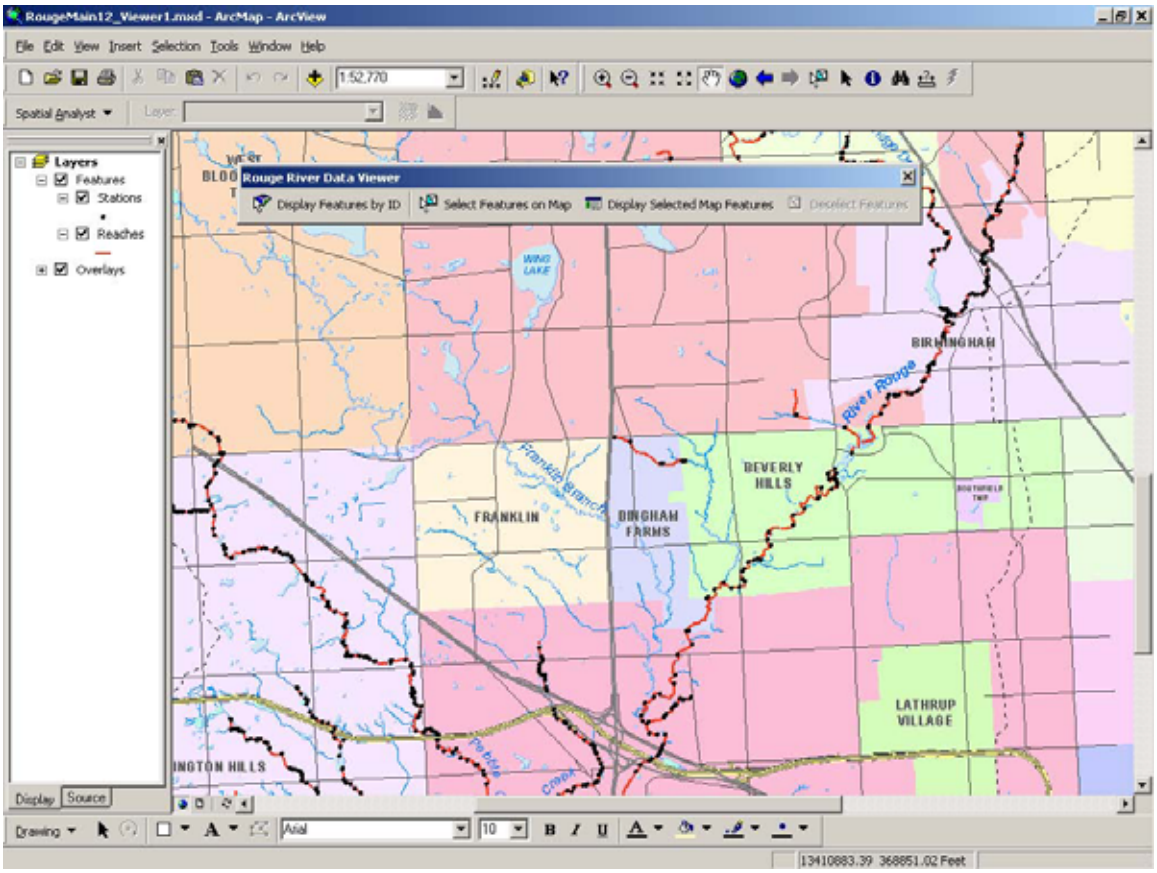


Figure 4-4: Rouge Main 1-2 Subwatershed Streambank Inventory Viewer Base Map and Toolbar

4.4.1 Selection of Station and Reach Features

The data viewer provides two options for selecting and displaying the data display form for one or multiple site ID numbers. The first option allows the user to display site features by selecting specific site IDs from a pull-down list. The second option for displaying site information allows the user interactively select one or more reach/station sites from the viewer map.

4.4.2 Feature Data Display Form

As described in the previous section, the data display for a feature can be created using one of two options – selection of a site from a pull-down list or interactive selection on the map itself. The data display form shows the site characteristics for the selected site recorded in the field during the streambank inventory and the site score resulting from the site prioritization, as shown in Figure 4-5. In addition, the display form shows "thumbnails" of any available photographs for the selected feature.



Figure 4-5: Feature Data Display Interface

Clicking on a thumbnail will generate a full-size view of the photograph and provide the option to scroll through the other photos associated with the selected feature, as shown in the example in Figure 4-6.



Figure 4-6: Full-Size View of Photograph for Selected Feature

5. PRIORITY SITES FOR CONCEPTUAL DESIGNS

One goal of the streambank inventory and prioritization was to identify sites for development of conceptual designs to mitigate streambank erosion. This section describes the process used for selection of these priority sites and presents the final list of priority sites for which designs were developed.

5.1 PROCESS FOR SELECTION

Information on the severe sites within each individual community (described in Section 4) was provided to each of the partner communities. The communities were requested to review the information and provide LTI a list of the sites for which they wish to have conceptual restoration designs developed.

Each partner community was provided the following information on the severe sites within their jurisdiction:

- A map of the community showing the location of the highest scoring streambank erosion inventory sites
- A summary table of the highest scoring streambank erosion inventory sites in the community, including site location, inventory score, and notes on the site
- Photographs of each of the highest scoring streambank erosion inventory sites

Community input on final priority site selection was critical, because of the possibility of a number of factors that could exclude the sites from being of interest. These factors include (but are not limited to) the following:

- Private ownership/lack of jurisdiction to implement mitigation/repair
- Identified structure is abandoned or obsolete and, therefore, no longer of interest
- Site is part of another project and does not need to be addressed by this project

The final list of priority sites selected by the partner communities in this process is presented in the next section.

5.2 FINAL PRIORITY SITES

Feedback from the participating communities regarding conceptual designs was compiled and indicated that four of the communities were interested in conceptual designs for sites in their communities. LTI reviewed the priority sites in those communities and recommended 12 sites representing a variety of streambank erosion conditions.

Table 5-1 summarizes the number of priority sites identified for each community and the location of the final 12 sites for conceptual design development. Locations of the

specific sites requested are shown in Figure 5-1. Conceptual designs for these 12 sites are presented in Part 3 of this report.

Table 5-1: Summary of Priority Sites for Conceptual Design

Community	Number of 'Severe' Streambank Erosion Sites	Conceptual Designs
Beverly Hills, Village of	8	0
Bingham Farms, Village of	1	1
Birmingham, City of	9	0
Bloomfield Hills, City of	17	0
Bloomfield Township	5	0
Farmington Hills, City of	56	4
Rochester Hills, City of	0	0
Southfield, City of	75	5
Troy, City of	4	2
West Bloomfield Township	2	0
Total	**177**	**12**

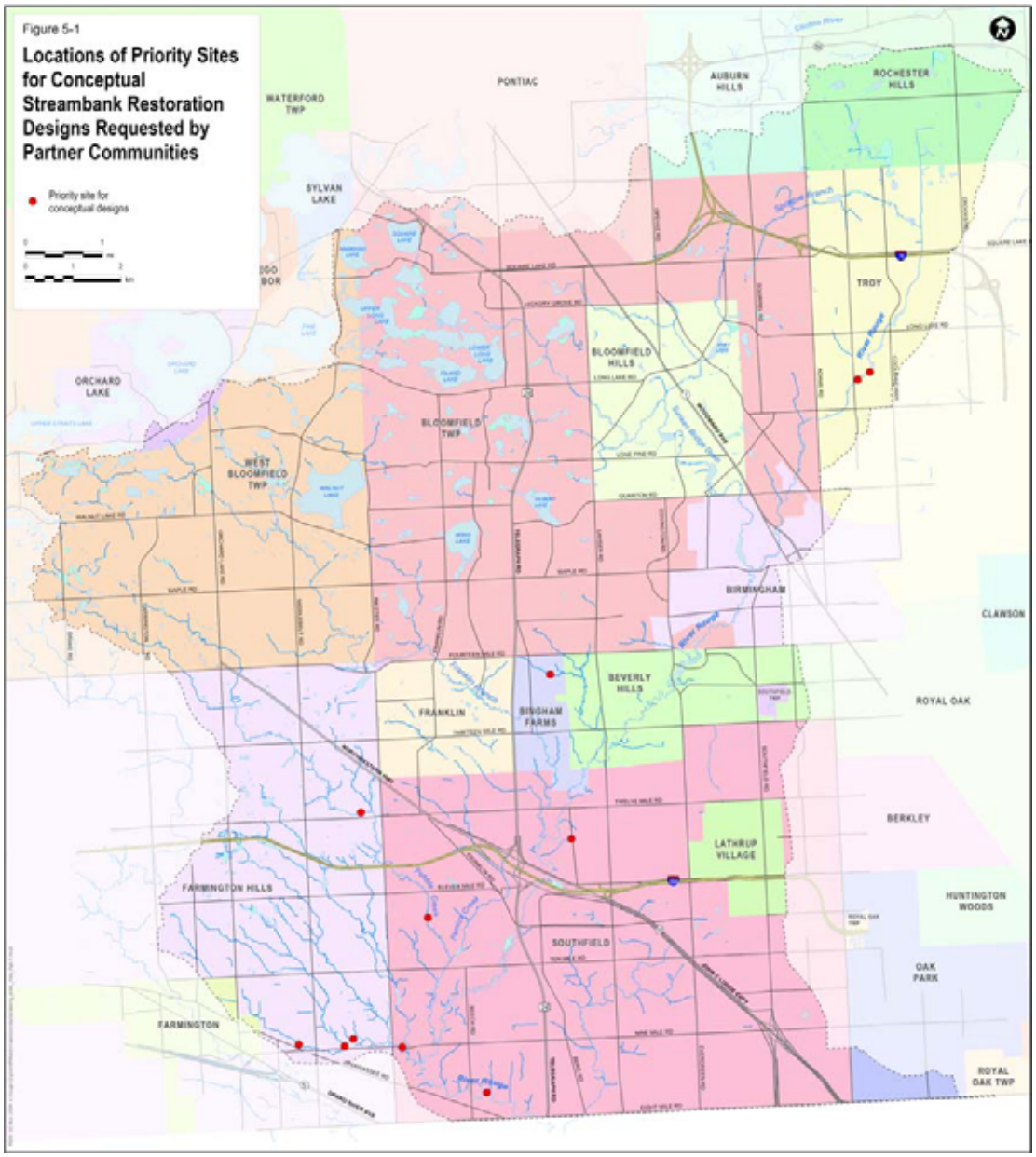


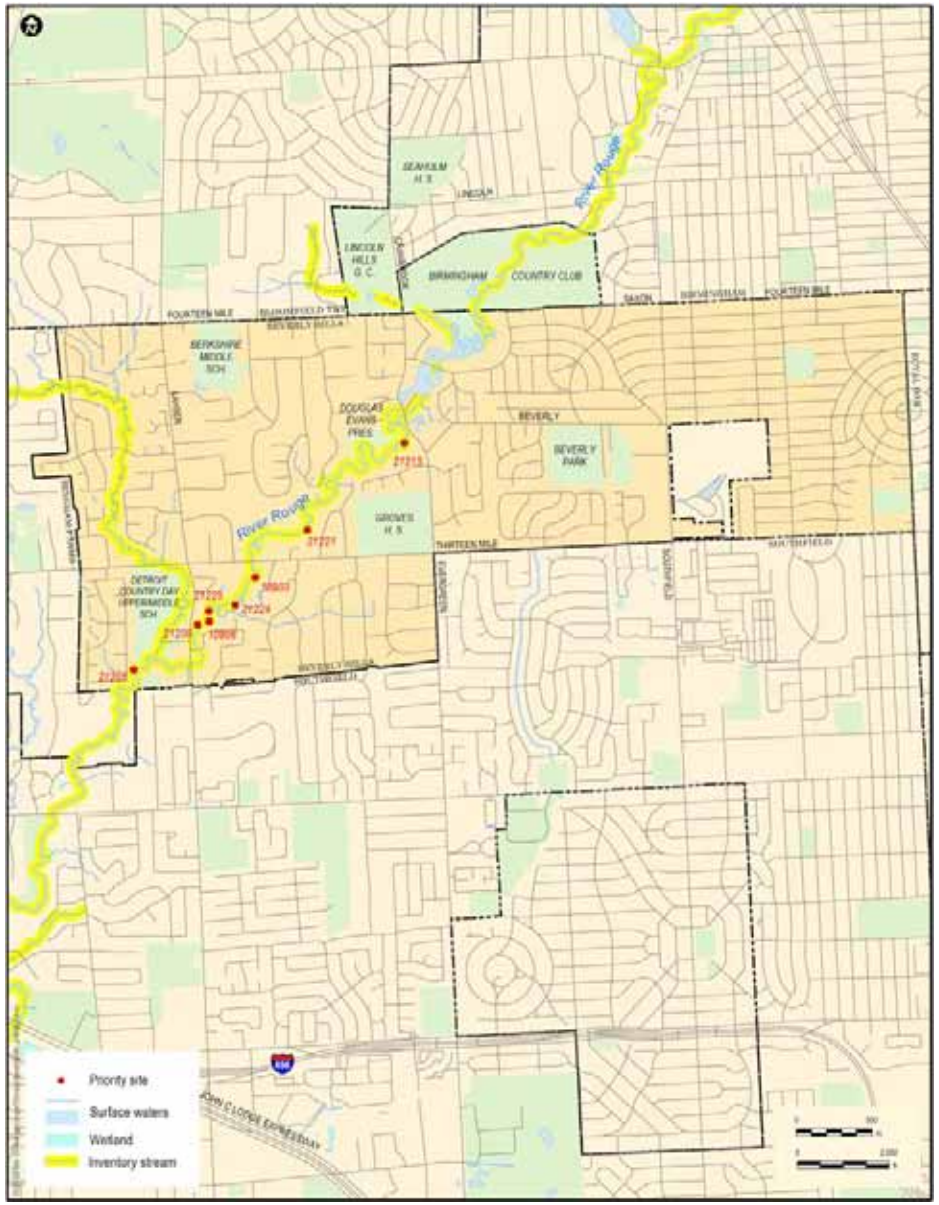
Figure 5-1: Locations of Priority Sites for Conceptual Streambank Restoration Designs Requested by Partner Communities

PART II:
COMMUNITY SPECIFIC SUMMARIES

Beverly Hills

VILLAGE OF BEVERLY HILLS

Streambank Inventory and Site Prioritization Results



Inventory Summary

A total of 3.7 miles of stream and river reaches were inventoried in the Village of Beverly Hills. Inventoried streams are highlighted in yellow on the map to the left. In these 3.7 miles, characteristics of 35 stations, 47 reaches, and 22 log jams were recorded. After scoring and ranking reaches and stations from the entire project study area, 8 of 177 priority sites were identified in the Village of Beverly Hills. The 177 priority sites were determined to be the most severe sites in the study area. Locations of priority sites in Beverly Hills are indicated by red dots on the map.

Erosion Severity Scores

The tables below summarize the site scores for stations and reaches inventoried in the Village of Beverly Hills and the entire Rouge Main 1-2 Subwatershed study area.

Station and Reach Scores for the Village of Beverly Hills

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	35	16	65	31
Reaches	47	13	40	26

Station and Reach Scores for the Rouge Main 1-2 Study Area

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	1237	7	68	28
Reaches	989	11	61	23

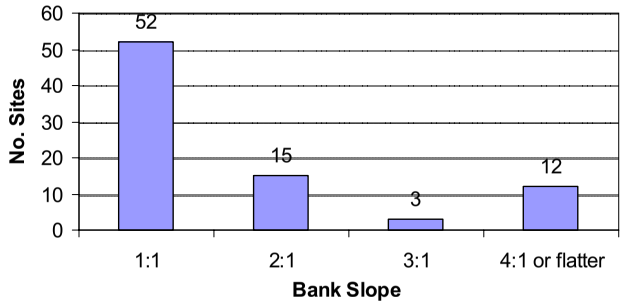
As indicated by the tables, erosion severity scores were higher on average for both stations and reaches in the Village of Beverly Hills. These scores indicate that, relative to other communities in the study area, erosion is generally more severe in the Village.

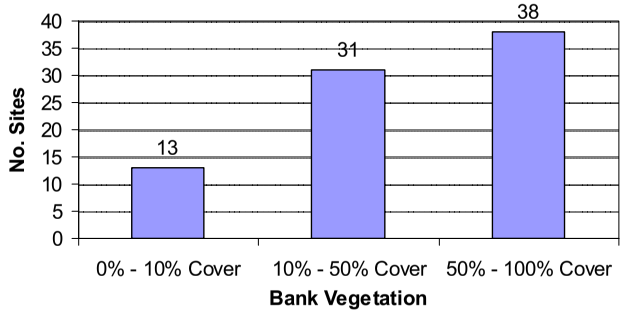
VILLAGE OF BEVERLY HILLS

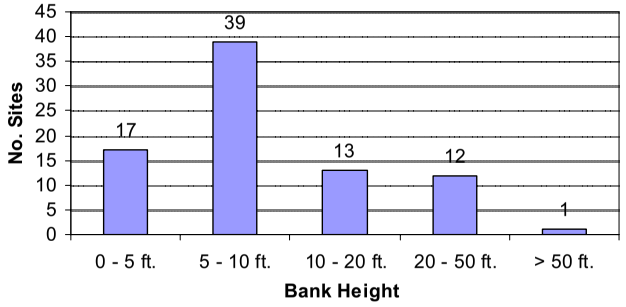
Streambank Inventory and Site Prioritization Results

Streambank Characteristics of Inventoried Stations and Reaches

The majority of sites inventoried in the Village of Beverly Hills are characterized by steep slopes (1:1), moderate to heavy vegetative cover (10-100%), and bank heights greater than 5 feet. The bar charts below illustrate these characteristics for stations and reaches in Beverly Hills.

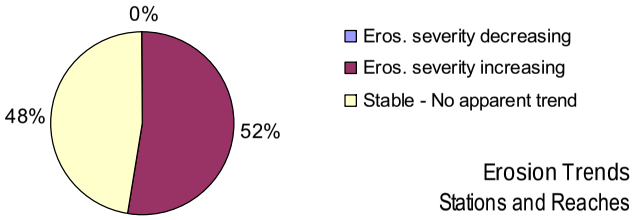






Erosion Characteristics of Inventoried Stations and Reaches

As shown in the pie charts below, approximately 548 of stations and reaches in the Village are stable, while erosion severity is increasing at 52% of sites. The three primary causes of erosion at inventoried sites are bends in stream reaches (67%), general erosion around structures (14%), and general erosion where no structures are present (12%).



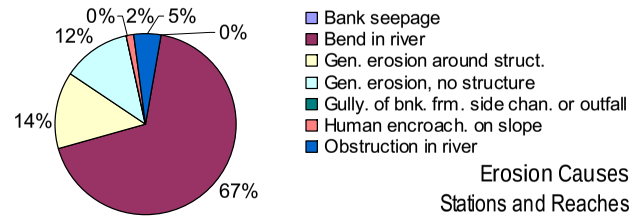


Photo of Typical Streambank

This photo is an example of a stream reach with the typical physical and erosion characteristics of inventoried streams in the Village of Beverly Hills.

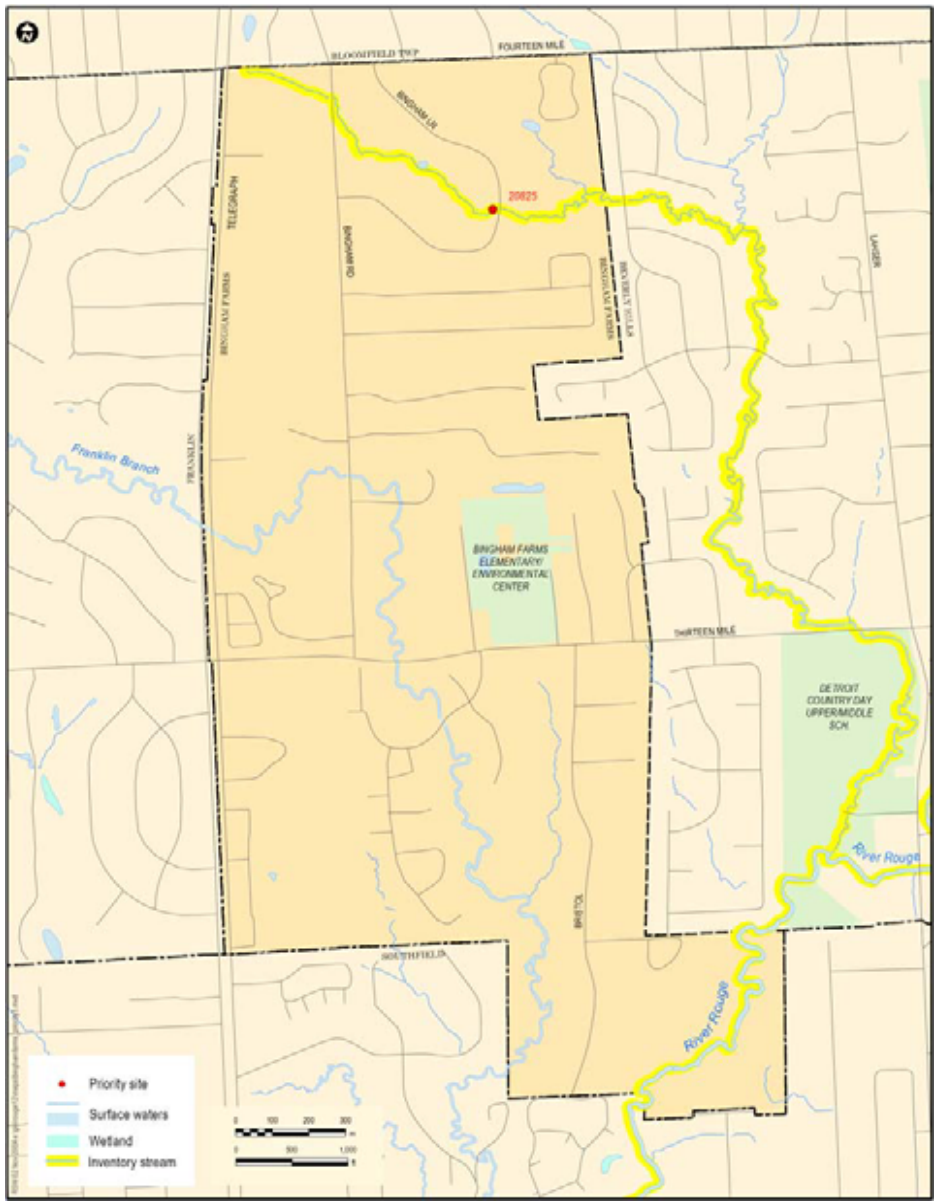


Site No. 10905

Bingham Farms

VILLAGE OF BINGHAM FARMS

Streambank Inventory and Site Prioritization Results



Inventory Summary

A total of 1.4 miles of stream and river reaches were inventoried in the Village of Bingham Farms. Inventoried streams are highlighted in yellow on the map to the left. In these 1.4 miles, characteristics of 6 stations, 13 reaches, and 12 log jams were recorded. After scoring and ranking reaches and stations from the entire project study area, 1 of 177 priority sites were identified in the Village. The 177 priority sites were determined to be the most severe sites in the study area. The location of the priority site in Bingham Farms is indicated by a red dot on the map.

Erosion Severity Scores

The tables below summarize the site scores for stations and reaches inventoried in the Village of Bingham Farms and the entire Rouge Main 1-2 Subwatershed study area.

Station and Reach Scores for the Village of Bingham Farms

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	6	15	43	24
Reaches	13	15	26	19

Station and Reach Scores for the Rouge Main 1-2 Study Area

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	1237	7	68	28
Reaches	989	11	61	23

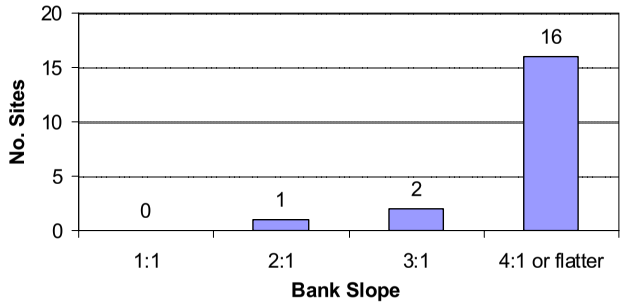
As indicated by the tables, erosion severity scores were lower on average for both stations and reaches in the Village of Bingham Farms. This indicates that, relative to other communities in the study area, erosion is generally not as severe in the Village.

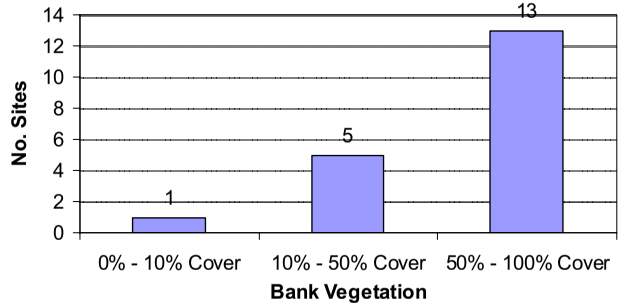
VILLAGE OF BINGHAM FARMS

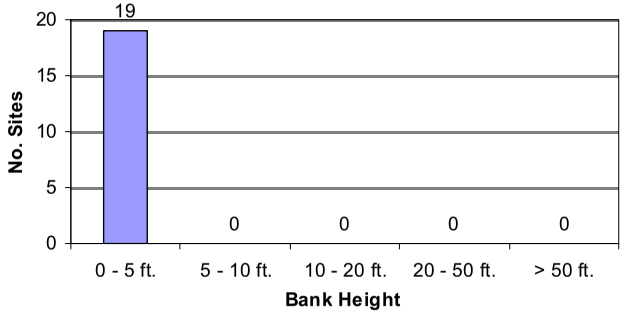
Streambank Inventory and Site Prioritization Results

Streambank Characteristics of Inventoried Stations and Reaches

The majority of sites inventoried in the Village of Bingham Farms are characterized by flat slopes (4:1), heavy vegetative cover (50-100%), and low bank heights (0 to 5'). The bar charts below illustrate these characteristics for stations and reaches in the Village.

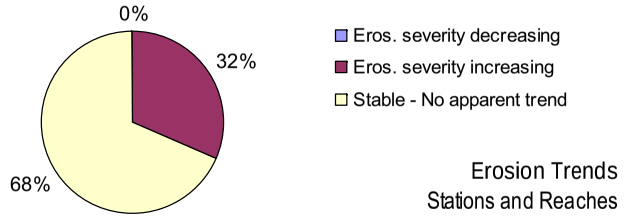






Erosion Characteristics of Inventoried Stations and Reaches

As shown in the pie charts below, approximately 68% of stations and reaches in the Village have stable streambanks, while erosion severity is increasing at 32% of sites. The two primary causes of erosion at inventoried sites are bends in stream reaches (53%) and general erosion (42%).



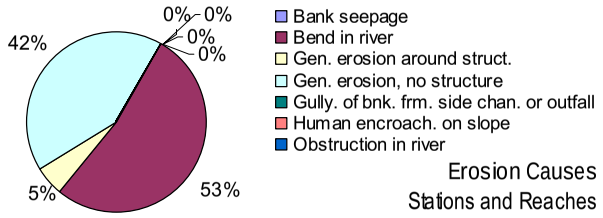


Photo of Typical Streambank

This photo is an example of a stream reach with the typical physical and erosion characteristics of inventoried streams in the Village of Bingham Farms.

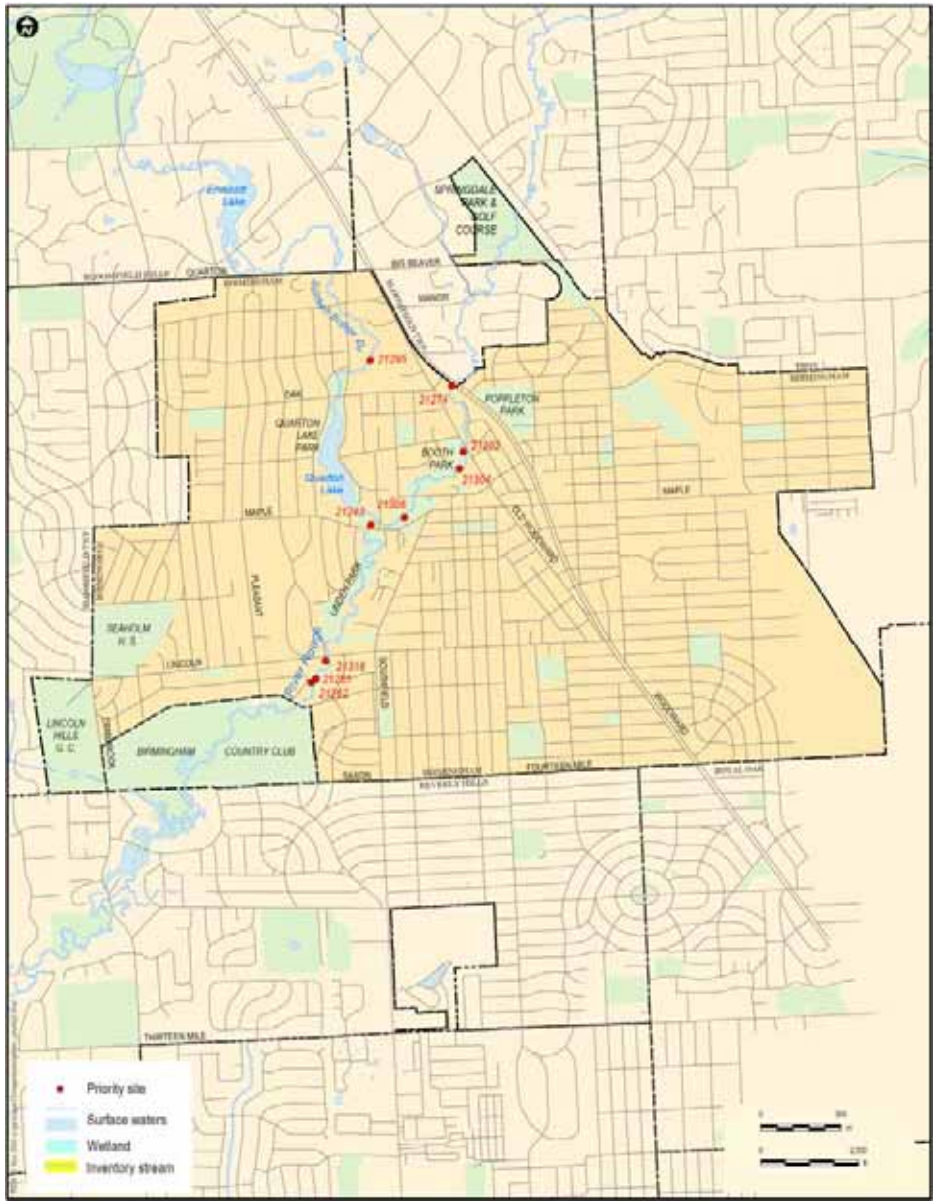


Site No. 10590

Birmingham

CITY OF BIRMINGHAM

Streambank Inventory and Site Prioritization Results



Inventory Summary

A total of 3.9 miles of stream and river reaches were inventoried in the City of Birmingham. Inventoried streams are highlighted in yellow on the map to the left. In these 3.9 miles, characteristics of 59 stations, 58 reaches, and 22 log jams were recorded. After scoring and ranking reaches and stations from the entire project study area, 9 of 177 priority sites were identified in the City of Birmingham. The 177 priority sites were determined to be the most severe sites in the study area. Locations of priority sites in the City of Birmingham are indicated by red dots on the map.

Erosion Severity Scores

The tables below summarize the site scores for stations and reaches inventoried in the City of Birmingham and the entire Rouge Main 1-2 Subwatershed study area.

Station and Reach Scores for the City of Birmingham

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	59	11	63	32
Reaches	58	14	30	22

Station and Reach Scores for the Rouge Main 1-2 Study Area

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	1237	7	68	28
Reaches	989	11	61	23

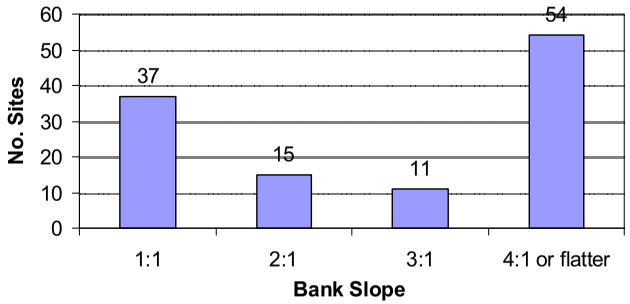
As indicated by the tables, erosion severity scores were slightly higher on average for stations in the City of Birmingham, with the maximum station score of 63 close to the maximum station score for the study area of 68. Reach scores for the City are slightly lower on average than the average for the study area.

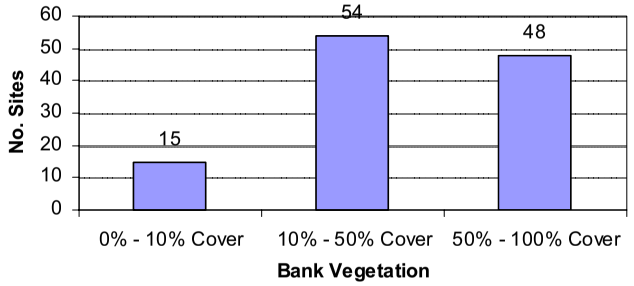
CITY OF BIRMINGHAM

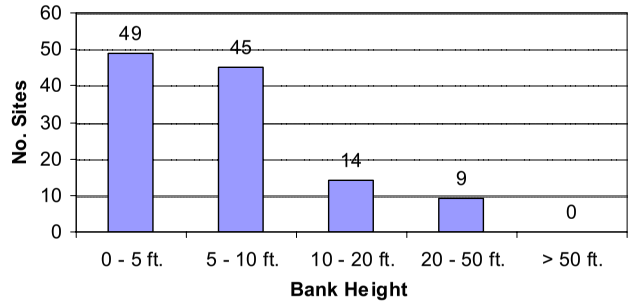
Streambank Inventory and Site Prioritization Results

Streambank Characteristics of Inventoried Stations and Reaches

The streambanks of sites inventoried in the City of Birmingham consist of flat to steep slopes, are primarily vegetated, and are generally less than 10 feet in height, though some sites with streambanks in the 20 to 50-foot range exist. The bar charts below illustrate these characteristics for stations and reaches in the City.

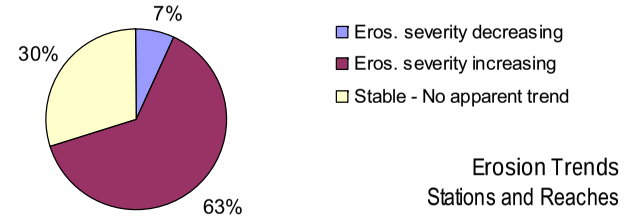






Erosion Characteristics of Inventoried Stations and Reaches

As shown in the pie charts below, approximately 37% of stations and reaches in the City are stable or decreasing in erosion severity, while erosion severity is increasing at 63% of sites. The two primary causes of erosion at inventoried sites are bends in stream reaches (67%) and general erosion around structures.



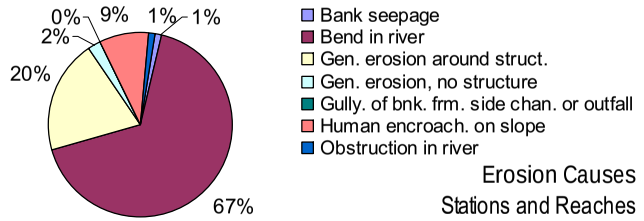


Photo of Typical Streambank

This photo is an example of a stream reach with the typical physical and erosion characteristics of inventoried streams in the City of Birmingham.

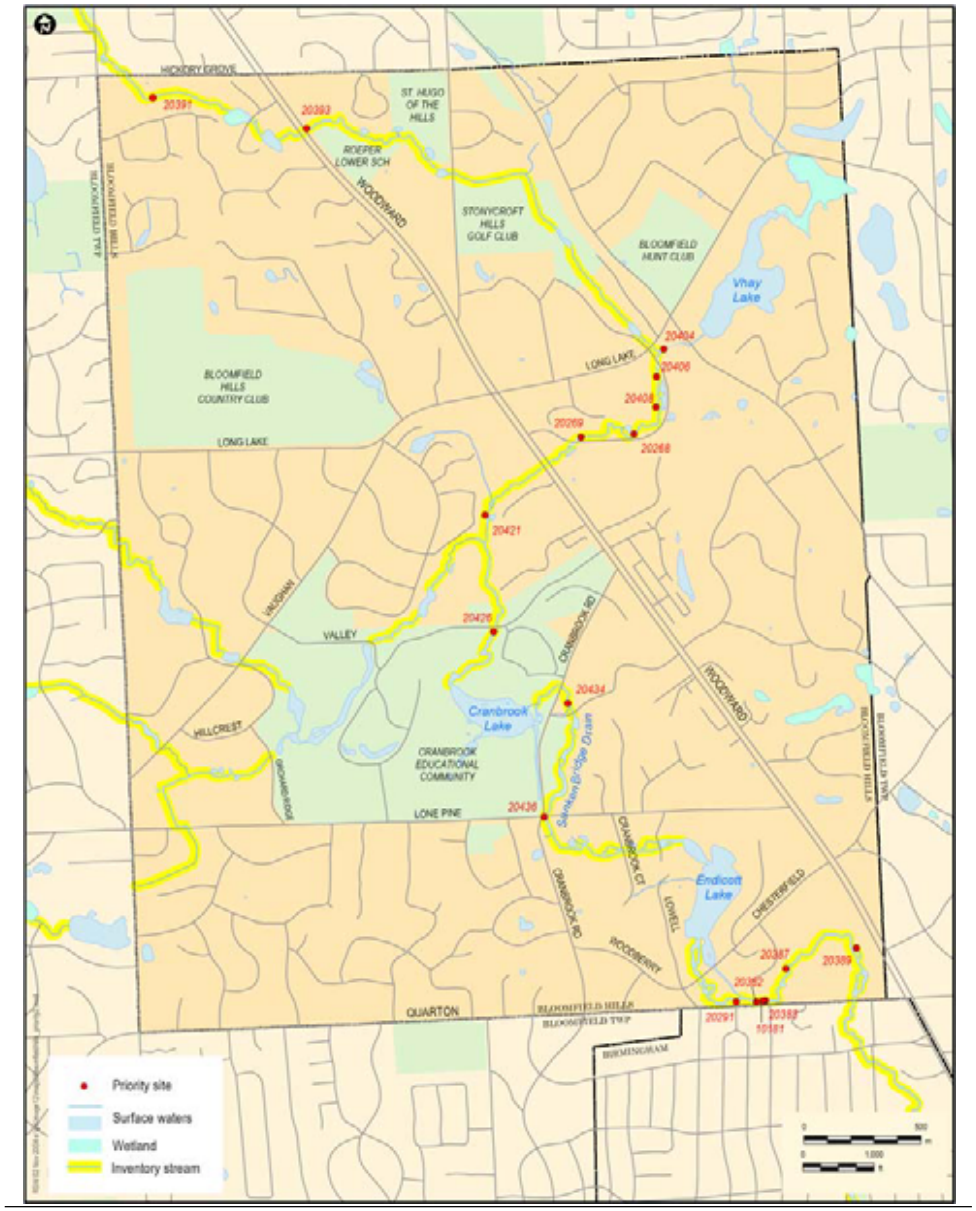


Site No. 10967

Bloomfield Hills

CITY OF BLOOMFIELD HILLS

Streambank Inventory and Site Prioritization Results



Inventory Summary

A total of 9.1 miles of stream and river reaches were inventoried in the City of Bloomfield Hills. Inventoried streams are highlighted in yellow on the map to the left. In these 9.1miles, characteristics of 121 stations and 101 reaches were recorded. No log jams were documented in the City. After scoring and ranking reaches and stations from the entire project study area, 17 of 177 priority sites were identified in Bloomfield Hills. The 177 priority sites were determined to be the most severe site in the study area. Locations of priority sites in the City of Bloomfield Hills are indicated by red dots on the map.

Erosion Severity Scores

The tables below summarize the site scores for stations and reaches inventoried in the City of Bloomfield Hills and the entire Rouge Main 1-2 Subwatershed study area.

Station and Reach Scores for the City of Bloomfield Hills

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	121	11	60	27
Reaches	101	12	59	21

Station and Reach Scores for the Rouge Main 1-2 Study Area

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	1237	7	68	28
Reaches	989	11	61	23

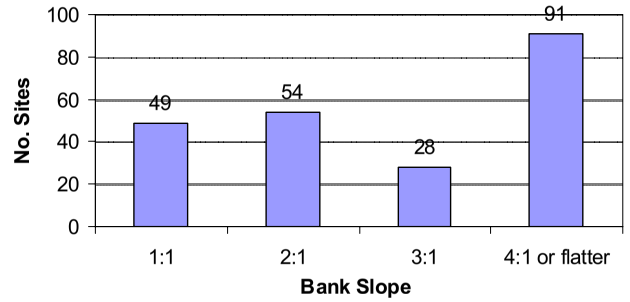
As indicated by the tables, erosion severity scores were slightly lower on average for both stations and reaches in the City of Bloomfield Hills. This indicates that, relative to other communities in the study area, erosion is generally not as severe in Bloomfield Hills.

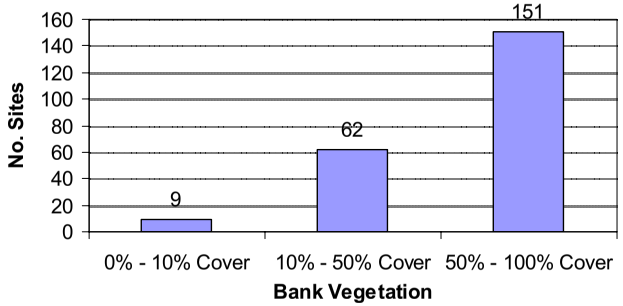
CITY OF BLOOMFIELD HILLS

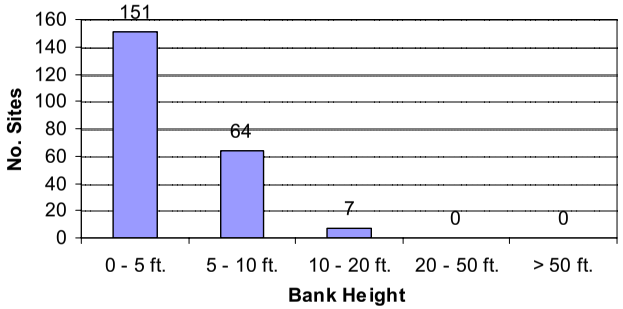
Streambank Inventory and Site Prioritization Results

Streambank Characteristics of Inventoried Stations and Reaches

The streambanks of sites inventoried in the City of Bloomfield Hills consist of flat to steep slopes with heavy vegetative cover (50-100%), and low bank heights (0 to 10'). The bar charts below illustrate these characteristics for stations and reaches in the City.

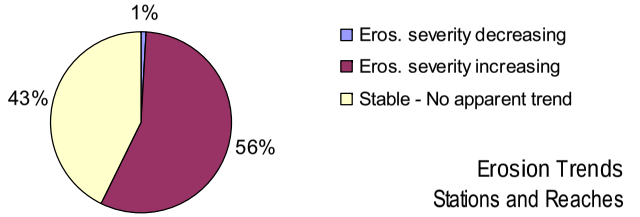






Erosion Characteristics of Inventoried Stations and Reaches

As shown in the pie charts below, approximately 44% of stations and reaches in the City are stable or decreasing in erosion severity, while erosion severity is increasing at 56% of sites. The two primary causes of erosion at inventoried sites are bends in stream reaches (45%) and general erosion around structures (26%).



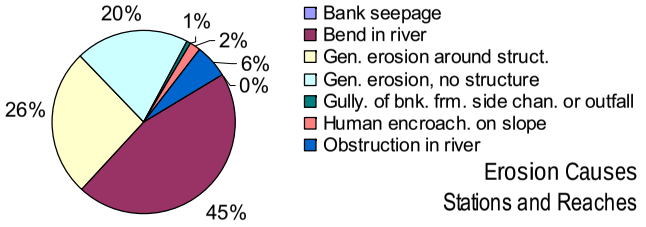


Photo of Typical Streambank

This photo is an example of a stream reach with the typical physical and erosion characteristics of inventoried streams in the City of Bloomfield Hills.



Site No. 10164

Bloomfield Township

BLOOMFIELD TOWNSHIP

Streambank Inventory and Site Prioritization Results



Inventory Summary

A total of 9.4 miles of stream and river reaches were inventoried in Bloomfield Township. Inventoried streams are highlighted in yellow on the map to the left. In these 9.4 miles, characteristics of 126 stations, 98 reaches, and 10 log jams were recorded. After scoring and ranking reaches and stations from the entire project study area, 5 of 177 priority sites were identified in Bloomfield Township. The 177 priority sites were determined to be the most severe sites in the study area. Locations of priority sites in Bloomfield Township are indicated by red dots on the map.

Erosion Severity Scores

The tables below summarize the site scores for stations and reaches inventoried in Bloomfield Township and the entire Rouge Main 1-2 Subwatershed study area.

Station and Reach Scores for Bloomfield Township

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	126	10	59	23
Reaches	98	14	30	20

Station and Reach Scores for the Rouge Main 1-2 Study Area

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	1237	7	68	28
Reaches	989	11	61	23

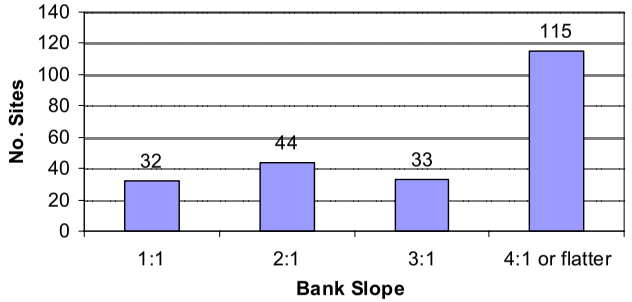
As indicated by the tables, erosion severity scores were slightly lower on average for both stations and reaches in Bloomfield Township. This indicates that, relative to other communities in the study area, erosion is generally not as severe in the Township.

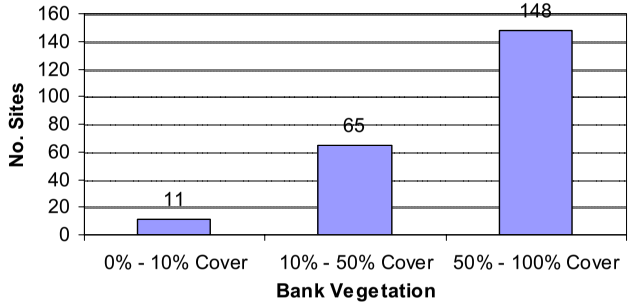
BLOOMFIELD TOWNSHIP

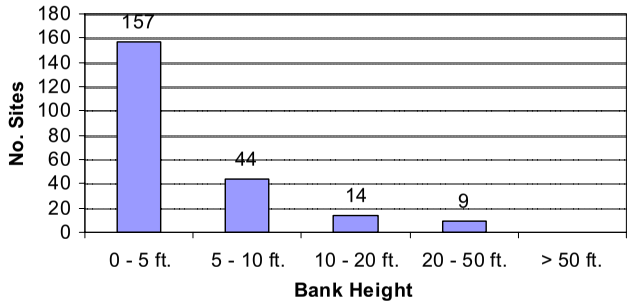
Streambank Inventory and Site Prioritization Results

Streambank Characteristics of Inventoried Stations and Reaches

The majority of sites inventoried in Bloomfield Township are characterized by flat slopes (4:1), heavy vegetative cover (50-100%), and low bank heights (0 to 5'). The bar charts below illustrate these characteristics for stations and reaches in Bloomfield Township.

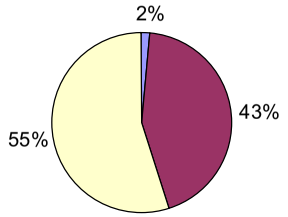




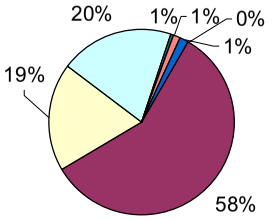


Erosion Characteristics of Inventoried Stations and Reaches

As shown in the pie charts below, approximately 57% of stations and reaches in the Township are stable or decreasing in erosion severity, while erosion severity is increasing at 43% of sites. The two primary causes of erosion at inventoried sites are bends in stream reaches (58%) and general erosion (20%).



Erosion Trends
Stations and Reaches



Erosion Causes
Stations and Reaches

Photo of Typical Streambank

This photo is an example of a stream reach with the typical physical and erosion characteristics of inventoried streams in Bloomfield Township.



Site No. 10132

Farmington Hills

CITY OF FARMINGTON HILLS
Streambank Inventory and Site Prioritization Results



Inventory Summary

A total of 21.2 miles of stream and river reaches were inventoried in the City of Farmington Hills. Inventoried streams are highlighted in yellow on the map to the left. In these 21.2 miles, characteristics of 397 stations, 274 reaches, and 213 log jams were recorded. After scoring and ranking reaches and stations from the entire project study area, 56 of 177 priority sites were identified in the City. The 177 priority sites were determined to be the most severe sites in the study area. Locations of priority sites in Farmington Hills are indicated by red dots on the map.

Erosion Severity Scores

The tables below summarize the site scores for stations and reaches inventoried in the City of Farmington Hills and the entire Rouge Main 1-2 Subwatershed study area.

Station and Reach Scores for the City of Farmington Hills

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	397	11	65	29
Reaches	274	12	61	23

Station and Reach Scores for the Rouge Main 1-2 Study Area

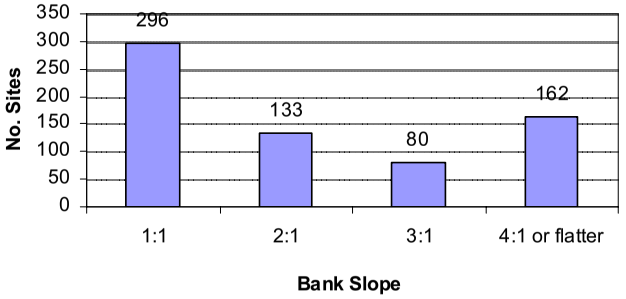
		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	1237	7	68	28
Reaches	989	11	61	23

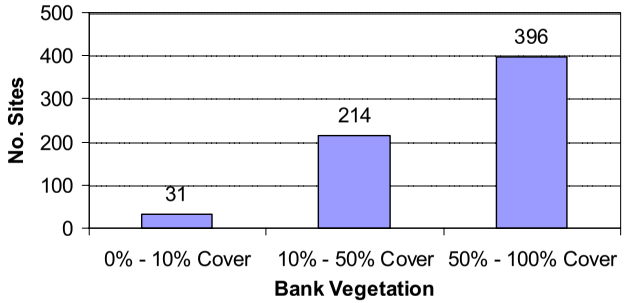
As indicated by the tables, erosion severity scores for stations in the City of Farmington Hills were just above the study area average, while reach scores for the City were equivalent to the study area average. These erosion severity scores indicate that erosion conditions in the Farmington Hills are typical of those seen throughout the study area.

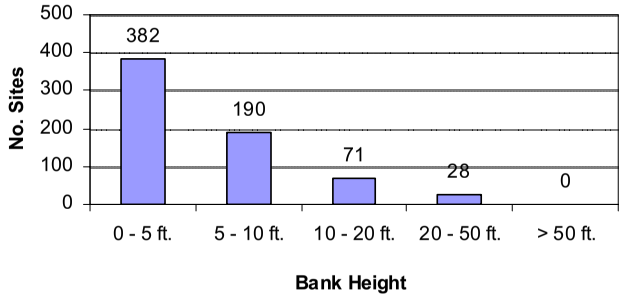
CITY OF FARMINGTON HILLS
Streambank Inventory and Site Prioritization Results

Streambank Characteristics of Inventoried Stations and Reaches

The majority of sites inventoried in the City of Farmington Hills are characterized by steep slopes (2:1 of steeper), heavy vegetative cover (50-100%), and bank heights less than 10 feet. The bar charts below illustrate these characteristics for stations and reaches in Farmington Hills.

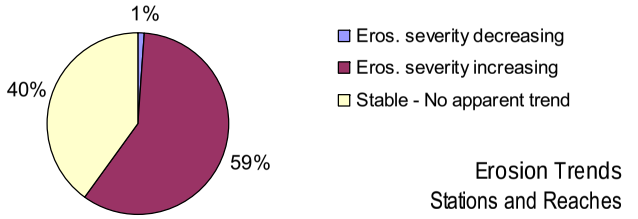






Erosion Characteristics of Inventoried Stations and Reaches

As shown in the pie charts below, approximately 41% of stations and reaches in the City are stable or decreasing in erosion severity, while erosion severity is increasing at 59% of sites. The two primary causes of erosion at inventoried sites are bends in stream reaches (56%) and general erosion around structures (23%).



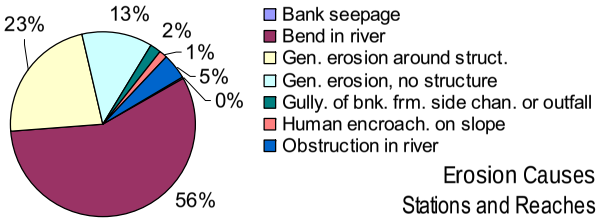


Photo of Typical Streambank

This photo is an example of a stream reach with the typical physical and erosion characteristics of inventoried streams in Farmington Hills.

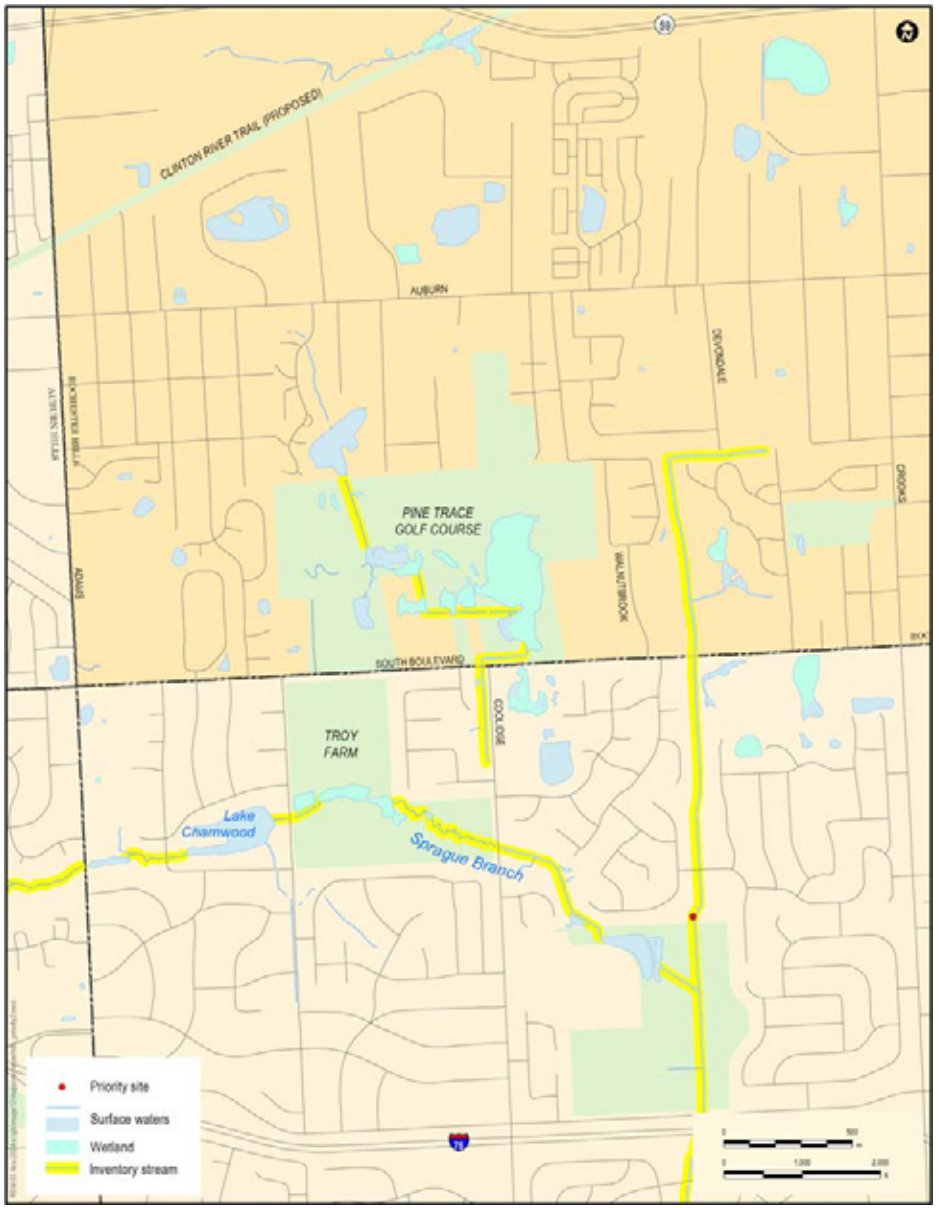


Site No. 10430

Rochester Hills

CITY OF ROCHESTER HILLS

Streambank Inventory and Site Prioritization Results



Inventory Summary

A total of 1.8 miles of stream and river reaches were inventoried in the City of Rochester Hills. Inventoried streams are highlighted in yellow on the map to the left. In these 1.8 miles, characteristics of 20 stations, 11 reaches, and 1 log jam were recorded. After scoring and ranking reaches and stations from the entire project study area, 0 of 177 priority sites were identified in the City. The 177 priority sites were determined to be the most severe sites in the study area.

Erosion Severity Scores

The tables below summarize the site scores for stations and reaches inventoried in City of Rochester Hills and the entire Rouge Main 1-2 Subwatershed study area.

Station and Reach Scores for City of Rochester Hills

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	20	15	40	24
Reaches	11	17	24	20

Station and Reach Scores for the Rouge Main 1-2 Study Area

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	1237	7	68	28
Reaches	989	11	61	23

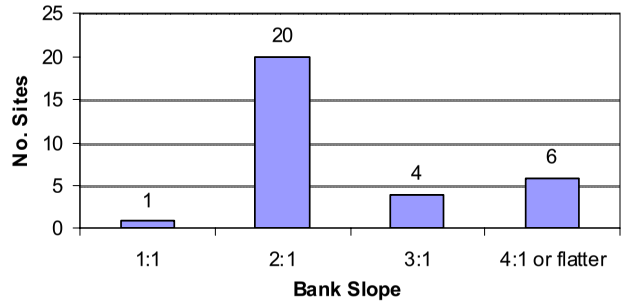
As indicated by the tables, erosion severity scores were lower on average for both stations and reaches in Rochester Hills. Maximum site scores for the City were also well below the maximum scores for the study area. These scores indicate that, relative to other communities in the study area, erosion is generally not as severe in the City.

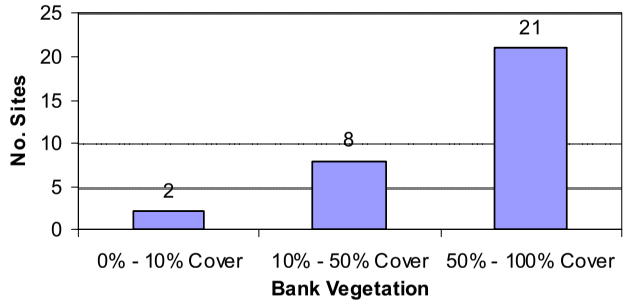
CITY OF ROCHESTER HILLS

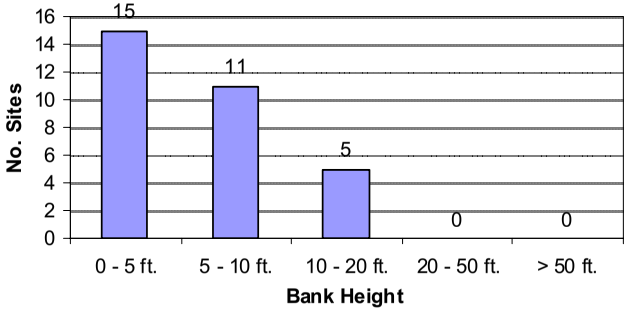
Streambank Inventory and Site Prioritization Results

Streambank Characteristics of Inventoried Stations and Reaches

The majority of sites inventoried in the City of Rochester Hills are characterized by relatively steep slopes (2:1), heavy vegetative cover (50-100%), and bank heights less than 10 feet. The bar charts below illustrate these characteristics for stations and reaches in Rochester Hills.

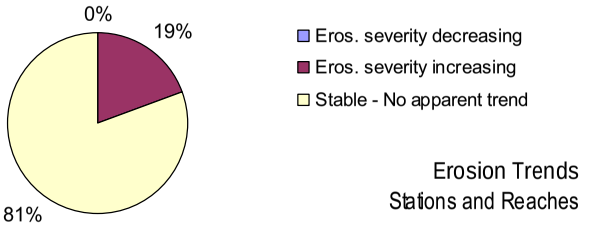






Erosion Characteristics of Inventoried Stations and Reaches

As shown in the pie charts below, approximately 81% of stations and reaches in the City are stable, while erosion severity is increasing at 19% of sites. The two primary causes of erosion at inventoried sites are general erosion around structures (589%) and general erosion where no structures are present (38%).



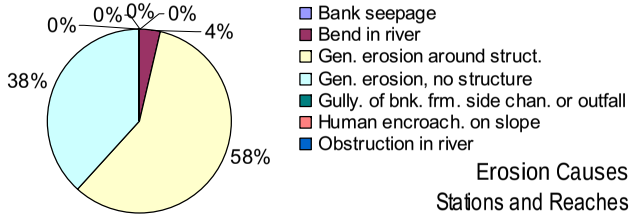


Photo of Typical Streambank

This photo is an example of a stream reach with the typical physical and erosion characteristics of inventoried streams in Rochester Hills.

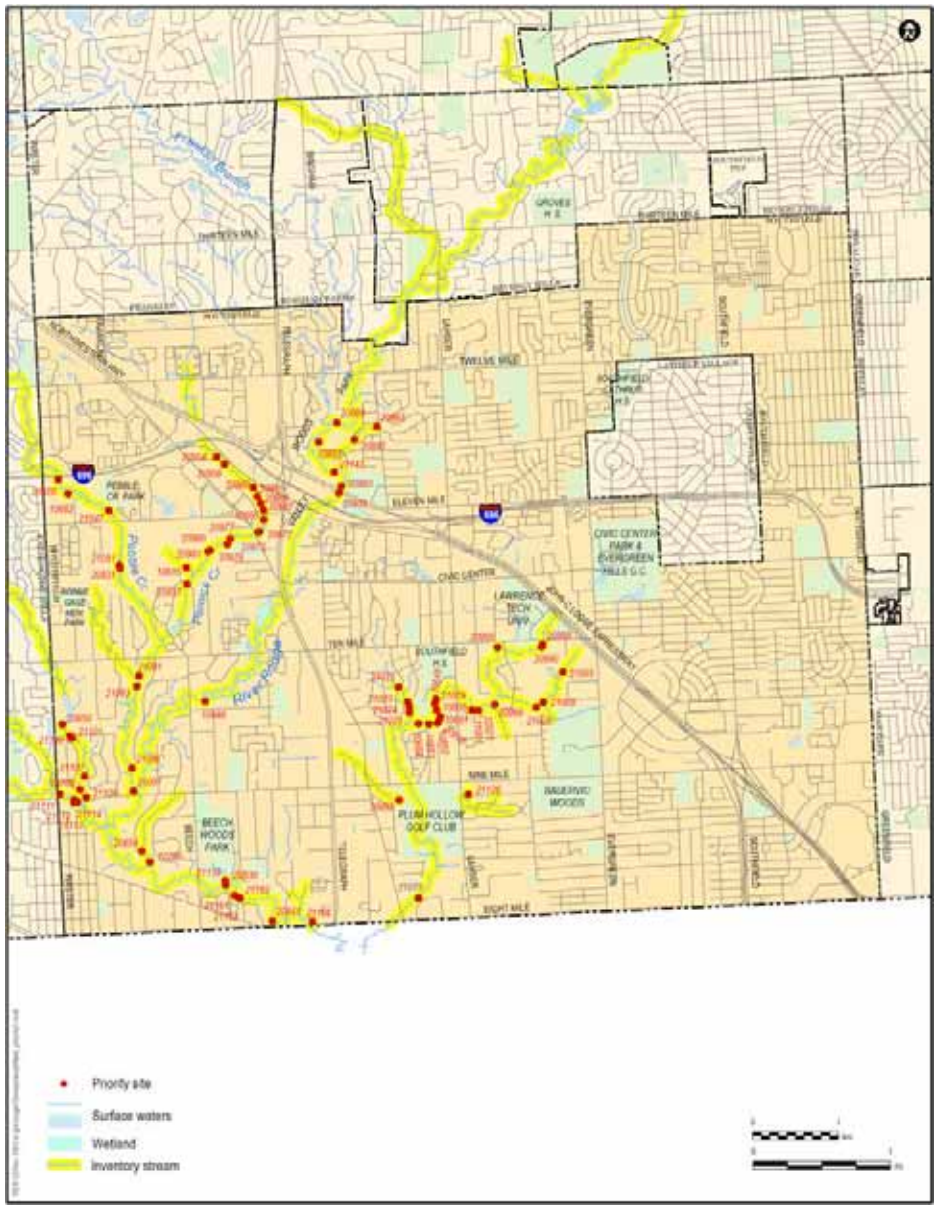


Site No. 10057

Southfield

CITY OF SOUTHFIELD

Streambank Inventory and Site Prioritization Results



Inventory Summary

A total of 28.1miles of stream and river reaches were inventoried in the City of Southfield. Inventoried streams are highlighted in yellow on the map to the left. In these 28.1 miles, characteristics of 327 stations, 275 reaches, and 276 log jams were recorded. After scoring and ranking reaches and stations from the entire project study area, 75 of 177 priority sites were identified in the City. The 177 priority sites were determined to be the most severe sites in the study area. Locations of priority sites in Southfield are indicated by red dots on the map.

Erosion Severity Scores

The tables below summarize the site scores for stations and reaches inventoried in City of Southfield and the entire Rouge Main 1-2 Subwatershed study area.

Station and Reach Scores for the City of Southfield

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	327	9	68	33
Reaches	275	13	41	27

Station and Reach Scores for the Rouge Main 1-2 Study Area

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	1237	7	68	28
Reaches	989	11	61	23

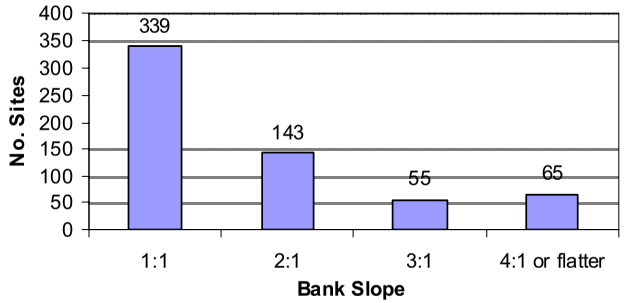
As indicated by the tables, erosion severity scores were higher on average for both stations and reaches in Southfield. The maximum station score for the City was the maximum overall score for the study area. These scores indicate that, relative to other communities in the study area, erosion is generally more severe in the City of Southfield.

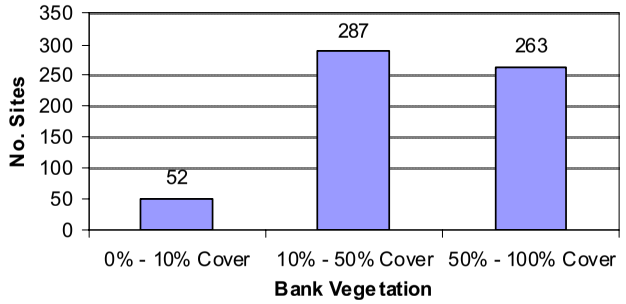
CITY OF SOUTHFIELD

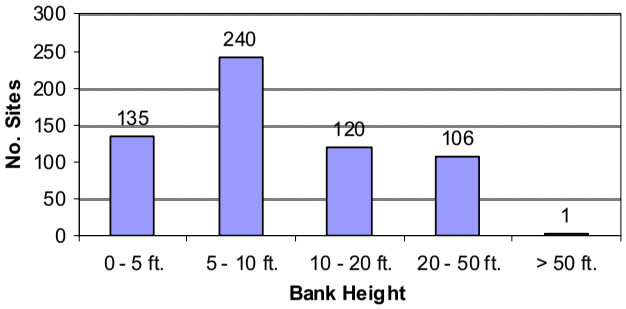
Streambank Inventory and Site Prioritization Results

Streambank Characteristics of Inventoried Stations and Reaches

The majority of sites inventoried in the City of Southfield are characterized by steep slopes (1:1), low vegetative cover (0-50%), and bank heights less than 10 feet. Numerous sites do exist with bank heights ranging from 10 to >50 feet. The bar charts below illustrate these characteristics for stations and reaches in Southfield.

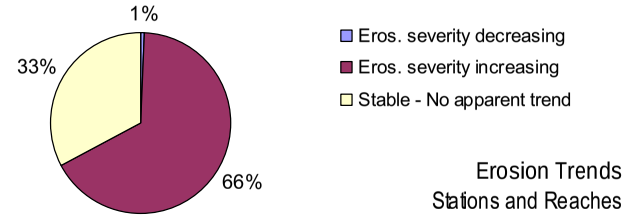






Erosion Characteristics of Inventoried Stations and Reaches

As shown in the pie charts below, approximately 34% of stations and reaches in the City are stable, while erosion severity is increasing at 66% of sites. The two primary causes of erosion at inventoried sites are bends in stream reaches (55%) and general erosion around structures (20%).



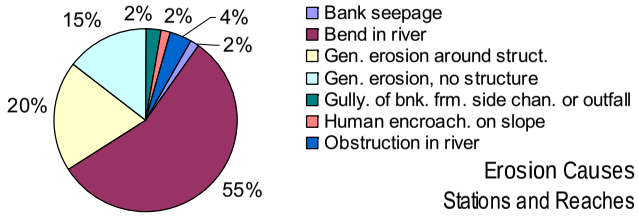


Photo of Typical Streambank

This photo is an example of a stream reach with the typical physical and erosion characteristics of inventoried streams in Southfield. Note that selection of a "typical" site in Southfield is difficult due to the large variation in site characteristics observed in surveyed reaches.



Site No. 10626

Troy

CITY OF TROY

Streambank Inventory and Site Prioritization Results



Inventory Summary

A total of 6.4 miles of stream and river reaches were inventoried in the City of Troy. Inventoried streams are highlighted in yellow on the map to the left. In these 6.4 miles, characteristics of 69 stations, 55 reaches, and 3 log jams were recorded. After scoring and ranking reaches and stations from the entire project study area, 4 of 177 priority sites were identified in Troy. The 177 priority sites were determined to be the most severe sites in the study area. Locations of priority sites in Troy are indicated by red dots on the map.

Erosion Severity Scores

The tables below summarize the site scores for stations and reaches inventoried in the City of Troy and the entire Rouge Main 1-2 Subwatershed study area.

Station and Reach Scores for the City of Troy

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	69	7	60	24
Reaches	55	11	32	22

Station and Reach Scores for the Rouge Main 1-2 Study Area

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	1237	7	68	28
Reaches	989	11	61	23

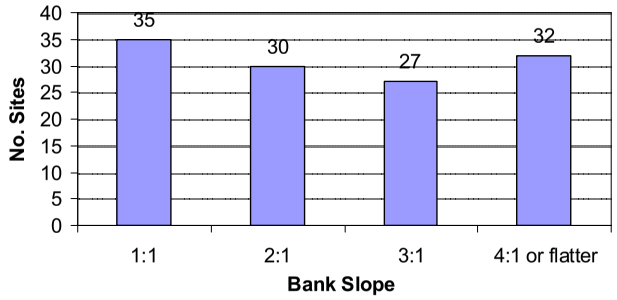
As indicated by the tables, erosion severity scores were lower on average for both stations and reaches in Troy. This indicates that, relative to other communities in the study area, erosion is generally not as severe in the City.

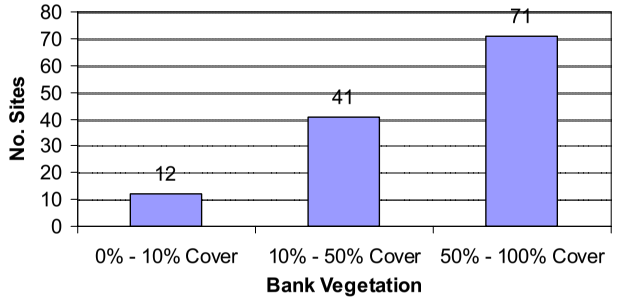
CITY OF TROY

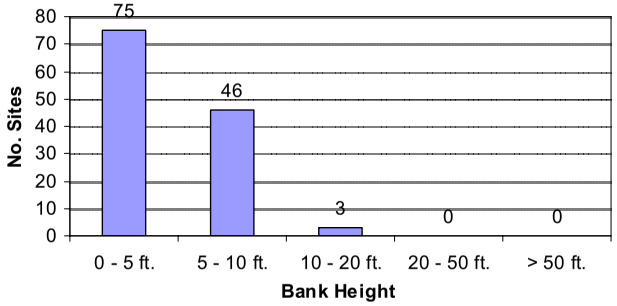
Streambank Inventory and Site Prioritization Results

Streambank Characteristics of Inventoried Stations and Reaches

The streambanks of sites inventoried in the City of Troy are characterized by a range in bank slopes, are mostly vegetated with 50-100% cover, and have bank heights less than 10 feet. The bar charts below illustrate these characteristics for stations and reaches in Troy.

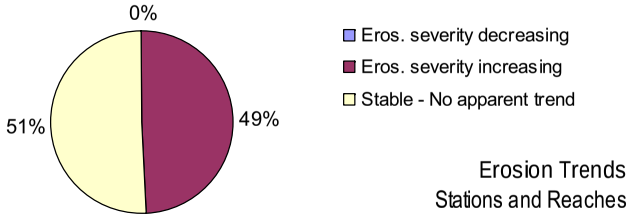






Erosion Characteristics of Inventoried Stations and Reaches

As shown in the pie charts below, approximately half of stations and reaches in the City are stable, while erosion severity is increasing at approximately half of sites. The two primary causes of erosion at inventoried sites are general erosion (37%) and bends in stream reaches (30%).



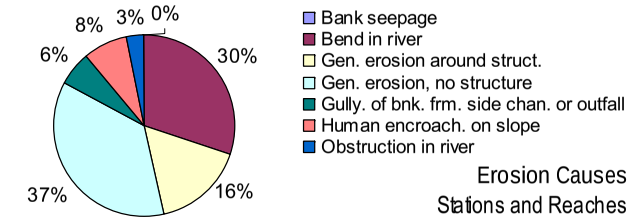


Photo of Typical Streambank

This photo is an example of a stream reach with the typical physical and erosion characteristics of inventoried streams in the City of Troy.



Site No. 10003

West Bloomfield Township

WEST BLOOMFIELD TOWNSHIP

Streambank Inventory and Site Prioritization Results



Inventory Summary

A total of 4.3 miles of stream and river reaches were inventoried in West Bloomfield Township. Inventoried streams are highlighted in yellow on the map to the left. In these 4.3 miles, characteristics of 77 stations, 57 reaches, and 34 log jams were recorded. After scoring and ranking reaches and stations from the entire project study area, 2 of 177 priority sites were identified in the Township. The 177 priority sites were determined to be the most severe sites in the study area. Locations of the priority sites in West Bloomfield are indicated by red dots on the map.

Erosion Severity Scores

The tables below summarize the site scores for stations and reaches inventoried in West Bloomfield Township and the entire Rouge Main 1-2 Subwatershed study area.

Station and Reach Scores for West Bloomfield Township

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	77	10	48	22
Reaches	57	13	27	20

Station and Reach Scores for the Rouge Main 1-2 Study Area

		Site Scores		
Site	No.	Min.	Max.	Avg.
Stations	1237	7	68	28
Reaches	989	11	61	23

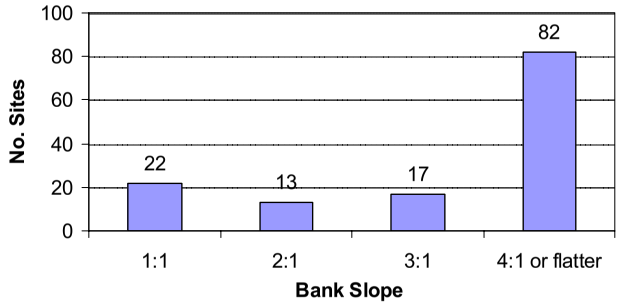
As indicated by the tables, erosion severity scores were lower on average for both stations and reaches in West Bloomfield. This indicates that, relative to other communities in the study area, erosion is generally not as severe in the Township.

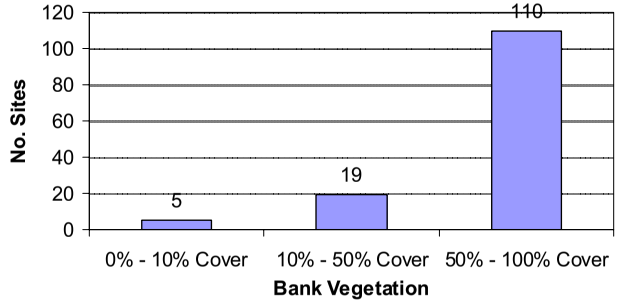
WEST BLOOMFIELD TOWNSHIP

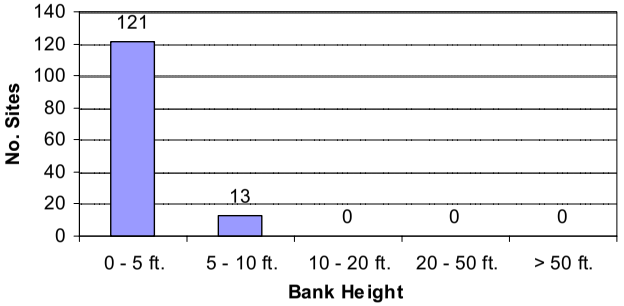
Streambank Inventory and Site Prioritization Results

Streambank Characteristics of Inventoried Stations and Reaches

The majority of sites inventoried in West Bloomfield Township are characterized by flat slopes (4:1), heavy vegetative cover (50-100%), and low bank heights (0 to 5'). The bar charts below illustrate these characteristics for stations and reaches in the Township.

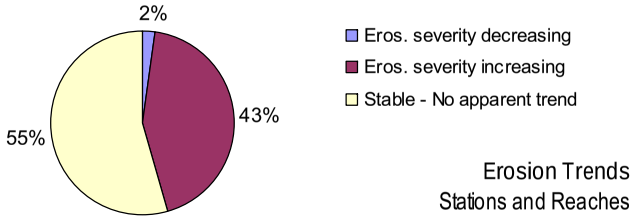






Erosion Characteristics of Inventoried Stations and Reaches

As shown in the pie charts below, approximately 57% of stations and reaches in the Township are stable or decreasing in erosion severity, while erosion severity is increasing at 43% of sites. The three primary causes of erosion at inventoried sites are bends in stream reaches (49%), general erosion around structures (22%), and general erosion where no structures are present (21%).



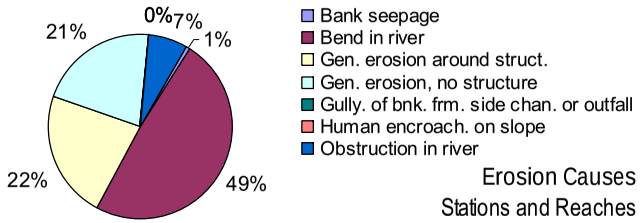


Photo of Typical Streambank

This photo is an example of a stream reach with the typical physical and erosion characteristics of inventoried streams in West Bloomfield Township.



Site No. 10264

PART III:
CONCEPTUAL DESIGNS

INTRODUCTION

This section presents conceptual streambank stabilization designs for 12 sites, as identified in Section 5 of Part I of this report. These conceptual designs are intended to illustrate methods for mitigating the variety of streambank erosion problems that are present in the Rouge Main 1-2 subwatershed and to provide some idea as to the cost of streambank stabilization.

HYDRAULIC ANALYSIS

Streambank stabilization design requires a thorough understanding of stream hydraulics at the project site. Velocities and shear stresses under design flow conditions are a primary consideration in selecting appropriate stabilization measures; typically, bioengineering stabilization methods can be used for design velocities under 8 feet per second (fps), while design velocities greater than 8 fps require hard armoring (Fischenich, 2001). In addition, flow depth under design conditions is a key aspect of stabilization design.

After selecting the 12 sites for conceptual design, a hydraulic analysis was conducted to estimate design flow velocity, shear stress, and depth of flow. The original intent of the study was to use existing hydraulic models from Federal Emergency Management Agency (FEMA) flood studies to generate these parameters, but by the time the final sites were selected and approved, the project schedule did not provide sufficient time to obtain the computer models. The FEMA reports were, however, obtained.

In lieu of hydraulic modeling, engineering calculations were performed assuming uniform flow (i.e. Manning's equation). First, flows were obtained from the Michigan Department of Environmental Quality (MDEQ) Hydrologic Studies Unit for five of the 12 sites. Flows at the other sites were estimated from the MDEQ flows using the drainage area ratio method. This was done because the sites were either very close to other sites, or they had drainage areas that were below the MDEQ estimation threshold (2 square miles). Flow estimates were generated for the 2-year, 10-year, 50-year, and 100-year events. These estimates are summarized in Table 1.

Site No.	Design flow (cfs)			
	2-yr	10-yr	50-yr	100-yr
10652	74	225	452	578
20154	477	845	1,193	1,392
20156	480	850	1,200	1,400
20562	89	111	223	285
20646	39	145	44	177
20774	146	547	166	669
20776	148	557	169	681
20825	6	18	36	46
20893	4	11	23	29
21051	120	380	800	1,000
21112	240	900	274	1,100
21159	700	2,140	4,300	5,500

Table 1: Flow Estimates for Conceptual Design Sites

Channel slopes were measured from USGS topographic maps and Manning's roughness coefficients were obtained from FEMA reports (FEMA, 1979, 1988, 1999). In all cases, a range of roughness coefficients was presented for the reached in question, so the sites were compared to photographs in a standard USGS reference (Barnes, 1967) to determine a reasonable single value. With these values, a rearranged form of Manning's equation was used as follows:

$$\frac{Qn}{S^{1/2}} = AR^{2/3}$$

where:

Q = design flow

n = roughness coefficient

S = channel slope

A = cross-sectional area of flow at design condition

R = hydraulic radius of flow at design condition

For conceptual design purposes, the 10-year flow event was chosen. Although channel-forming discharge is much closer to the 2-year recurrence interval in most cases, it is expected that capital improvement project with a 2-year design life would be unacceptable. Using the 10-year flow, channel slope, and roughness coefficient, the value on the left side of the equation was calculated. The surveyed channel section at each site was then used to develop equations to describe A and P as functions of depth. Substituting these relationships in the rearranged Manning's

equation, the equation could be iteratively solved to determine the appropriate flow depth.

Once the flow depth was determined, the cross-sectional area of flow and the hydraulic radius were used to calculate average flow velocity (V) and shear stress (τ) under design conditions using the following equations:

$$V = \frac{Q}{A}$$

and

$$\tau = \gamma RS$$

where γ = specific weight of water (62.4 lbs/ft^3)

The hydraulic parameter estimates for each site are provided with each conceptual design.

In one case (Site No. 20825, Bingham Farms), the flow channel was so small and poorly defined that usable depth/area and depth/hydraulic radius relationships could not be developed. Given the small drainage area, however, it is likely safe to assume that flows and velocities do not exceed the threshold for the use of bioengineering measures.

At another location (Site No. 20154), even the 2-year event was predicted to overtop the channel banks and enter the floodplain. This may be the actual condition but it cannot be verified with the available information. It is also possible that the channel slope is actually steeper than it appears on the topographic map or the roughness coefficient is actually lower than believed, either of which could significantly effect the calculation of flow depth. In lieu of using the iterative solution described above for this site, Manning's equation was used to determine the flow that completely fills the channel. Hydraulic parameters under this condition were used for the stabilization design.

It should be noted that the hydraulic analysis presented here was only intended as a preliminary analysis to support conceptual design. Final site designs for streambank stabilization should be supported by a complete site survey and thorough hydraulic analysis, including computer modeling to evaluate upstream impacts if necessary.

COST ESTIMATES

Cost estimates are provided for the streambank stabilization measures recommended in each conceptual design. These cost estimates were developed using unit costs from current technical references and quantity estimates based on site inspection. The unit costs used herein are summarized in Table 2.

Stabilization Method	Unit	Unit Cost	Explanation	Reference
Bioengineering Methods				
brushlayering	ft^2	$1.10 to $2.20	(with staff and/or volunteers)	Allen and Fischenich, 2001
	ft^2	$2.30 to $4.60	(with contractor)	"
vegetated geogrid	l.f.	$105		Allen and Leech, 1997
	s.f.	$15 to $35		Sotir and Fischenich, 2003
coir roll	l.f.	$12 to $36		Allen and Fischenich, 2000
live fascines	l.f.	$10 to $30		Sotir and Fischenich, 2001
live stakes	ea.	$1.50 to $3.50		Gray and Sotir, 1996
joint planting	ea.	$2.00 to $9.00		"
live crib wall	ft^2	$10 to $25	4 ft^2 per l.f. of bank typ.	"
plant plugs	ea.	$1.50		typ.
Armoring Methods				
gabions	yd^3	$150 to $450		Freeman and Fischenich, 2000
	l.f.	$20 to $30	for 1' x 3' basket	Rouge, 2001
riprap	s.y.	$25 to $35	for plain 8" riprap	"
	s.y.	$30 to $45	for plain 16" riprap	"
	ton	$20	includes delivery & placement	Allen and Leech, 1997
	c.y.	$44	assumes 165 lb/ft^3 and $20/ton	Allen and Leech, 1997

Table 2: Unit Costs for Streambank Stabilization Measures

It should be noted that these unit costs represent total installed costs, which includes materials, labor and equipment. Stabilization measures will typically be less expensive if installed by municipal crews and more expensive if installed by private contractors. Furthermore, these costs do not include other project costs such as engineering design, permitting, easements, service procurement, ancillary construction costs, and project management.

USE OF CONCEPTUAL DESIGNS

The conceptual designs presented in this report are intended to illustrate how a variety of streambank erosion problems can be mitigated and to demonstrate the application of various stabilization measures. The conceptual designs are not intended to support project construction; in all cases additional data and analysis are required to complete a final design. Finally, it should be recognized that, in some cases, multiple stabilization techniques may be applicable and the conceptual designs presented here are not the only possible mitigation design.

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Site No. 10649-10652 (Evans Drain, Southfield)

Problem Description

Site No. 10649-10652 consists of a relatively long reach of Evans Drain in the City of Southfield between Nine Mile and Ten Mile Roads. The site was originally logged as four separate reaches, due to varying channel characteristics. In review, however, it was determined that similar erosion problems exist throughout the area and form one long area of concern. The site is approximately 1,435 feet long. The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem.

Banks on both sides of the channel in this site, which reach heights from five to ten feet above the channel bottom, are eroding. Erosion typically starts at the toe of the bank and extends up the bank three to five feet. This reach is potentially one of the most significant bank erosion areas in the Rouge Main 1-2 subwatershed, in terms of sediment loading. The deeply incised nature of the channel in many places is likely attributable to the fine silt and clay soils. Land use in the vicinity of the site is primarily commercial/corporate. The site is depicted in Figure 1.



Figure 1. Bank Erosion at Site No. 10649-10652.

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. It should be noted, however, that the channel cross-section throughout the reach varies considerably. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

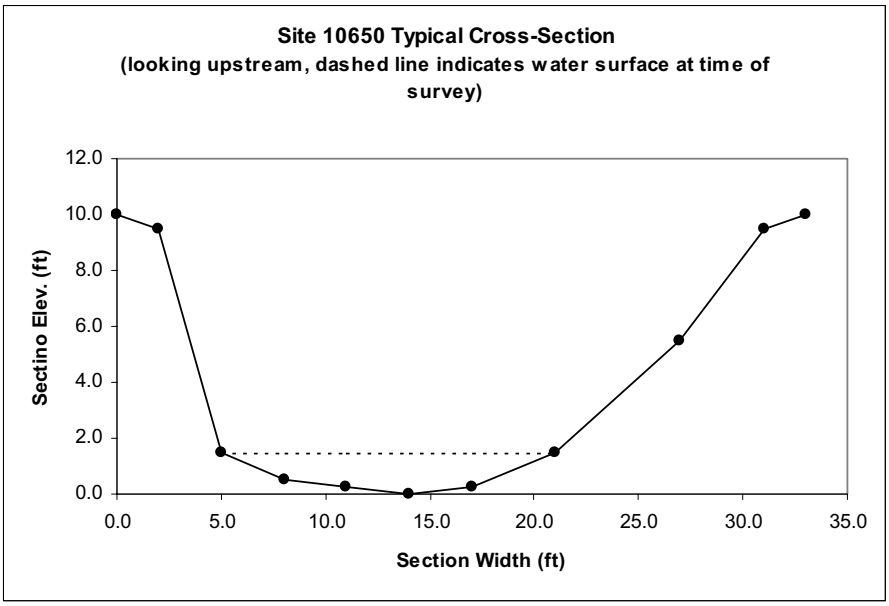


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
10-yr flow (cfs)	2140
Channel slope (ft/ft)	0.001
Roughness coefficient	0.03
Depth, center (ft)	5.9
Velocity, ave. (ft/sec)	14.8
Shear stress, ave. (lb/ft^2)	0.2

Table 1. Hydraulic Design Conditions for Site No. 10649-10652.

Recommended Stabilization Design

The preliminary hydraulic analysis conducted in support of conceptual design indicates that the 10-year flow will have an average velocity of 14.8 ft/sec, which exceeds the threshold for bioengineering methods (8 ft/sec). However, this is an extremely high velocity, calling into question the applicability of the simple analysis Mannings calculation for this site.

If the velocity is really as high as indicated under design conditions, channel armoring would be required to stabilize the banks and it is likely that relatively large stone sizes would be necessary. Given the detrimental ecological impact of armoring more than 1400 feet of channel, other options should be considered.

Assuming the hydraulic analysis accurately reflects site conditions, the recommended stabilization design for this site includes the following elements:

- Regrading of the banks to reduce their slope from nearly vertical to approximately 2:1.
- Installation of riprap armoring, sized to withstand the erosive force of the design flow.
- Installation of joint planting in the riprap, using live stakes. Joint planting of riprap is illustrated in Figure 3.

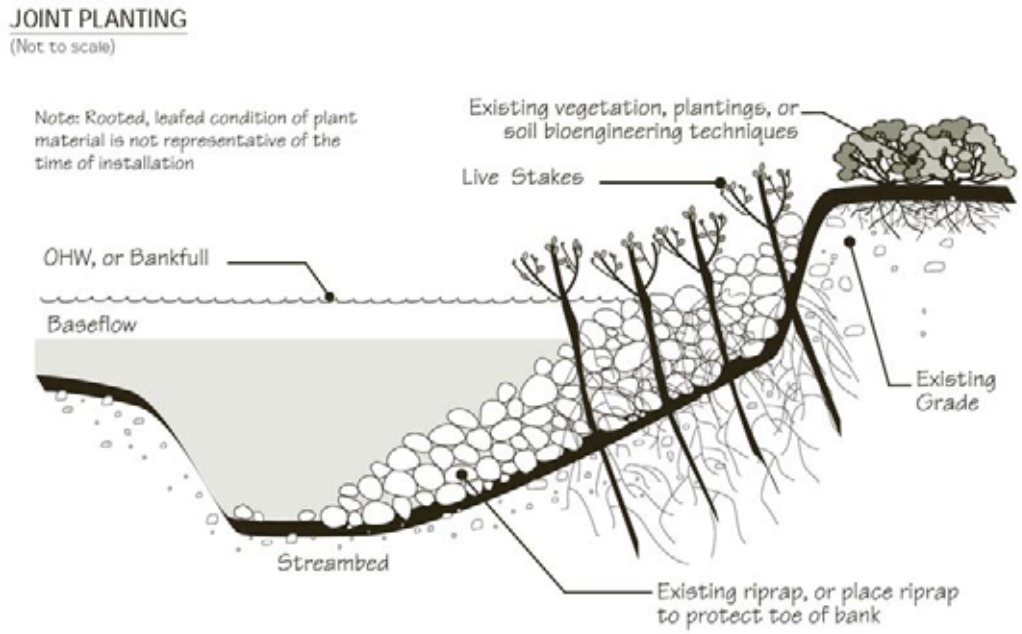


Figure 3. Typical Design for Joint Planting of Riprap (Source: USFS, 2002).

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Earthwork	c.y.	$15	5400	$81,000
Riprap	ton	$20	1800	$36,000
Joint plantings	ea.	$3	15,000	$45,000
			Total:	$165,000

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. Actual costs will depend on material availability and market pricing. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.

Because of the unusually high velocities predicted by the preliminary hydraulic analysis, a detailed hydraulic analysis should be conducted before final design. If the velocities under design conditions are as high as predicted by the preliminary analysis, it may be possible to reduce stormwater flows through the reach by way of upstream hydrologic controls. This should be evaluated in conjunction with the hydraulic analysis.







Reach is approximately 1,435' long and exhibits ongoing bank erosion on both sides of the stream, with more severe erosion on the outer bends. Stream is almost completely separated from the floodplain by steep (1:1 or greater) banks, approximately 8' high. This reach is a major contributor of suspended solids to the Rouge River system, due to bank erosion. Continued erosion may threaten private property.

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ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Sites 10649-10652
Southfield, Michigan
Unnamed Stream, Tributary to River Rouge

SHEET 1

PROBLEM DESCRIPTION

0 50 100 ft



Limno-Tech, Inc.
Ann Arbor, Michigan

Site No. 20154 (Rouge River, Troy)

Problem Description

Site No. 20154 is located on the Rouge River in Troy, immediately downstream from a grade control structure. One major erosion problem exists at this site. There is a bend in the river immediately downstream of the grade control structure and a stormwater outfall has been placed in the middle of the bend, leading to severe bank erosion adjacent to the outfall. The entire end section of the concrete outfall is exposed.

The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem. The site is located in a residential area and is depicted in Figure 1.



Figure 1. Bank Erosion Immediately Downstream of Exposed Stormwater Outfall at Site No. 20154.

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

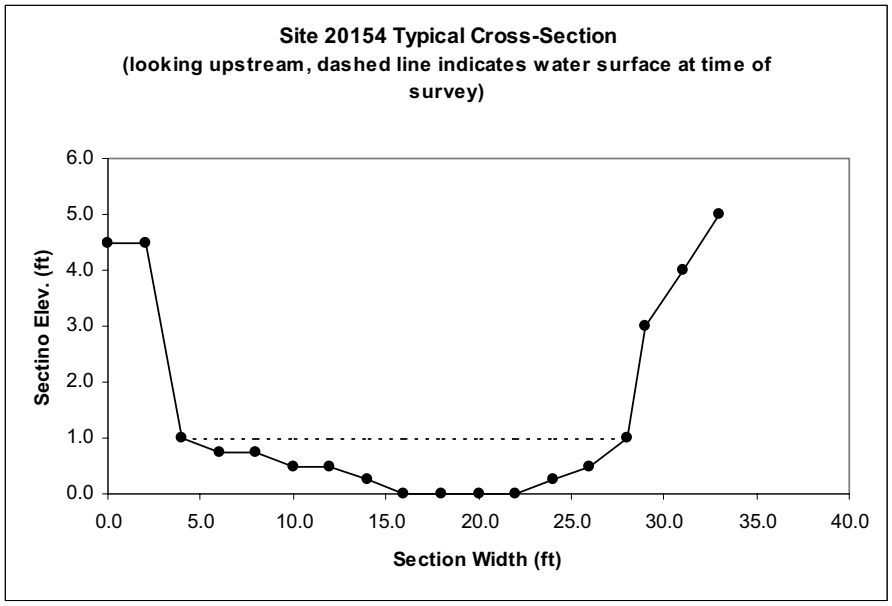


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
Channel-full flow (cfs)	200
Channel slope (ft/ft)	0.0011
Roughness coefficient	0.025
Depth, center (ft)	4.5
Velocity, ave. (ft/sec)	1.8
Shear stress, ave. (lb/ft^2)	0.1

Table 1. Hydraulic Design Conditions for Site No. 20154.

Recommended Stabilization Design

The velocity estimated by the preliminary hydraulic analysis (1.8 ft/sec) is well within the range for bioengineering methods, therefore hard armoring of the banks would not normally be necessary. However, the presence of the stormwater outfall structure is apparently causing turbulence and recirculation within the river, leading to excessive erosion around the structure. For this reason, riprap armoring of the banks adjacent to the outfall is recommended, following removal of the exposed concrete pipe end section. Replacement of the concrete wing wall may not be necessary if riprap is properly designed.

Eroded banks elsewhere in the vicinity can be stabilized using bioengineering techniques, but a thorough hydraulic analysis should be conducted prior to final design because the rapidly changing channel geometry (alignment and width) brings into question the validity of Manning's equation for this site.

Assuming that bioengineering methods are feasible for this site, the recommended stabilization design for this site includes the following elements:

- Backfilling and grading of eroded bank immediately downstream from outfall for a distance of 32 feet.
- Regrading of banks downstream of filled area (20' further) and upstream of outfall (20').
- Riprap armoring of the bank surrounding the outfall for 4' upstream and 8' downstream.
- Toe protection using coir logs or soil-filled geotubes outside of riprap area (20' in downstream direction, 20' in upstream direction).
- Erosion control blanket coverage of regraded banks for short-term stability until vegetative growth matures, except where riprap is placed.
- Seeding and live stake placement to promote vegetative growth.

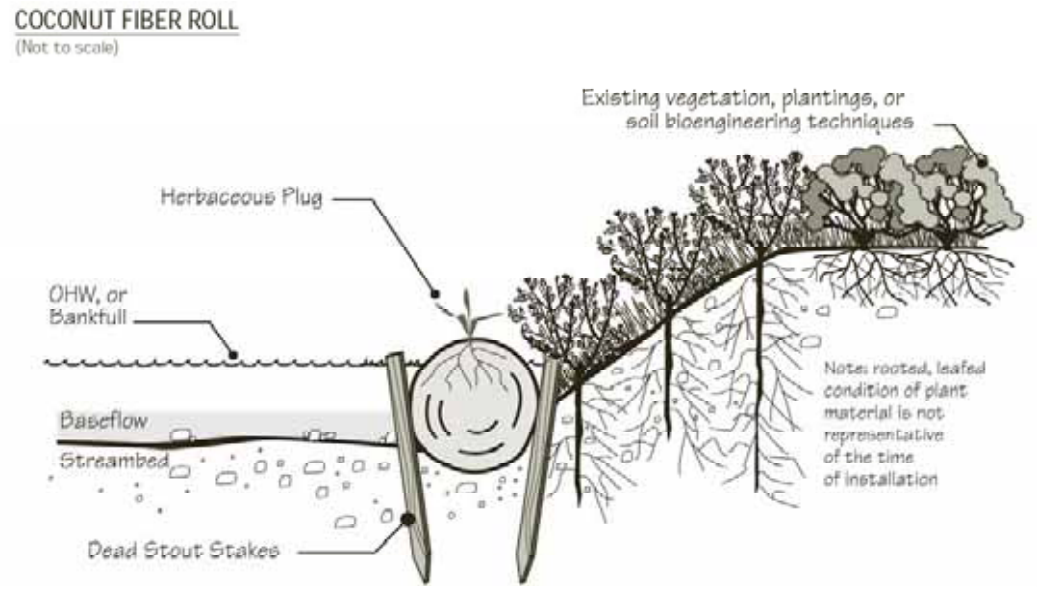


Figure 3. Typical Design for Coir Fiber Log for Toe Protection (Source: USFS, 2002).

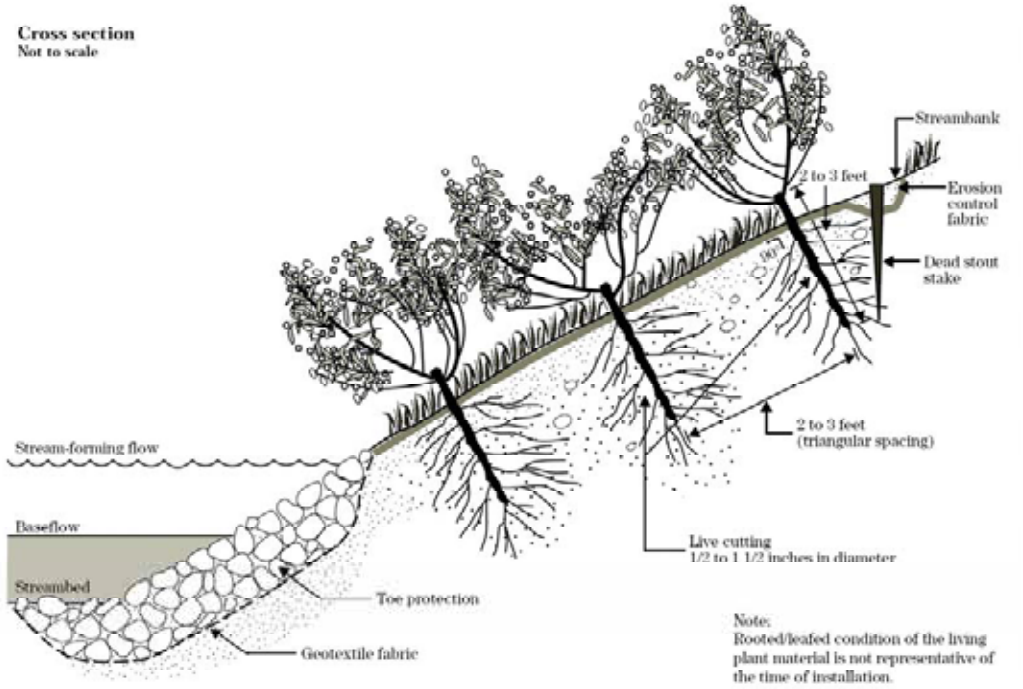


Figure 4. Typical Design for Live Stakes with Erosion Control Blanket for Streambank Protection (Source: NRCS, 1996).

Although Figure 4 shows stone toe protection, this is not necessary for Site No. 20154, unless indicated by further hydraulic analysis. As described above, riprap armoring of the banks adjacent to the stormwater outfall is recommended.

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Earthwork	c.y.	$15	97	$1,455
Riprap	ton	$20	10	$200
Coir log	l.f.	$25	60	$1,500
Erosion control blanket	s.y.	$2.50	40	$100
Live stakes	ea.	$2.50	360	$900
			Total:	$4,155

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.



Concrete storm outfall placed on outer bank at sharp bend in river has exacerbated bank erosion. End section of outfall pipe is exposed. Recirculation on downstream side of outfall has exacerbated erosion.

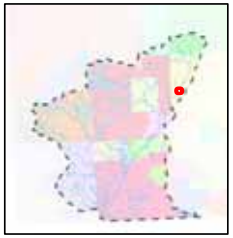
ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 20154
Troy, Michigan
River Rouge

SHEET 1

PROBLEM
DESCRIPTION

0 50 100
ft



Limno-Tech, Inc.
Ann Arbor, Michigan

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Site No. 20156 (Rouge River, Troy)

Problem Description

Site No. 20156 is located on the Rouge River in Troy, several hundred feet upstream from Beach Road. One major erosion problem exists at this site. A stormwater outfall was constructed with the outlet pointing in a downstream direction, which has caused bank erosion downstream from the outfall. Streambanks elsewhere in the vicinity of this site exhibit only slight erosion.

The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem. The site is located in a residential area and is depicted in Figure 1.



Figure 1. Bank Erosion Immediately Downstream of Exposed Stormwater Outfall at Site No. 20156.

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

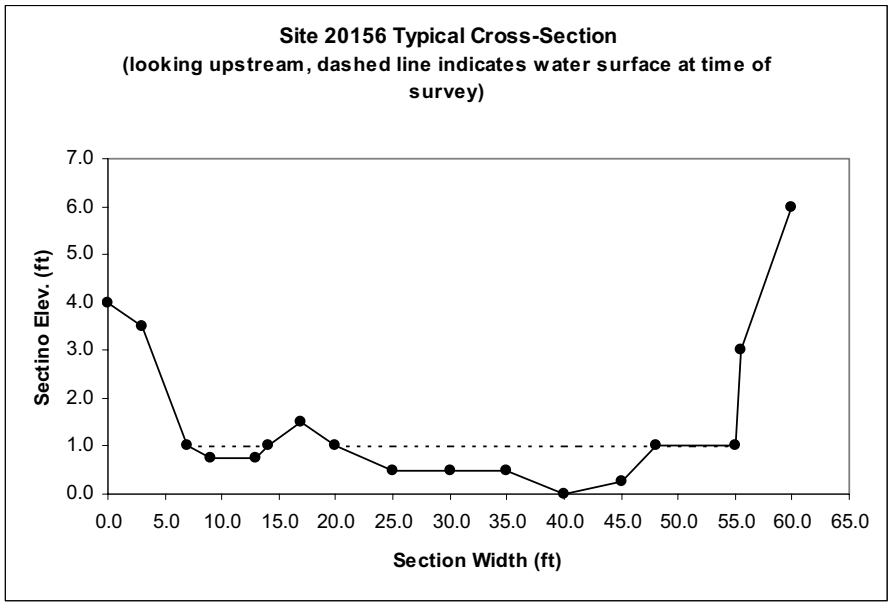


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
10-yr flow (cfs)	850
Channel slope (ft/ft)	0.0011
Roughness coefficient	0.03
Depth, center (ft)	6.4
Velocity, ave. (ft/sec)	4.1
Shear stress, ave. (lb/ft^2)	0.3

Table 1. Hydraulic Design Conditions for Site No. 20156.

Recommended Stabilization Design

The velocity estimated by the preliminary hydraulic analysis (1.8 ft/sec) is well within the range for bioengineering methods, therefore hard armoring of the banks would not normally be necessary. However, it is apparent that the major bank erosion problem is not caused by ambient flow, but by stormwater discharging from the outfall. Because there is insufficient information to estimate this flow, the recommended stabilization design assumes that velocities can exceed eight feet per second and that hard armoring of the bank is necessary. Site inspection indicates that a concrete sack revetment was used in the past to stabilize a portion of the bank located approximately 20 to 25 feet downstream of the outfall, but the area between this concrete revetment and the outfall is unprotected and is eroding.

The recommended stabilization design for this site includes the following elements:

- Regrading of the downstream bank, including eroded portion, portion with concrete sack revetment, and 10 feet beyond concrete sack revetment (approximately 45' feet total).
- Riprap armoring of the bank from toe to top of bank, 5' upstream and 45' downstream.

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Earthwork	c.y.	$15	45	$675
Riprap	ton	$20	31	$620
			Total:	$1,295

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.





KINGSBURY

BEACH RD

WENTWORTH AVE

Concrete storm outfall directed at downstream angle is eroding bank.

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ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 20156
Troy, Michigan
River Rouge

SHEET 1

PROBLEM
DESCRIPTION

0 50 100
ft



Limno-Tech, Inc.
Ann Arbor, Michigan

Site No. 20562 (Pebble Creek, Farmington Hills)

Problem Description

Site No. 20562 is located on Pebble Creek in the City of Farmington Hills, immediately east of Danvers Drive and north of Twelve Mile Road. Sheet 1 shows a plan view of the site area, as well as site photographs depicting the erosion problem. The north streambank downstream of the 7' CMP culvert under Danvers Drive is eroded, as are the embankments immediately adjacent to the culvert. It appears that poured concrete was used in an attempt to stabilize part of the northern embankment in the past, but the concrete has failed and large pieces now lie in the creek. The creek meanders downstream of the culvert and approximately 130' of the northern bank is currently eroded to a steep face.

An impoundment exists upstream of the culvert with a vertical spillway immediately upstream of the culvert. The impoundment is currently almost filled with sediment and has a standing water depth of approximately one foot. In this condition, the impoundment can provide little storm flow attenuation and likely contributes to excessive velocities downstream.



Figure 1. Bank Erosion at Site No. 20562.

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

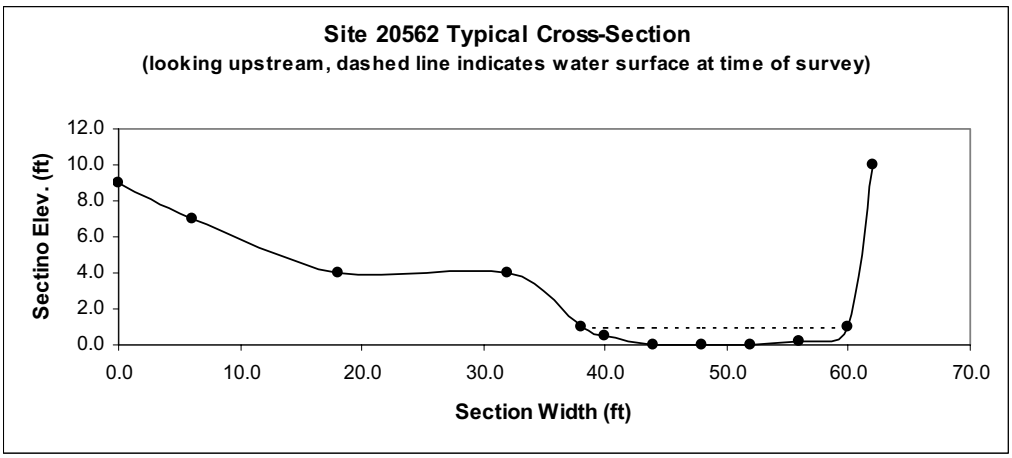


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
10-yr flow (cfs)	111
Channel slope (ft/ft)	0.0045
Roughness coefficient	0.03
Depth, center (ft)	1.9
Velocity, ave. (ft/sec)	2.9
Shear stress, ave. (lb/ft^2)	0.4

Table 1. Hydraulic Design Conditions for Site No. 20562.

Recommended Stabilization Design

The estimated velocity for the 10-year design event flow for this site is only 2.9 cfs, therefore bioengineering methods will be feasible at this site. Because of the potential threat to the stability of the Danvers Drive crossing, riprap armoring of the embankments adjacent to the culvert is recommended.

The recommended stabilization design for this site includes the following elements:

- Riprap stabilization of the embankments immediately adjacent to the Danvers Drive culvert.
- Regrading of approximately 130 l.f. of the northern streambank to a slope of 2:1 or less.
- Toe stabilization with coir logs (or soil-filled geotubes).
- Riprap for end protection of coir logs.
- Brushlayering on the upper banks (above the toe protection) with live stakes.

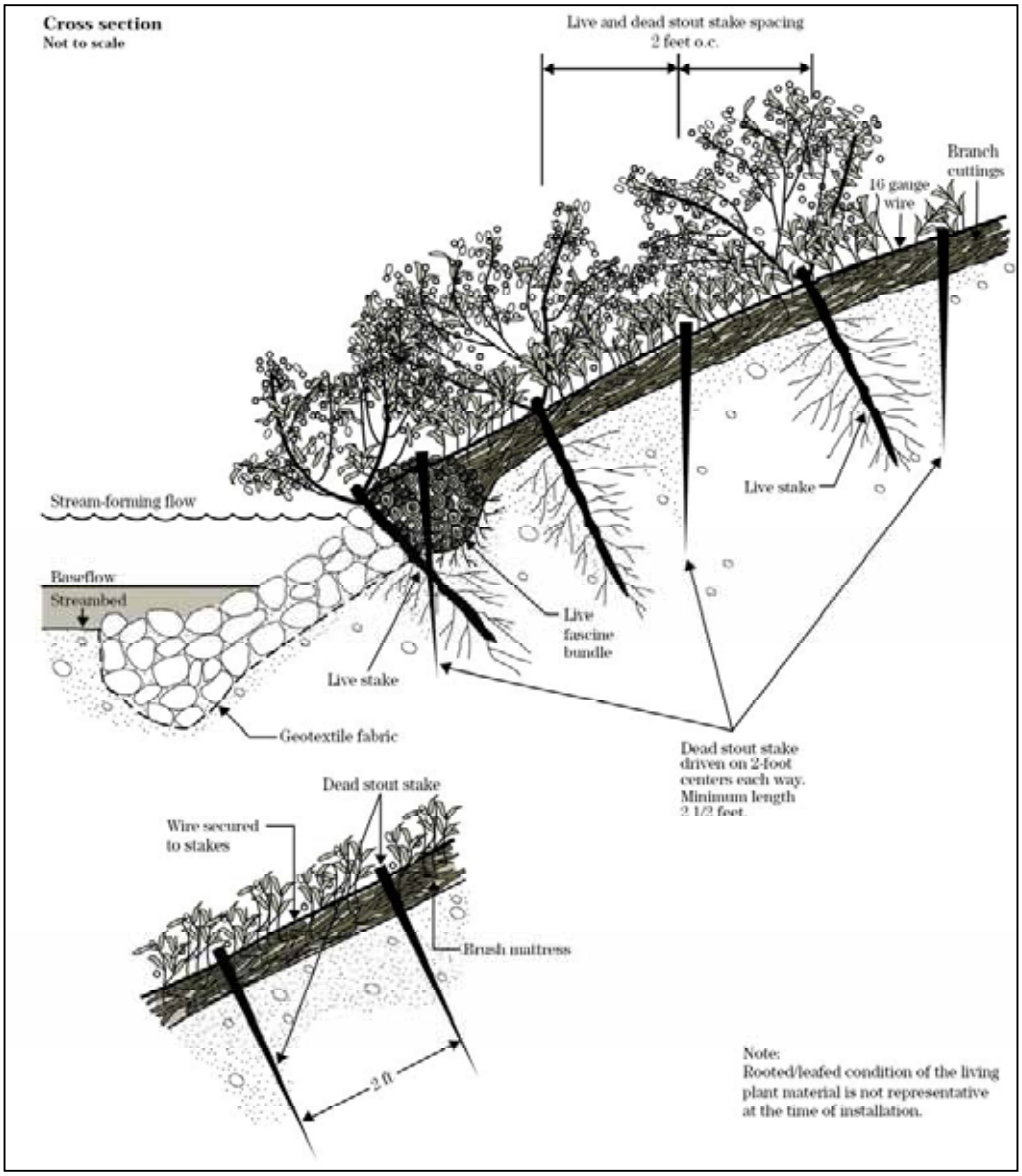


Figure 3. Typical Brushlayering Details (Source: NRCS, 1996).

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Riprap (embankment)	ton	$20	20	$400
Earthwork	c.y.	$15	300	$4,500
Coir logs	l.f.	$25	130	$3,250
Brushlayering	ft^2	$4	1040	$4,160
Riprap (end protection)	ton	$20	3	$60
			Total:	$12,370

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.

ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 20562
Farmington Hills, MI
Pebble Creek

SHEET 1
PROBLEM
DESCRIPTION





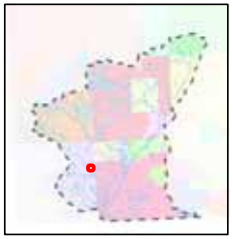


DANVERS DR

TWELVE MILE RD

0 50 100
ft

Approximately 150' of north bank, immediately downstream of 7' CMP culvert at Danvers Rd., is eroded to a shear face. Apparent cause is high flood flows from culvert.



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Ann Arbor, Michigan

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Site No. 20646 (Trib. A - Main Ravines Drain, Farmington Hills)

Problem Description

Site No. 20646 is located on Tributary A of the Main Ravines Drain in Farmington Hills. The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem. A stormwater outfall was constructed with the outlet pointing in a downstream direction, which has caused bank erosion downstream from the outfall. Streambanks elsewhere in the vicinity of this site exhibit only slight erosion. The site is depicted in Figure 1.



Figure 1. Bank Erosion Downstream of Stormwater Outfall at Site No. 20646 (Photo taken looking downstream).

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

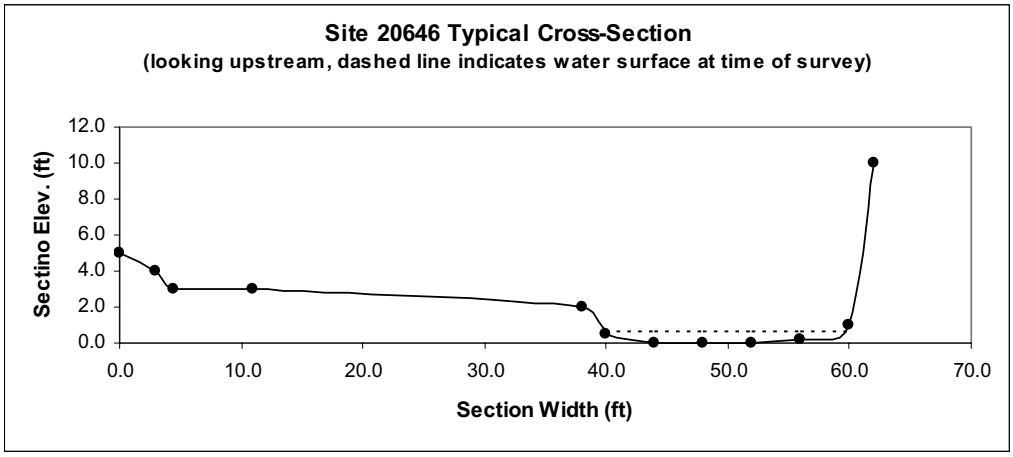


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
10-yr flow (cfs)	44
Channel slope (ft/ft)	0.0072
Roughness coefficient	0.03
Depth, center (ft)	1.7
Velocity, ave. (ft/sec)	3.1
Shear stress, ave. (lb/ft^2)	0.5

Table 1. Hydraulic Design Conditions for Site No. 20646.

Recommended Stabilization Design

The velocity estimated by the preliminary hydraulic analysis (3.1 ft/sec) is within the range for bioengineering methods (i.e. less than 8 ft/sec), therefore hard armoring of the banks would not normally be necessary. However, it is apparent that the major bank erosion problem is not caused by ambient flow, but by stormwater discharging from the outfall. Because there is insufficient information to estimate this flow (and velocity), the recommended stabilization design assumes that velocities can exceed 8 ft/sec and that armoring of the bank is necessary.

The recommended stabilization design for this site includes the following elements:

- Regrading of the banks to provide a clean base for gabions. This will require clearing of brush and small trees, but is unavoidable given space constraints.

- Installation of stone-filled gabions to protect the bank downstream of the outfall.

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Earthwork	c.y.	$15	30	$450
Gabions	c.y.	$300	7	$2,100
			Total:	$2,550

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. Actual costs will depend on material availability and market pricing. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.







ASTOR

PURDUE AVE

GLENMOOR HTS DR

COLGATE AVE

SHIAWASSEE RD

NINE MILE RD

Banks around storm water outfall are eroding, probably due to high storm flows causing turbulence and recirculation.

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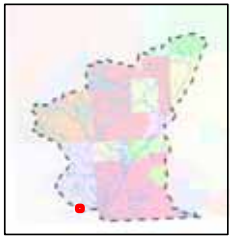
ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 20646
Farmington Hills, MI
Small Unnamed Stream, Tributary to River Rouge

SHEET 1

PROBLEM DESCRIPTION

0 50 100 ft



Limno-Tech, Inc.
Ann Arbor, Michigan

Site No. 20774 (Main Ravines Drain, Farmington Hills)

Problem Description

Site No. 20774 is located on the Main Ravines Drain in the City of Farmington Hills. The site is a relatively high, steep slope adjacent to a residential area. The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem.

A slope failure area measuring approximately 25' high and 50' wide at the base has developed on the south side of the stream channel. The cause of the failure cannot be determined without further investigation, but it appears to be a combination of toe erosion (the failure is on the outside of a mild bend), a steep slope, and disposal of wood and concrete debris at the top of the slope. Accumulated debris at the base of the slope appears to be providing some temporary toe protection. The site is depicted in Figure 1.



Figure 1. Bank Erosion at Site No. 20774.

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

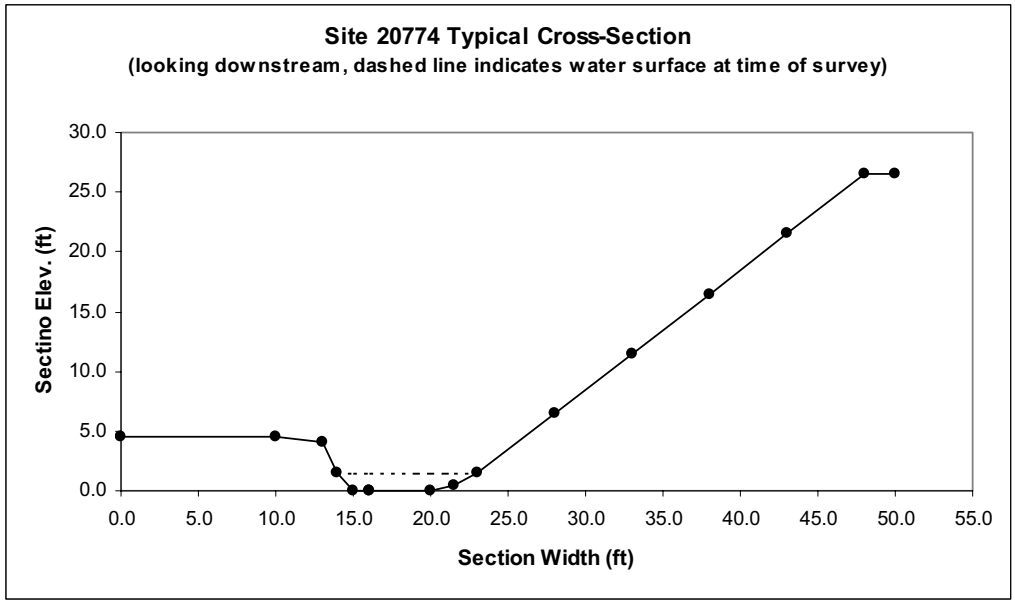


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
10-yr flow (cfs)	166
Channel slope (ft/ft)	0.0062
Roughness coefficient	0.03
Depth, center (ft)	3.9
Velocity, ave. (ft/sec)	4.6
Shear stress, ave. (lb/ft^2)	0.9

Table 1. Hydraulic Design Conditions for Site No. 20774.

Recommended Stabilization Design

The estimated velocity under design conditions (4.6 ft/sec) is within the range for bioengineering methods (8 ft/sec). Given the height of the slope, however, stone toe protection is recommended. Bioengineering methods can then be used on the upper bank areas.

The recommended stabilization design for this site includes the following elements:

- Stone toe protection along base of failure area, extending slightly upstream and downstream as well (70' total). Existing debris at toe can likely be buried behind stone toe protection
- Backfilling and grading of slope above toe protection to create a good base for bioengineering methods and maintain a slope less than 1:1.
- Live fascines on lower half of slope. Figure 3 shows a typical design for live fascines.
- Pre-seeded erosion control blanket on the upper portion of the slope.

Because of the height of the failure area, a geotechnical investigation & slope stability analysis is recommended before final design for this site.

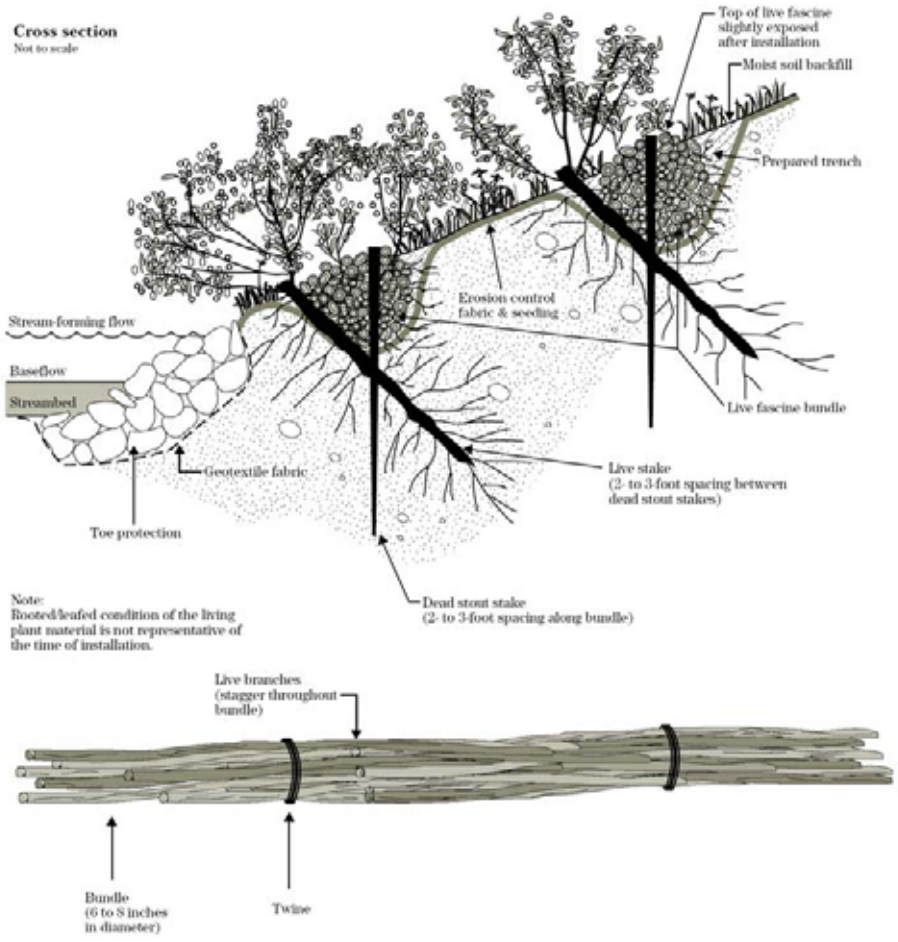


Figure 3. Typical Design for Live Fascines for Streambank Protection (Source: NRCS, 1996).

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Stone toe protection	l.f.	$100	70	$7,000
Earthwork	c.y.	$15	50	$750
Live fascines	l.f.	$30	120	$3,600
Erosion control blanket	s.y.	$2.50	40	$100
			Total:	$11,450

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. Actual costs will depend on material availability and market pricing. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.



ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 20774
Farmington Hills, MI
Unnamed Stream, Tributary to River Rouge

SHEET 1

PROBLEM DESCRIPTION

0 50 100 ft

Steep bank section (approximately 25' high and 50' wide) is experiencing sliding failure due to toe erosion. Fallen concrete, logs, and other debris from above appear to be providing some toe protection currently.



Limno-Tech, Inc.
Ann Arbor, Michigan

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Site No. 20776 (Main Ravines Drain, Farmington Hills)

Problem Description

Site No. 20776 is located on the Main Ravines Drain in the City of Farmington Hills. The streambank at this location is part of a relatively high, steep slope adjacent to a residential area. The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem.

The erosion problem at this site is apparently due to the failure of a large tree that has fallen across the stream with its root ball against the east bank. The tree has apparently caused higher flows to back up, which has results in severe erosion of the base of the east bank. The site is depicted in Figure 1.



Figure 1. Bank Erosion at Site No. 20776.

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

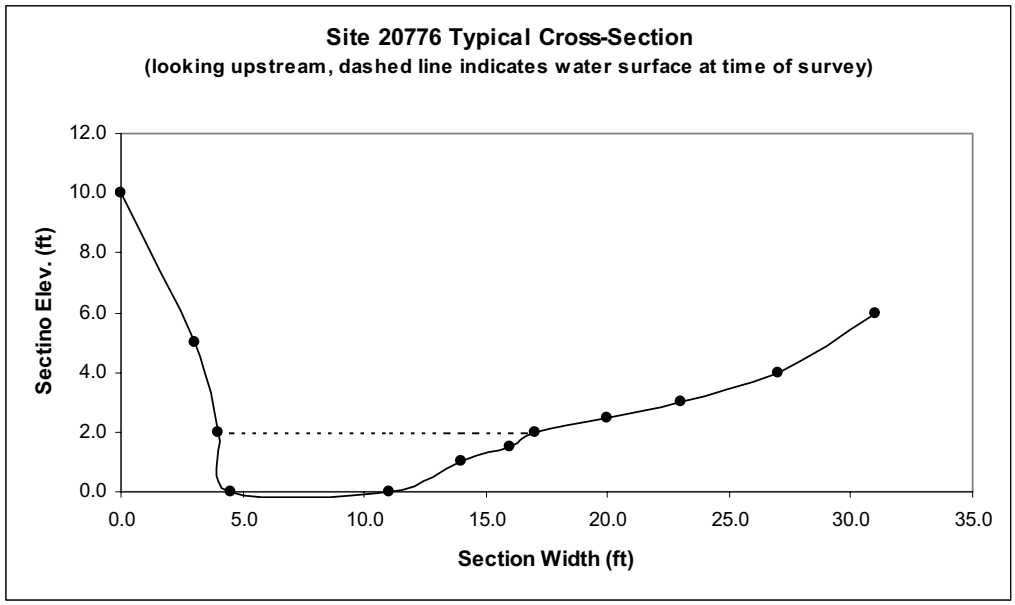


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
10-yr flow (cfs)	169
Channel slope (ft/ft)	0.0062
Roughness coefficient	0.03
Depth, center (ft)	3.2
Velocity, ave. (ft/sec)	4.0
Shear stress, ave. (lb/ft^2)	0.7

Table 1. Hydraulic Design Conditions for Site No. 20776.

Recommended Stabilization Design

The estimated velocity under design conditions (4.0 ft/sec) is within the range for bioengineering methods (8 ft/sec). Given the height of the slope, however, stone toe protection is recommended. Bioengineering methods can then be used on the upper bank areas.

The recommended stabilization design for this site includes the following elements:

- Removal of the fallen tree.
- Stone toe protection along base of eroded area, extending slightly upstream and downstream as well (75' total).
- Backfilling and grading of slope behind and above toe protection to create a good base for bioengineering methods and maintain a slope less than 1:1.
- One row of live fascines just above the stone toe protection. Figure 3 shows a typical design for live fascines.
- Pre-seeded erosion control blanket on the upper portion of the slope.

Because of the height of the failure area, a geotechnical investigation & slope stability analysis is recommended before final design for this site.

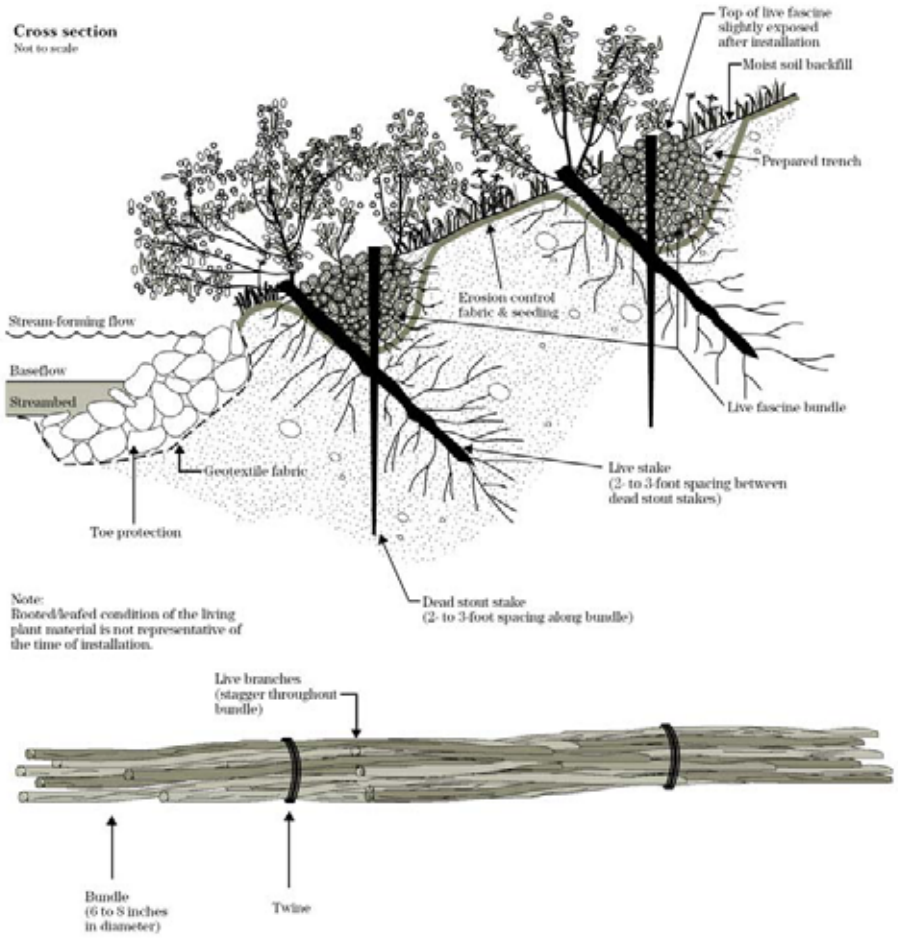


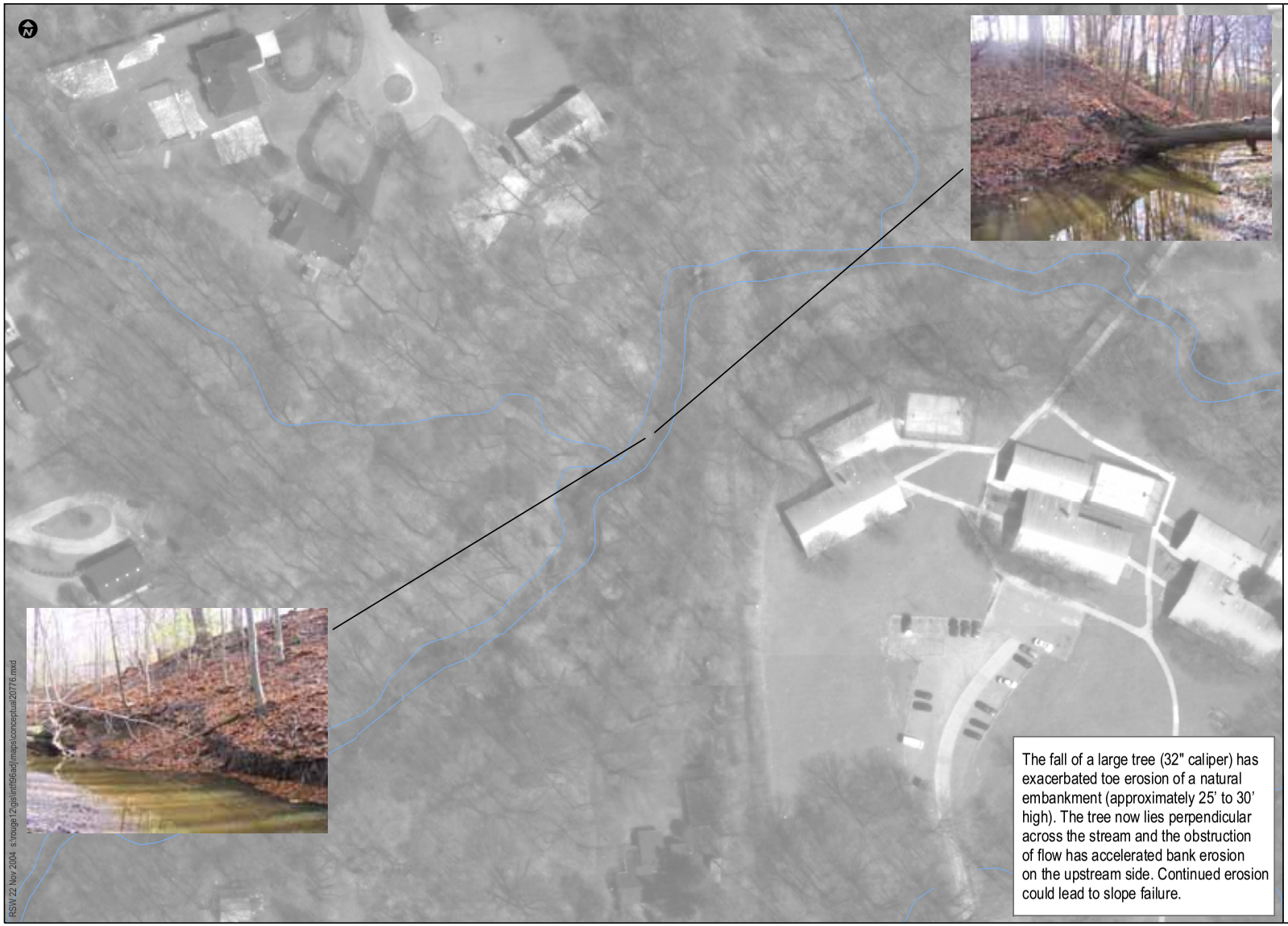
Figure 3. Typical Design for Live Fascines for Streambank Protection (Source: NRCS, 1996).

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Stone toe protection	l.f.	$100	75	$7,000
Earthwork	c.y.	$15	95	$1,425
Live fascines	l.f.	$30	55	$1,650
Erosion control blanket	s.y.	$2.50	100	$250
			Total:	$10,325

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. Actual costs will depend on material availability and market pricing. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.



The fall of a large tree (32" caliper) has exacerbated toe erosion of a natural embankment (approximately 25' to 30' high). The tree now lies perpendicular across the stream and the obstruction of flow has accelerated bank erosion on the upstream side. Continued erosion could lead to slope failure.

ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 20776
Farmington Hills, MI
Unnamed Stream, Tributary to River Rouge

SHEET 1

PROBLEM DESCRIPTION

0 50 100 ft



Limno-Tech, Inc.
Ann Arbor, Michigan

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Site No. 20825 (Unnamed Tributary, Bingham Farms)

Problem Description

Site No. 20825 is located on a small, unnamed tributary to the Rouge River in Bingham Farms, near Bingham Lane. At this location, Guy-wire anchors for a utility pole have been planted very close to the stream channel and are being exposed by erosion. Although not a major source of sediment loading to the Rouge, this is a common type of problem in urbanized watersheds. Left unchecked, any erosion could lead to fail of the guy-wires and, subsequently, the pole.

The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem. The site is located in a residential area and is depicted in Figure 1.



Figure 1. Bank Erosion Near Utility Pole Guy-Wires at Site No. 20825.

Hydraulic Conditions for Design

The channel at Site Number 20825 is not sufficiently well-defined to determine a typical cross-section. For this reason, it was not possible to complete a hydraulic analysis of the site using the methods employed in this study.

However, given that the drainage area for this site is less than one square mile, it is unlikely that it experiences flows high enough to cause velocities in excess of 8 feet per second, therefore bioengineering methods would be applicable here.

Recommended Stabilization Design

Given the small area and presumably low flows and velocities at this site, bioengineering methods are likely applicable. In an unobstructed area, it might be possible and economical to realign the shallow channel away from the guy-wires, however a large tree prevents this approach at Site Number 20825.

In lieu of channel realignment, the recommended stabilization design for this site includes the following elements:

- Coir log stabilization of the channel banks.
- Backfilling and regrading of earth to fully bury guy-wire anchors.
- Erosion control blanket for stabilization of the disturbed areas.

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Earthwork (channel realignment & fill)	c.y.	$15	10	$150
Coir logs	l.f.	$25	40	$1,000
Erosion control blanket	s.y.	$2.50	8	$20
			Total:	$1,170

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.







Ground is eroding around guy-wire anchors near stream, probably due to overbank flooding during storm events. Continued ground erosion around guy-wires could lead to pole failure.

BINGHAM LN

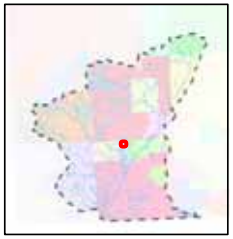
ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 20825
Bingham Farms, MI
Small Unnamed Stream, Tributary to River Rouge

SHEET 1

PROBLEM DESCRIPTION

0 50 100 ft



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Limno-Tech, Inc.
Ann Arbor, Michigan

Site No. 20893 (Unnamed Tributary to Rouge River, Southfield)

Problem Description

Site No. 20893 is located on an unnamed tributary to the Rouge River in the City of Southfield, immediately west of Bell Road. The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem.

Flow passes under Bell Road through 60-inch concrete pipe and the banks adjacent to the pipe were stabilized using gabions in the past. The gabions have now failed, apparently due to improper stone sizing and bed and toe erosion. Collapsed gabions now lie in the stream, creating a flow obstruction and further exacerbating erosion.

Approximately 175 feet downstream from Bell Road, the stream channel bends sharply to the west, creating a bend of roughly 90^{o}. Approaching the bend, the banks on the east side of the stream are eroded to near-vertical slopes as high as 18 feet. Erosion along this bank is severe, appears to be progressing, and clearly threatens the riparian residential properties. Based on the large area of exposed earth along the western bank, this site is a significant source of sediment loading.



Figure 1. Bank Erosion at Site No. 20893.

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

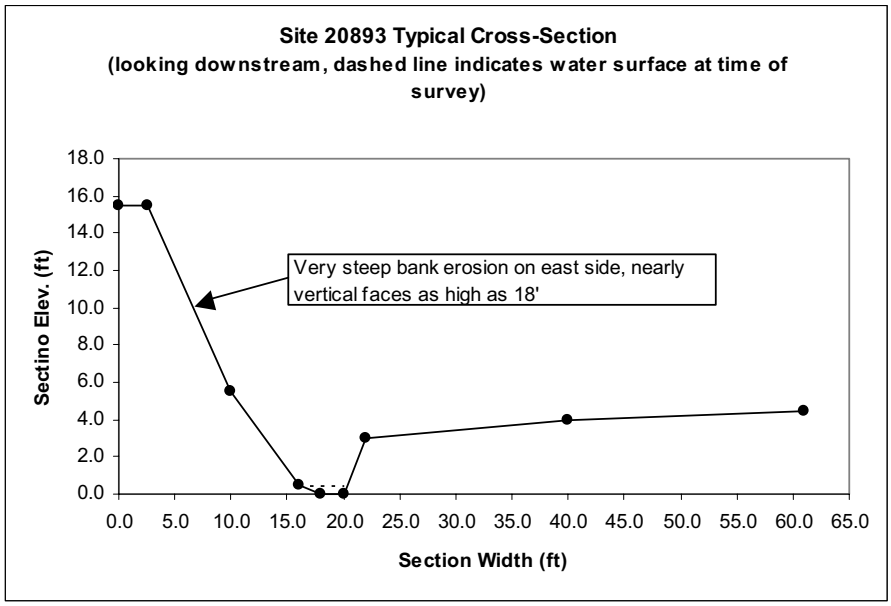


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
10-yr flow (cfs)	11
Channel slope (ft/ft)	0.00119
Roughness coefficient	0.0575
Depth, center (ft)	1.5
Velocity, ave. (ft/sec)	1.6
Shear stress, ave. (lb/ft^2)	0.6

Table 1. Hydraulic Design Conditions for Site No. 20893.

Recommended Stabilization Design

The 10-year design event flow for this site is estimated at only 11 cfs, resulting in a relatively low velocity (1.6 ft/sec) under design conditions, which indicates that bioengineering methods will be feasible at this site. However, it is difficult to correlate the failed gabions and severe bank erosion evident at the site with these relatively mild hydraulic conditions, therefore detailed hydrologic and hydraulic analysis of the site are strongly recommended prior to final design of streambank stabilization measures.

Assuming that the estimates of hydraulic design conditions are reasonably accurate, potential stabilization methods are limited by the height and steepness of the bank on the east side of the stream. Further assuming that cutting the slopes back to the east would unacceptable to riparian land owners, the recommended design must involve building out the base of the east bank, thus shifting the channel to the west. The greatest shift will be at the point closest to the upstream side of the bend, where the bank is the highest and steepest. This realignment of the channel will result in a reduced bank slope on the east and a less severe bend in the river, which should reduce the erosive force on the outer bank of the bend.

Given the relatively low design velocities, vegetated geogrids are recommended for rebuilding the east bank. A typical vegetated geogrid design is illustrated in Figure 3. Because the maximum recommended height for a single geogrid series is eight feet, it will be necessary to construct them in tiers, with the top of the first series being stepped back before the second (upper) series is installed. Assuming a final bank slope of 1.5:1 with the bank height varying from 9 feet to 18 feet, the base of the east bank will be shifted approximately 5 to 10 feet or more from its present location.

In summary, the recommended stabilization design for this site includes the following elements:

- Channel realignment to increase bank slope on the east side of the stream and decrease the curvature of the bend.
- Stone toe protection along the length of the outer bend.
- Vegetated geogrids to stabilize the east bank, increasing the slope to approximately 1.5:1.
- Coir log toe protection along the inner bank of the realigned channel.
- Erosion control blankets with seeding and live stakes along the inner bank of the realigned channel
- Gabion replacement adjacent to 60” concrete pipe.

This conceptual design assumes that a 1.5:1 slope is inherently stable for the native soils on the east bank at this site. Given the height of the bank, a geotechnical investigation and analysis should be conducted as part of final design to determine the stability of the present slope and to determine the minimum stable slope.

The detailed hydraulic analysis for this site should examine the potential for bed erosion immediately downstream of the concrete pipe and evaluate the need for bed protection or energy dissipation at that location.

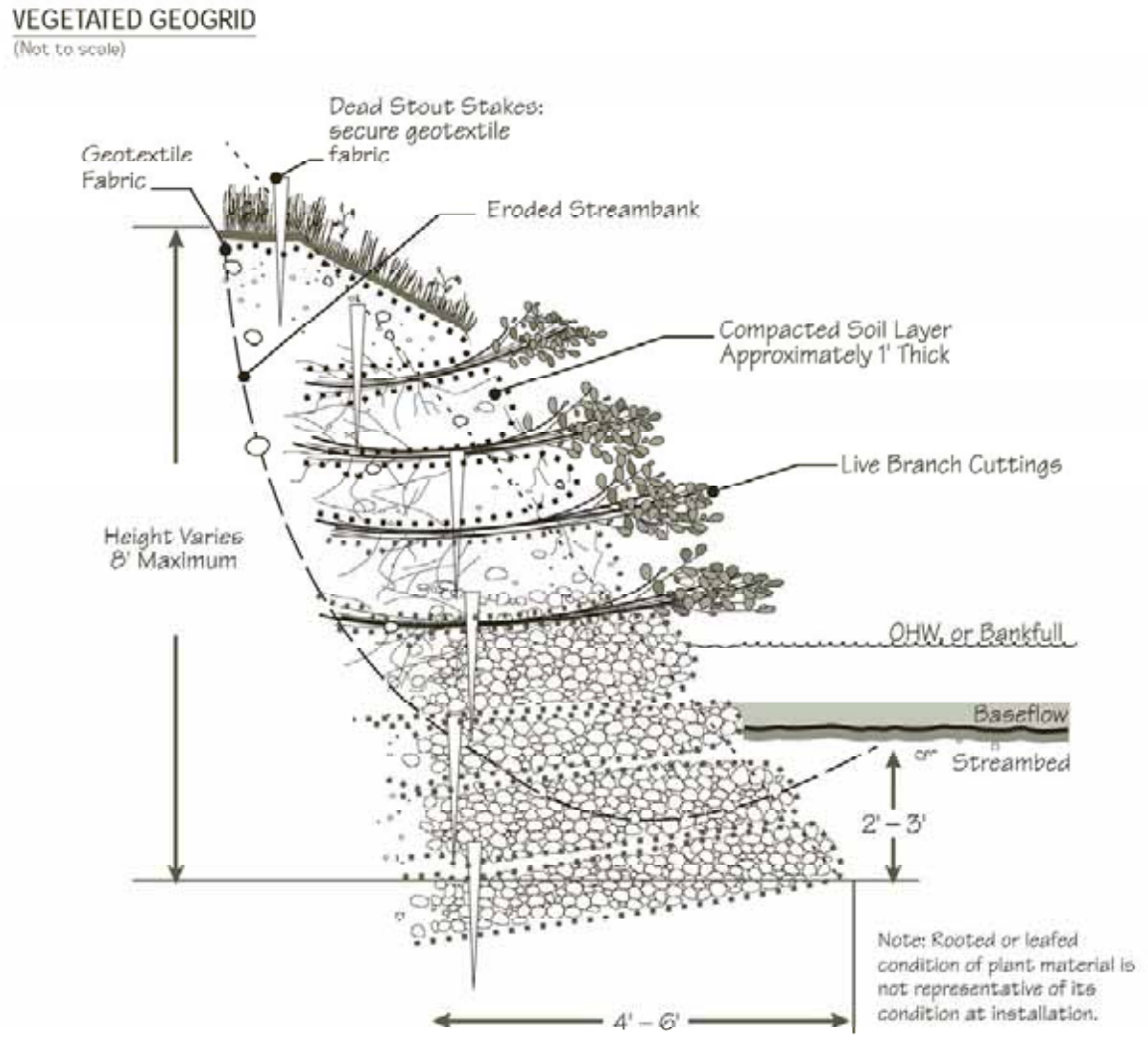


Figure 3. Vegetated Geogrid Design for Streambank Protection (Source: USFS, 2002).

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Earthwork (channel realignment)	c.y.	$15	1700	$25,500
Stone toe protection	l.f.	$100	150	$15,000
Vegetated geogrid	ft^2	$30	2700	$81,000
Coir log toe protection	l.f.	$25	150	$3,750
Erosion control blanket	s.y.	$2.50	90	$225
Live stakes	ea.	$2.50	750	$2,100
Gabion replacement	c.y.	$300	50	$15,000
			Total:	$142,575

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.







BROOKS LN

VALLEY CREST LN

TWYCKINGHAM WAY

BELL RD

LAUREL VALLEY DR

60" concrete pipe discharges upstream of sharp bend, resulting in channel incision, outer bank erosion. Erosion of outer bank has resulted in extremely steep banks abutting private property.

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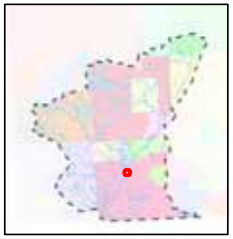
ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 20893
Southfield, Michigan
Tributary to
River Rouge

SHEET 1

PROBLEM
DESCRIPTION

0 50 100
ft



Limno-Tech, Inc.
Ann Arbor, Michigan

Site No. 21051 (Pebble Creek, Southfield)

Problem Description

Site No. 21051 consists of a bank failure on the outer bend of a meander in Pebble Creek, in the City of Southfield. The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem.

A slope failure area measuring approximately 20' high and 65' wide at the base has developed on the east side of the creek channel. The cause of the failure cannot be determined without further investigation, but it appears to be a combination of toe erosion and a steep slope along an outer bend. The site is depicted in Figure 1 and is located adjacent to the Holy Sepulchre cemetary.



Figure 1. Bank Erosion at Site No. 21051.

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

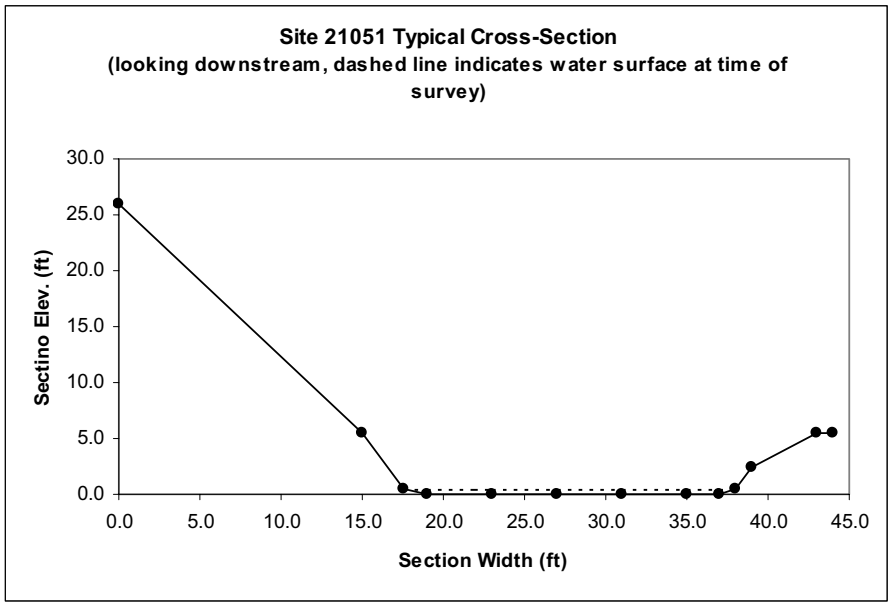


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
10-yr flow (cfs)	380
Channel slope (ft/ft)	0.004
Roughness coefficient	0.03
Depth, center (ft)	6.4
Velocity, ave. (ft/sec)	4.9
Shear stress, ave. (lb/ft^2)	0.6

Table 1. Hydraulic Design Conditions for Site No. 21051.

Recommended Stabilization Design

The estimated velocity under design conditions (4.9 ft/sec) is within the range for bioengineering methods. Given the height of the slope, however, stone toe protection is recommended. Bioengineering methods can then be used on the upper bank areas.

The recommended stabilization design for this site includes the following elements:

- Live crib wall along the base of the slope. This structure will provide very good toe protection and push the base out four to six feet, allowing backfill above to reduce the slope in the failed area.
- Backfilling and grading of slope above the crib wall to create a good base for bioengineering methods and maintain a slope less than 1:1.
- Pre-seeded erosion control blanket on the upper portion of the slope.
- Riprap protection on the upstream and downstream ends of the cribwall.

Because of the height of the failure area, a geotechnical investigation & slope stability analysis is recommended before final design for this site.

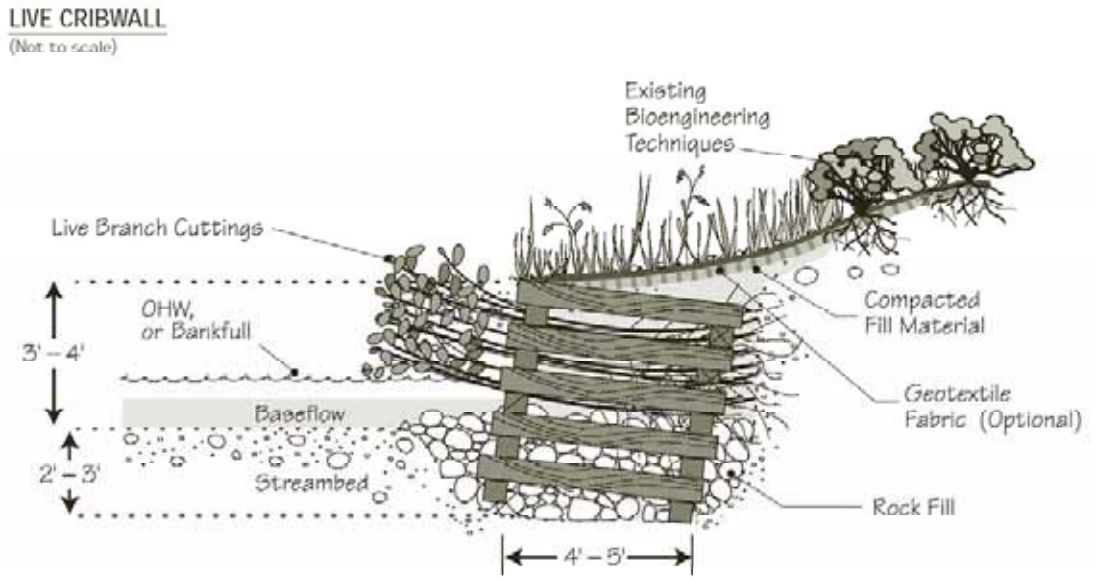


Figure 3. Typical Design of Live Cribwall for Streambank Protection (Source: USFS, 2002).

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Live crib wall	ft^2	$25	600	$15,000
Earthwork	c.y.	$15	120	$1,800
Riprap (end protection)	ton	$20	20	$400
Erosion control blanket	s.y.	$2.50	100	$250
			Total:	$17,450

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. Actual costs will depend on material availability and market pricing. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.







Slump failure of slope (approximately 20' high by 65' long) on outer bend due to toe erosion. Upper scarp of failure zone is approximately 20' from road in cemetery.

ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 21051
Southfield, Michigan
Pebble Creek

SHEET 1

PROBLEM
DESCRIPTION

0 50 100
ft



Limno-Tech, Inc.
Ann Arbor, Michigan

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Site No. 21112 (Farmington Branch, Southfield)

Problem Description

Site No. 21112 is located immediately upstream of the Nine Mile Road bridge on Farmington Branch, which was built on a meander of the stream. Two erosion problems exist at this site:

- There is a sharp bend in the stream immediately upstream of the bridge and the outer bank is eroding from just upstream of the bend, to the eastern bridge abutment (approximately 200 ft).
- The bank at the western bridge abutment is also eroding from the momentum of the water coming around the bend and being redirected under the bridge.

The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem. Although the bridge does not appear to be in imminent danger, stabilization measures should be taken to prevent further erosion around the structure. Along the banks, erosion has exposed tree roots and appears to be progressing. The eroded bank varies from approximately four feet to six feet high. The site is located in a residential area and is depicted in Figure 1.



Figure 1. Bank Erosion at Site No. 21112.

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

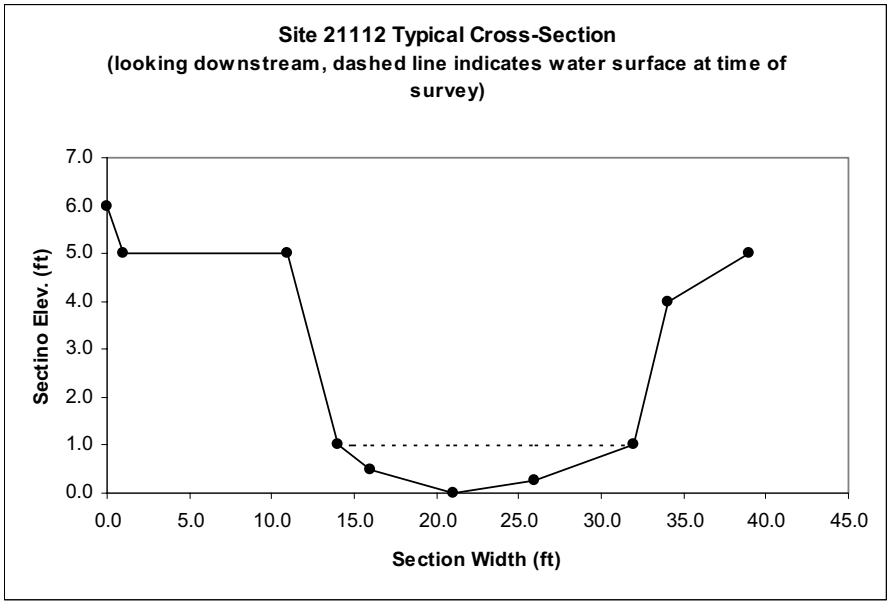


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
10-yr flow (cfs)	274
Channel slope (ft/ft)	0.0035
Roughness coefficient	0.03
Depth, center (ft)	4.1
Velocity, ave. (ft/sec)	3.7
Shear stress, ave. (lb/ft^2)	0.6

Table 1. Hydraulic Design Conditions for Site No. 21112.

Recommended Stabilization Design

The estimated velocity under design conditions (3.7 ft/sec) is well within the range for bioengineering methods, therefore hard armoring of the banks is not necessary. However, extra toe protection is recommended along the outside of the bend because the sharpness of the bend results in a high angle of impact from flowing water. Here, stone toe protection is recommended. In addition, the banks immediately adjacent to the bridge abutment should be armored with riprap to provide maximum structural protection.

Bank erosion can be addressing by regrading or backfilling behind coir logs to reduce the bank slope where necessary. The coir logs will provide support to the regraded bank until vegetation is fully established and will provide some toe protection, particularly along the approach to the bend. The regraded banks can then be covered with erosion control blankets and seeding and live stakes can be used to promote vegetative growth.

The recommended stabilization design for this site includes the following elements:

- Regrading of the outer banks to reduce their slope from nearly vertical to approximately 2:1 or less.
- Stone toe protection of the outer bank at the sharpest part of the bend (approximately 60 l.f.)
- Coir log toe protection elsewhere (approximately 140 l.f.).
- Erosion control blankets to cover the regraded banks.
- Live stakes installed in the erosion control blanketed areas.
- Riprap revetment of the bridge embankments.
- Riprap protection of the upstream end of the bioengineering measures.

Figure 3 shows a typical layout for a coir (coconut) fiber log and Figure 4 shows a typical layout for live staking with erosion control blanket.

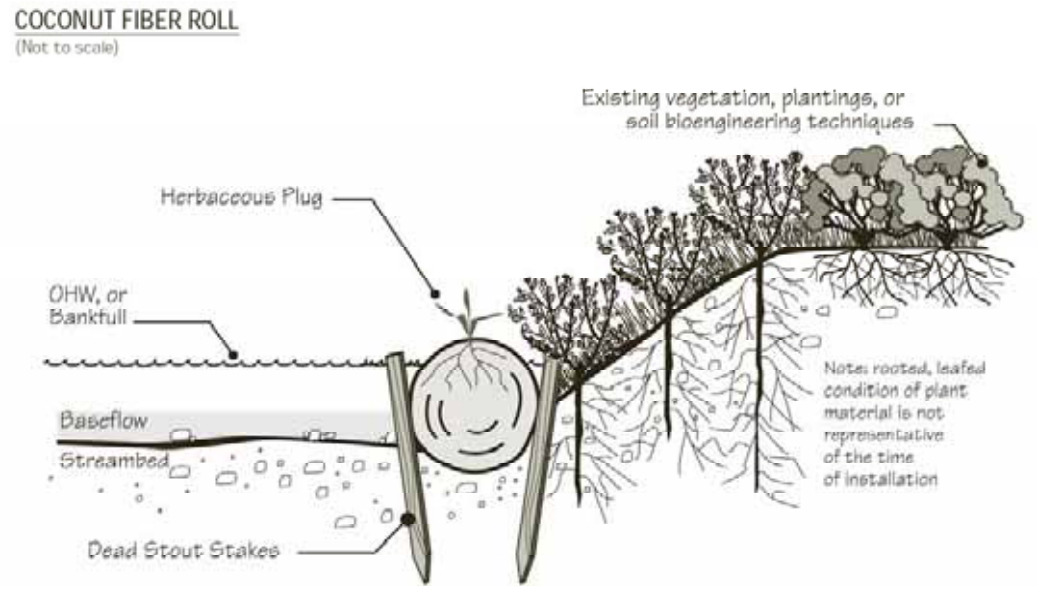


Figure 3. Typical Design for Coir Fiber Log for Toe Protection (Source: USFS, 2002).

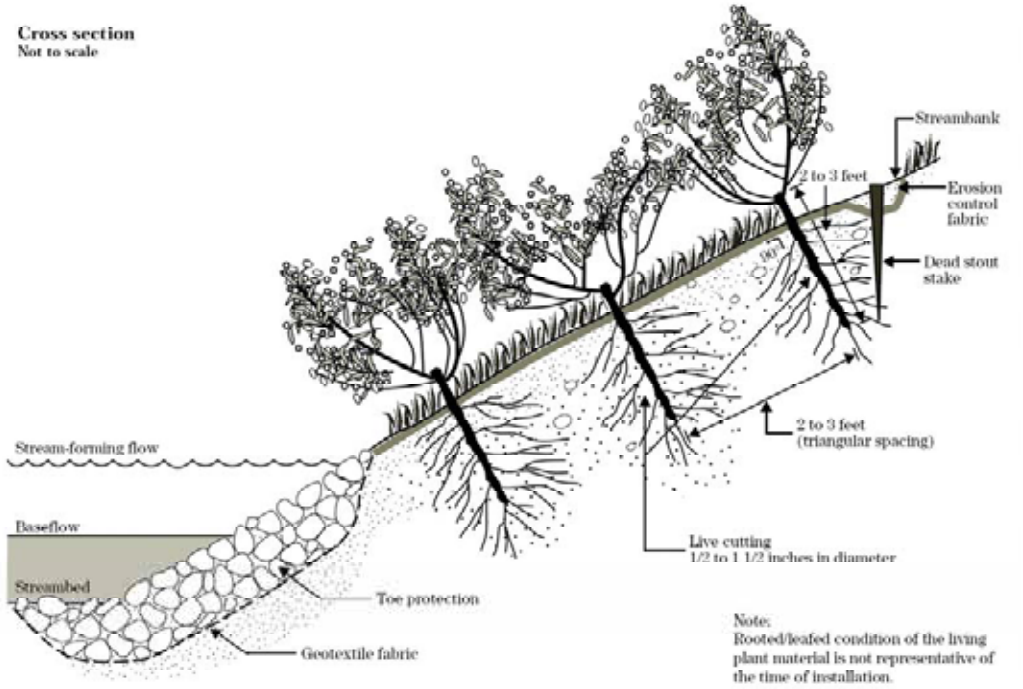


Figure 4. Typical Design for Live Stakes with Erosion Control Blanket for Streambank Protection (Source: NRCS, 1996).

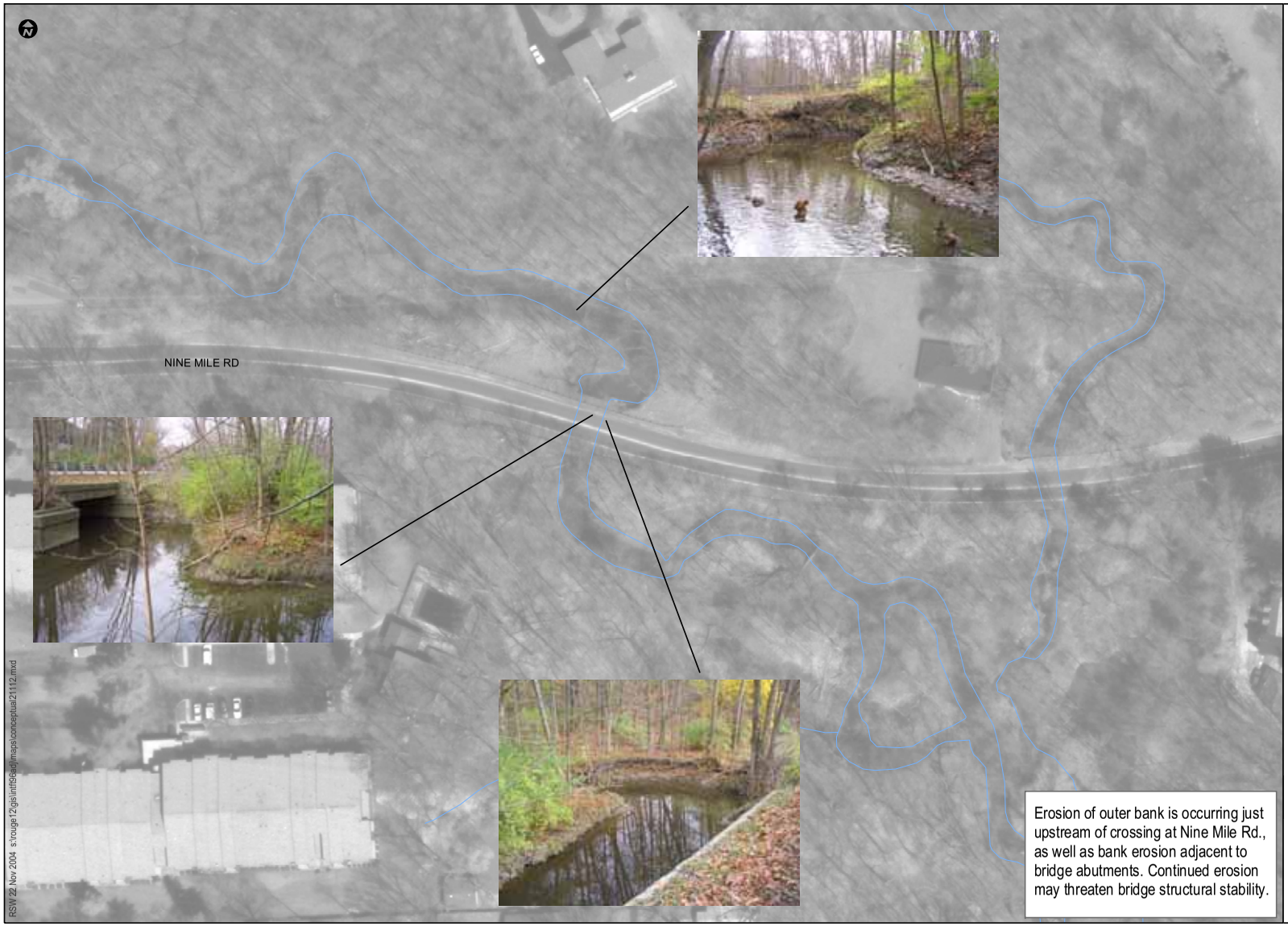
Although Figure 4 shows stone toe protection, this may only be necessary on the outer bend, as described above. On the bank approaching the bend, coir logs should be feasible for toe protection, as long as the upstream ends are protected from the oncoming current, such as by riprap as recommended here.

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Earthwork	c.y.	$15	270	$4,050
Stone toe protection	l.f.	$100	60	$6,000
Coir logs	l.f.	$25	140	$3,500
Riprap (embankments)	ton	$20	20	$400
Riprap (upstream end)	ton	$20	6	$180
Erosion control blanket	s.y.	$2.50	140	$350
Live stakes	ea.	$2.50	1200	$3,000
			Total:	$17,480

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.



ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 21112
Southfield, Michigan
Unnamed Stream, Tributary to River Rouge

SHEET 1

PROBLEM DESCRIPTION

0 50 100 ft

Erosion of outer bank is occurring just upstream of crossing at Nine Mile Rd., as well as bank erosion adjacent to bridge abutments. Continued erosion may threaten bridge structural stability.



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Ann Arbor, Michigan

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Site No. 21159 (Rouge River, Southfield)

Problem Description

Site No. 21159 consists of a broad meander of the Rouge River, located in the City of Southfield, downstream of the confluence of Pernick Creek. The attached figure shows a plan view of the site area, as well as site photographs depicting the erosion problem. The outer banks of the bend are eroding and the streambank in the eroded reach presently consists of relatively steep, barren earth. Erosion has exposed storm water outfalls and tree roots, and appears to be progressing. The eroded area is approximately 200 feet long and six to eight feet high. The top of the eroded bank transitions to a relatively flat floodplain, currently used for the Beech Woods golf course. The site is depicted in Figure 1.



Figure 1. Bank Erosion at Site No. 21159.

Hydraulic Conditions for Design

A typical cross-section of the problem area is depicted in Figure 2. Hydraulic parameters and conditions under the design flow (10-year flow event) were determined, as described in the beginning of Part III of this report and area summarized for this site in Table 1.

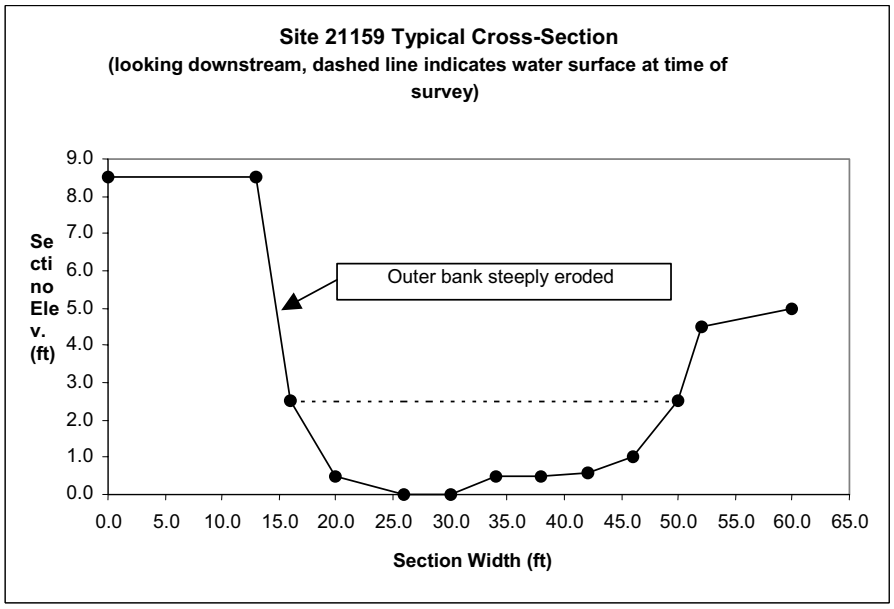


Figure 2. Typical Channel Cross-Section.

Hydraulic Parameter or Design Condition	Site Value
10-yr flow (cfs)	2140
Channel slope (ft/ft)	0.0012
Roughness coefficient	0.025
Depth, center (ft)	7.7
Velocity, ave. (ft/sec)	7.6
Shear stress, ave. (lb/ft^2)	0.5

Table 1. Hydraulic Design Conditions for Site No. 21159.

Recommended Stabilization Design

The estimated velocity under design conditions (7.6 ft/sec) is near the threshold for bioengineering methods (8 ft/sec). A safe approach would be to armor the banks with riprap or some other 'hard' engineering surface. However, this would likely require a large quantity of stone and would be a very expensive solution. Furthermore, it would have little ecological benefit, other than reduce sediment loading to the river from bank erosion. Given that the erosion exists on the outside of a bend, however, it should be

possible to use stone barbs (also known as stone dikes or weirs), which would reduce the actual velocity along the bank and allow for the placement of bioengineering stabilization methods. The advantages of this approach are that costs are reduced from a total 'hard armoring' approach and plant growth in the bioengineered areas between the stone dikes will provide habitat and help control non-point source runoff.

The recommended stabilization design for this site includes the following elements:

- Regrading of the banks to reduce their slope from nearly vertical to approximately 2:1.
- Installation of stone barbs to protect the outer bank. Figure 3 shows a typical layout for stone barbs on the outside of a river bend. The size, number, and spacing of the barbs would be determined during final engineering design. For estimating purposes, it is assumed that the barbs would be approximately 16' long (8' keyed into bank), 6' to 8' a their widest point, and 8' high (half buried in the bed of the stream). It is also assumed that eight barbs would be required.

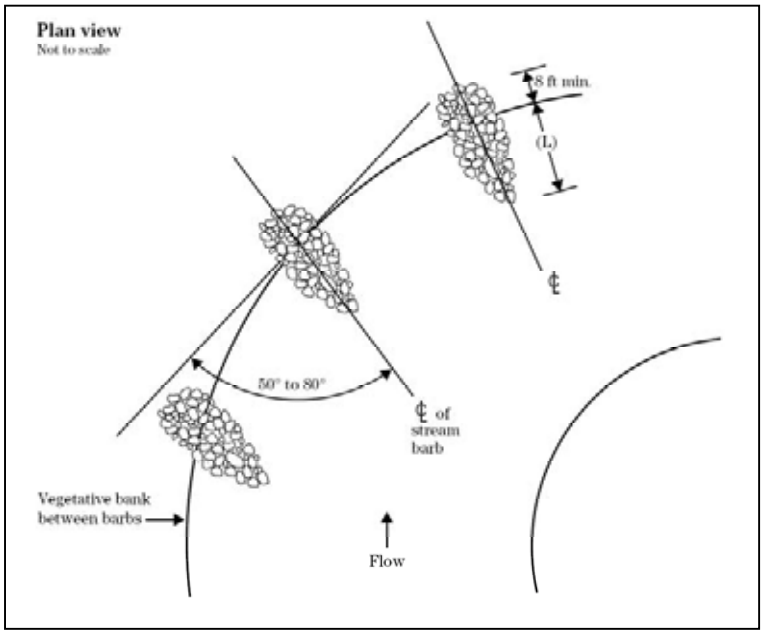


Figure 3. Typical Layout of Stone Barbs for Streambank Protection (Source: NRCS, 1996).

- Bank toe protection between the barbs using coir logs or similar materials.
- Brushlayering of the regraded banks between the stone barbs. A typical brushlayering design is illustrated in Figure 4. Although Figure 4 shows a live fascine bundle and stone toe protection, it may be possible to use coir logs for toe

protection and stabilization because the stone barbs will reduce near-bank velocities and mitigate much of the direct scour that is currently occurring.

- Riprap armoring of the upstream and downstream ends of the bioengineering measures upstream of the first stone barb and downstream of the last stone barb.

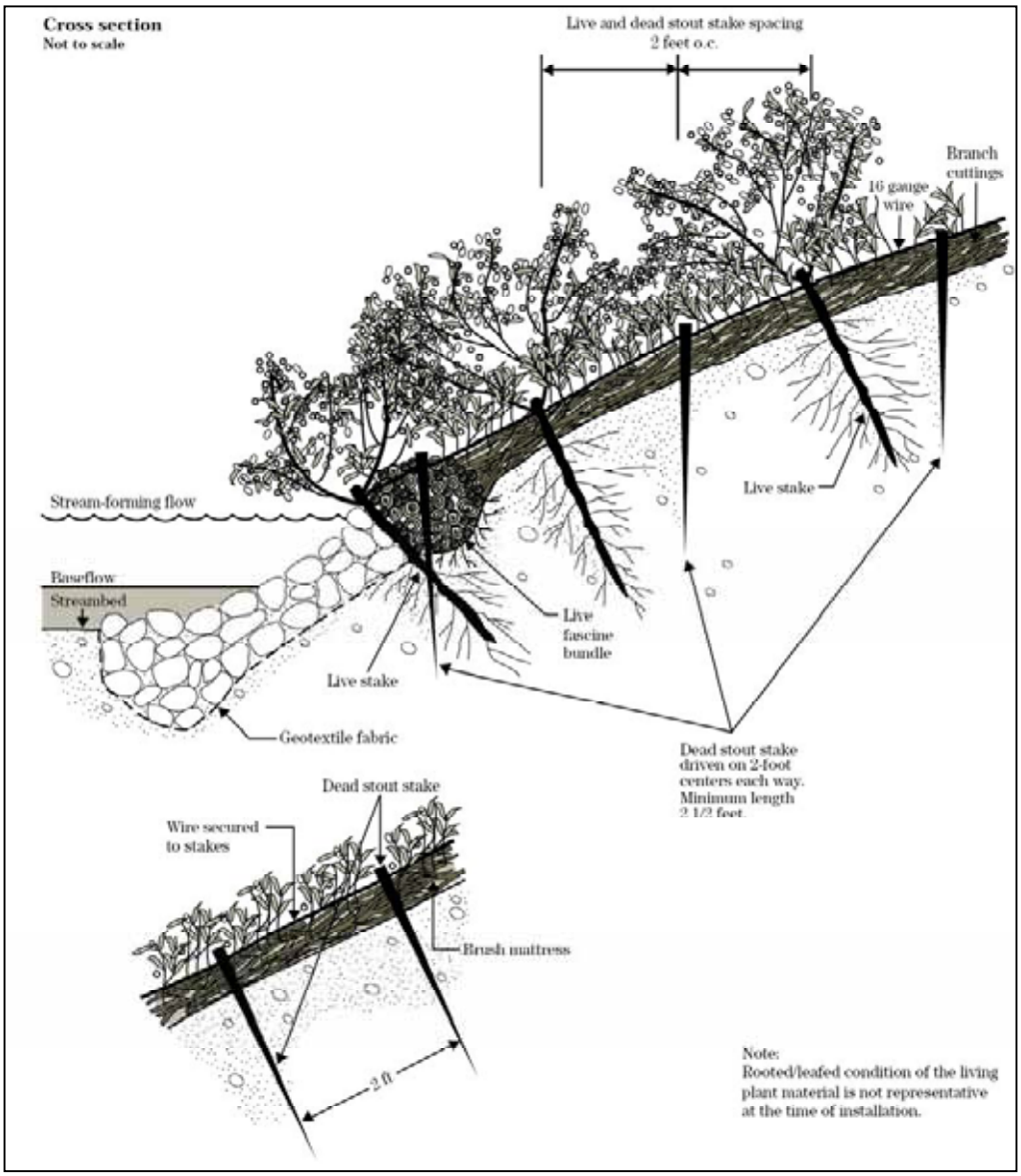


Figure 4. Typical Brushlayering Details (Source: NRCS, 1996).

Estimated Stabilization Costs

The estimated costs for the bank stabilization measures described above are summarized below.

Item	Unit	Unit Cost	Qty.	Subtotal
Earthwork	c.y.	$15	100	$1,500
Riprap (stone barbs)	ton	$20	660	$13,200
Coir logs	l.f.	$25	200	$5,000
Riprap (end protection)	ton	$20	24	$480
Brushlayering	ft^2	$4	2000	$8,000
			Total:	$28,180

The quantities listed above are estimates only, for conceptual purposes, and may vary with final design. Actual costs will depend on material availability and market pricing. It should be noted that these costs do not include all project costs. Other project costs will include, but are not necessarily limited to, the following: engineering design (including thorough hydraulic analysis), permitting, easements, contractor procurement, site access & preparation, and project management.







CARLETON AVE

Erosion of outer bank is occurring on a broad meander of the river, resulting in a near-vertical eroded face adjacent to golf course and failure of a concrete storm outfall.

RSW 22 Nov 2004 s:\rouge12\gis\intf96adj\maps\conceptual\21159.mxd

ROUGE MAIN 1-2 WATERSHED
STREAMBANK EROSION
INVENTORY 2004

Site 21159
Southfield, Michigan
River Rouge

SHEET 1

PROBLEM
DESCRIPTION

0 50 100 ft



Limno-Tech, Inc.
Ann Arbor, Michigan

ROUGE RIVER GATEWAY PROJECT: RESTORATION OF AN URBAN RIVER

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ABSTRACT

The Rouge River Gateway Corridor is one of the most important natural and cultural assets of southeast Michigan. It includes the last eight miles of the Rouge River and neighboring communities. This area has all of the basic ingredients for a vibrant urban place: nature, culture, people, and economic might. Yet the Rouge River and its riparian communities are distressed. Like many urban waterways, pollution, channelization, and industry have severed the Rouge from people and ecology. Sixteen years ago, the Detroit Free Press noted that, "By the time the main branch of the Rouge has wound its way past 40 miles of suburban sewer overflows, industrial discharges, and storm water runoff it has picked up enough garbage to kill off nearly all but the lowest forms of life." The Rouge was unquestionably the most polluted river in the state.

Since then, forty-eight Metro Detroit communities, three counties, and numerous stakeholders have made great strides in eliminating combined sewer overflows (CSOs), non-point source pollution, and other sources of impairment. This watershed approach to pollution control has had a significant impact. Last year, the Rouge met the state dissolved oxygen water quality standard (5 mg/liter) during dry weather and more diverse species of fish have been sighted.

Powerful stakeholders, realizing the renewed potential of this neglected river, have combined forces to create a vision for the Gateway Corridor. The Rouge River Gateway Partnership is a diverse alliance of leaders representing Wayne County, five municipalities, cultural institutions,

and private businesses. While attracting new investment is one goal of the Partnership, celebration of heritage, preservation and enhancement of natural habitats, and support of recreational opportunities are also priorities.

Under the guidance of the Partnership, a master plan has been developed that will allow people, ecology, and economy to coexist equitably in the landscape. Currently, these elements are rigidly compartmentalized, reflective of traditional zoning patterns. Existing public access to the river is limited and uncomfortable. From the streets and highways, the Rouge is barely noticeable. The Rouge Gateway Master Plan aims to create connections where barriers now exist.

The plan includes a number of projects that will restore relationships between the Rouge and its natural and social systems. Ecosystems are strengthened by projects like the greening of the Rouge Manufacturing Complex, restoration of an oxbow at Greenfield Village, bank stabilization at Henry Ford Community College, and a fish ladder around a historic landmark dam at the Ford Fair Lane Estate. Detroit Water and Sewerage Department plans to cover a twelve-acre concrete CSO storage facility with a songbird meadow. The Army Corps of Engineers is studying models for partial removal of the concrete channel to create new fish habitat and natural riverbanks. These efforts will restore the Rouge as a shimmering ribbon of water that is home to diverse wildlife and indigenous plant species.

A public greenway and riverboat taxi is proposed for the entire eight-mile length of the Gateway Corridor once renaturalization of the riverbanks is complete. A path system will connect to fourteen miles of existing greenway through adjacent communities and become a critical link within a larger greenway plan for southeast Michigan. Interpretation of the area's rich history, best stormwater management practices, and ecological restoration will occur along the path. This multi-modal transportation network will reconnect thousands of urban residents to the Rouge's natural beauty.

The Rouge River will be both a magnet for community activity and a way for residents to better understand their unique role as stewards of this riparian ecosystem. This paper will discuss development and elements of the master plan, partnership and consensus building, and ecological restoration progress.

INTRODUCTION

The Rouge River watershed in southeast Michigan has all of the basic ingredients for a vibrant urban place: nature, culture, people, and economic might. Yet the Rouge River and its riparian communities are distressed. Like many urban waterways, pollution, channelization, and industry have severed the Rouge from people and ecology. Sixteen years ago, the Detroit Free Press noted that, "By the time the main branch of the Rouge has wound its way past 40 miles of suburban sewer overflows, industrial discharges, and storm water runoff it has picked up enough garbage to kill off nearly all but the lowest forms of life." The Rouge was unquestionably the most polluted river in the state.

Since then, forty-eight Metro Detroit communities, three counties, and numerous stakeholders have made great strides in eliminating combined sewer overflows (CSOs), non-point source pollution, and other sources of impairment. This watershed approach to pollution control has had a significant impact. For the past 2 years, for the first time in over 10 years, the Rouge River met the state dissolved oxygen water quality standard (5 mg/liter) during dry weather and more diverse species of fish have been sighted.

The Rouge River Gateway Corridor consists of an eight-mile stretch of the Main Branch of the Rouge River extending from the confluence of its tributaries, near Ford Road in Dearborn, to its mouth at the Detroit River. It is one of the most important natural and cultural assets of Southeast Michigan (see Figure 1 for location map). Over the last fifty years the value of this resource has been reduced by degradation of character and ecological quality. Today, concrete channels and poor water quality limit the river's capability to support wildlife. Inaccessibility to the river's edge severs the important connection between the Rouge River and people.

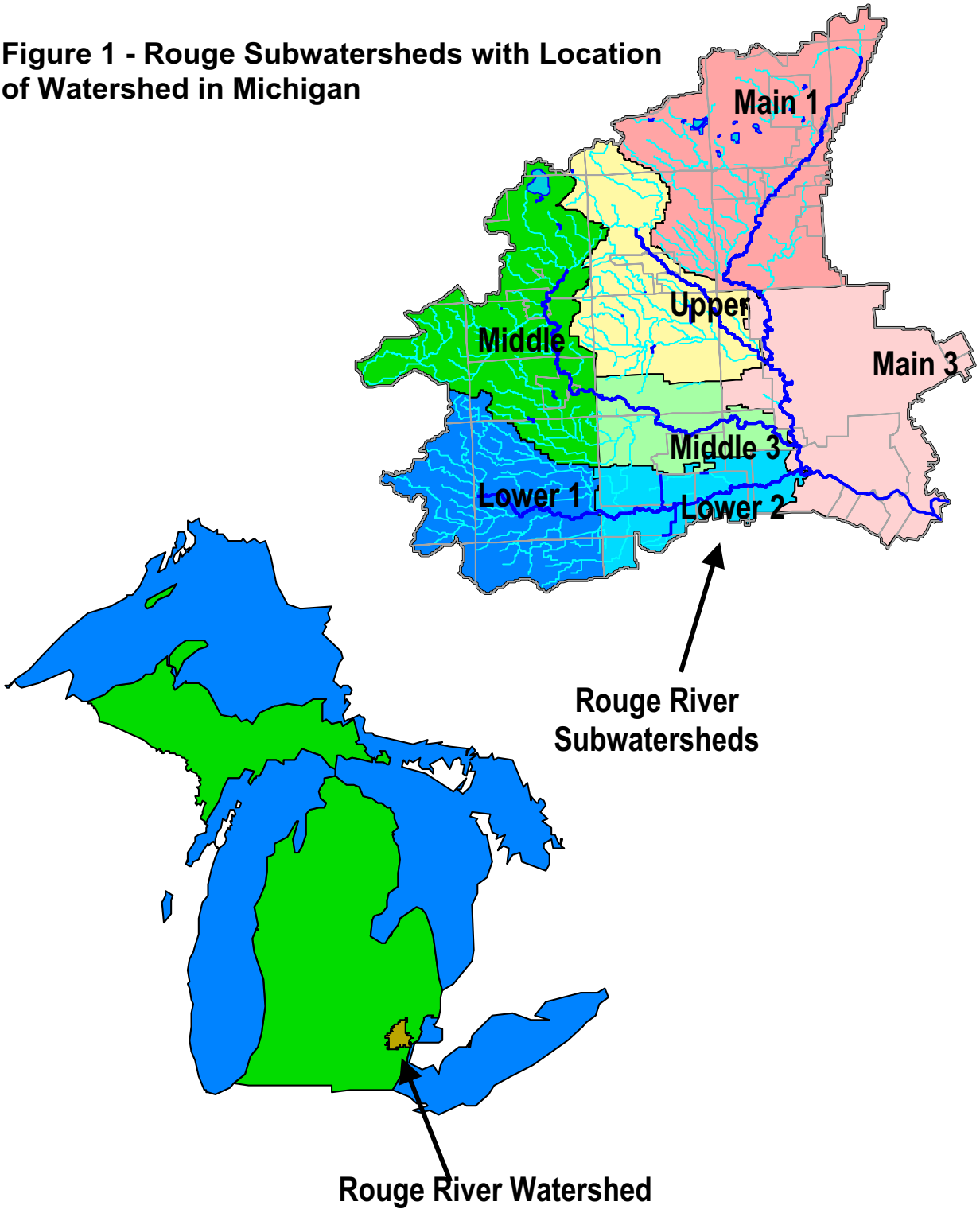
Wayne County, local municipalities, state agencies, and the federal government have been working together with institutions, small businesses, corporations, and citizens during the past year to create an organization that supersedes political boundaries. This organization, the Rouge River Gateway Partnership, has embodied a range of planning and design initiatives to ensure that the Rouge River thrives as a natural and cultural resource for generations to come. The intent of the Partnership is to create a strategy where diverse priorities, policies, and projects are coordinated under an overall design-management approach.

The Gateway Master Plan is much more than a greenway concept. It identifies cultural and environmental interpretive sites such as the Rouge Manufacturing Complex and the Oxbow Restoration at Greenfield Village. It presents concepts for concrete channel removal and riverbank restoration that are now being engineered by the US Army Corps. It works at several scales by presenting a concept and suggesting potential developments harmonious with that concept. For example, the proposed Delray Industrial Park incorporates good planning principles with recreation, environmental stewardship and economic development. The park will buffer neighborhoods to the north from heavy industry to the south. Storm water infiltration areas will provide a natural setting for pedestrian access.

The proposed path system will provide for non-motorized traffic between Detroit and Northville. Residents and tourists will be able to walk, or take a river taxi, to destinations previously only accessible by motorized vehicles. This increased convenience and connectivity will enhance the quality of life in Southeast Michigan as well as strengthen it as a tourist destination. As the Rouge River realizes its potential as a habitat for wildlife, it is also acting as a catalyst for new development and an amenity for existing development. The Rouge River flows through an area with rich culture and history. It is a focal point and a thread that ties these cultural resources into a series of related experiences.

This comprehensive program proposes to merge strategies for ecological restoration, economic development, recreation, and tourism by embracing the history of the river and its capacity for renewal. The goal is to reinstate the river as an important resource that will enhance the ecology and quality of life in communities connected by the Rouge River Gateway Corridor. Active

Figure 1 - Rouge Subwatersheds with Location of Watershed in Michigan



progress is being made towards this goal: State of Michigan grants for two million dollars have already been awarded to restore a historic oxbow in the river, and discussions are taking place with the US Army Corps of Engineers to modify the harsh appearance of the concrete flood channel. The ongoing effort to clean and restore the Rouge River is the foundation of the Master Plan.

Rouge River Gateway Partnership

The Rouge River Gateway Partnership was formed in the summer of 1999 to represent interests in the most downstream section of the Rouge River. Officials from these communities, together with leaders representing cultural institutions, private business, and Wayne County make up the Partnership as follows: City of Allen Park, City of Dearborn, City of Detroit, City of Melvindale, Edward C. Levy Company, Ford Motor Company, Henry Ford Community College, Henry Ford Museum & Greenfield Village, Marathon Ashland Petroleum LLC, Michigan Consolidated Gas Company, Rouge Steel Company, The University of Michigan – Dearborn, and Wayne County. Support agencies include: Michigan Department of Environmental Quality, Michigan Department of Natural Resources, Rouge River National Wet Weather Demonstration Project (Rouge Program Office), US Army Corps of Engineers, Detroit District, and US Environmental Protection Agency, Region 5.

The Partnership provides a forum to build consensus to revitalize the Rouge River with the goal of making the river an amenity. The Gateway Partnership has been meeting on nearly a monthly basis since the summer of 1999. Over 200 stakeholders have attended regular Partnership meetings. The central idea of the Master Plan - a balance of environmental stewardship, cultural heritage, recreation and economic development - is the vision of the Gateway Partnership. Throughout the planning process, meetings were held with subcommittees of the larger body to understand the plans and goals of individual Partnership members. Summaries of the work sessions were regularly presented to the larger group. This communication demonstrated the shared benefits and potential connections between proposed developments. Enthusiasm to share information increased as the participants realized the magnitude of the project as a whole.

Over 500 individuals attended the 2001 report on the state of the watershed and unveiling of the *Rouge River Gateway Master Plan*. Although the Master Plan is published, the planning process is far from over.

Master Plan Goals & Strategies

The purpose of the Rouge River Gateway Master Plan is to advance, extend, and coordinate current planning and redevelopment projects to achieve the goals of ecosystem restoration, heritage preservation, increased recreation, and economic development along the Rouge River. Regional and national attention have given the Gateway Partnership the spark it needs to take the first step toward creating a national model for redevelopment of historic industrial communities and restoration of an urban river.

The Master Plan outlines strategies based on the premise that goals of the Partnership are interdependent. Enhancement of ecological quality will yield economic and cultural benefits. In turn, economic vitality can be used to support heritage preservation and ecological quality. People are inherently attracted to water. As the quality of the river in the Gateway Corridor improves, it can become a centerpiece for neighboring communities.

Most importantly, the Master Plan coordinates the efforts of various stakeholders to maximize investments. The synergy of new and existing developments that enhance local character and environmental quality will generate a great resurgence of economic vitality for the entire region. Rouge Gateway Partnership initiatives will reclaim the river as an invaluable natural, cultural, recreational, and economic resource for Southeast Michigan - its rich heritage preserved for generations to come.

Historical Context

People have used the Rouge River as an integral part of their lives for centuries. Impressions of this history are still visible in the landscape. Agriculture, manufacturing, cultural diversity, and natural succession have all shaped today's river banks. The first known inhabitants of the region were the Mound Builders. Their name refers to the large mounds in which they may have buried their dead. The next inhabitants of the region were the Potawatami, attracted to the region because of its rich soils and an abundance of fur-bearing animals. Native Americans referred to the river as "Minosa Goink", which means "Singeing Skin River", or the place where game animals were dressed.

The French first settled on the banks of the Rouge River in the 1780s. They named the river "Rouge", or red. Settlers would claim a few hundred feet of river frontage and extend their farms deep into the forest. Remnants of these "ribbon farms" still exist today in land ownership patterns along the river. Europeans continued to immigrate into the region to take advantage of its resources. They used the reddish clay for brick, mined the area's salt deposits, and built farming communities along the riverbanks. The native prairie oak savannah and hardwood forests were cleared to make room for agriculture and industry.

Rapid growth and industrial development characterized the late nineteenth century. Henry Ford purchased extensive land holdings along the river. He built a factory in Dearborn to manufacture farm tractors, but kept a good portion of his land in agricultural production, partially for testing equipment. In 1914, he started construction of a permanent residence on the banks of the Rouge River.

A defining moment in the history of the river transpired with the construction of the Ford Rouge Plant during World War I. The development of the plant was motivated by Henry Ford's desire to supply submarine chasers to the US military. The Ford Rouge Manufacturing Complex grew into a massive self –contained industrial complex that daily employed over ninety thousand men in the early 20th century. Raw materials

including coke, iron ore, and rubber were brought in and transformed into cars in less than thirty hours, a process that set a new global standard for industry. The Rouge Manufacturing Complex became the largest manufacturing site in the world.

During the 1970s, the US Army Corps of Engineers constructed a concrete channel between the Henry Ford Estate and the Rouge Manufacturing Complex to control the flow of the Rouge River and prevent potential flooding in upstream communities. The smooth-sided channel facilitated quick movement of storm water and allowed development of large tracts of land that were previously prone to flooding. This land now supports office parks, senior housing, a golf course, and recreation centers.

Today, the character of the corridor's lower half is still defined by the Rouge Manufacturing Complex, considered by many as the most profoundly influential industrial site of the twentieth century. This is where the labor of Henry Ford and thousands of others stimulated a regional and national cultural transformation that the world would follow. Ford's ingenuity converted Southeast Michigan's agrarian society to an industrial dynasty. The products of this legacy, specifically the automobile, quickly became an integral component of our nation's lifestyle

Regional and National Influences

A tremendous momentum to develop and implement this Master Plan has evolved from current regional and national trends. Initiatives already underway include:

Rouge River National Wet Weather Demonstration Project (The Rouge Project): The Rouge Project, under a grant from the U.S. Environmental Protection Agency (EPA), has been instrumental in organizing funding and community activities to improve and reduce pollution in the Rouge River. Since 1992, the EPA has provided over $700 million dollars for technical assistance to eliminate combined sewer overflows, involve community groups, and implement strategies and best management practices to reduce stormwater and other non-point source pollution to the river. In that time, the water quality of the river has improved to the point where dissolved oxygen levels average at least 5 mg. per liter during dry weather. This condition meets the State of Michigan's water quality standards for dissolved oxygen.

Automobile National Heritage Area: The mission of the Automobile National Heritage Area is to preserve and interpret the story of the automobile, to improve awareness of our rich automotive heritage, increase tourism, and encourage capital investment and development. The Rouge River Corridor is one of six areas of concentration designated in Michigan as of historic significance, and one of four in Metro Detroit. The goal of the Automobile National Heritage Area is to "link all of the many historic sites, greenways, and auto-related tours and educational programs for the enrichment of the community."

American Heritage River Initiative: The Greater Detroit American Heritage River Initiative (AHR) is a multi-stakeholder group with an action-oriented process intended to

achieve, sustain, and celebrate the communities, economies, histories, cultures, and environments of Southeast Michigan's waterfront. The goal of promoting linked riverfront greenways is among six first-phase priorities that have been identified by the Initiative. AHR is working with community partners that specifically encourage linked greenways along the Detroit River from Lake St. Clair to Lake Erie, across to Canada, and up key tributaries such as the Rouge River and its Auto Heritage Area.

Southeast Michigan Greenways Initiative: The Southeast Michigan Greenways Initiative promotes the region's trail network. The Initiative is the implementing agency for the Greenway Vision, which funds "green" projects. Their goal is to connect the seven county area of Southeast Michigan with pedestrian and bike trails. The Rouge River Gateway Corridor is a primary target to develop part of this integrated regional network.

MASTER PLAN DEVELOPMENT

It has become apparent to gateway riparian owners that the improved water quality and forthcoming environmental enhancements will expose the natural and historic riches of the corridor, and in turn offer tremendous opportunities for recreation and economic development. State and federal mandates require all untreated combined sewer overflows to be eliminated over the next 12 years. Industrial clean up efforts are also underway. Ford Motor Company is leading this effort with an environmentally sensitive plan to redevelop the Rouge Manufacturing Complex.

Consistent land ownership abutting the river is recognized as very important in providing opportunity for public access. Wayne County controls the riverbanks, except for two short stretches. One, located along the east bank, north of Michigan Avenue, is occupied by Henry Ford Community College and the University of Michigan - Dearborn; the second runs along both banks from the turning basin to the Detroit River.

The existing character of the river varies greatly throughout the Gateway Corridor. North of Michigan Avenue, the river retains its natural state as it gracefully winds through a bottom land forest. Between Michigan Avenue and the turning basin, the river is forced into a concrete channel. Except for slow turns at each end, the channel is straight. From the turning basin to the Detroit River, the Rouge has been dredged and widened to accommodate navigation by large Great Lakes vessels. The "short cut canal" resulted in the formation of Zug Island at the confluence with the Detroit River.

To establish continuity between existing developments and new opportunities, four distinct Character Zones were identified along the river corridor. These include the Natural River Zone, the Cultural River Zone, the Urban River Zone, and the Industrial River Zone *(Figure 2)*.

Figure 2 - Analysis Map Showing Opportunities And Strengths Of Gateway Corridor



The ***Natural River Character Zone*** begins at the northern end of the Gateway project area and extends southward to include the campuses of Henry Ford Community College and the University of Michigan – Dearborn. It consists of bottomland forest adjacent to the Rouge River's unconstrained meandering banks. Conservation and habitat enhancement are the dominant activities in this area. Opportunity exists to immerse visitors into the beauty of the natural environment. This segment of the river is a resource for research and education about the natural world.

In the ***Cultural River Character Zone*** the river is surrounded by world-class cultural resources such as the Henry Ford Estate and the Henry Ford Museum & Greenfield Village. These institutions are devoted to presenting the history of twentieth-century ingenuity. Jens Jensen's sensitive planning of these sites has created an underlying natural character evolving from the natural river zone. Nearby, the historic museums of downtown Dearborn, housed in the preserved edifices of historic Fort Dearborn, offer another dimension to the interpretation of this region's past. There is a logical transition of complementary character as the Natural Zone overlaps the Cultural Zone on the University of Michigan-Dearborn campus, although the Cultural River Zone abruptly ends at the Southfield Freeway Bridge.

The ***Urban River Character Zone,*** beginning at a freeway bridge and encompasses Dearborn, Allen Park, and Melvindale. It transitions into the Industrial Zone at the Greenfield Road Bridge. This stretch of the river is a place where a concentration of people live, work, and play. Existing multifamily housing developments, the historic Springwells neighborhood, and a senior citizen complex provide a substantial residential population.

This population is anticipated to grow. Additional housing developments are planned for the near future and the office/research parks of Ford and Visteon are expanding. Another company is completing an office facility on the River's south bank, east of Rotunda Drive. The National Football League's Detroit Lions are constructing their new practice facility near the banks of the river.

In the Urban Zone, the river has potential to evolve from its current use as a storm water conveyance channel to a central amenity for offices, homes, shops, and senior housing. It is a place where bicycling, rollerblading, fishing, kayaking, and golfing can define the corridor as an attractive recreational resource in the heart of urban life.

The ***Industrial River Character Zone*** begins at Greenfield Road and extends to the mouth of the Rouge, at the Detroit River. The role of the Rouge Manufacturing Complex as part of American industrial history is apparent in the landscape here. It is where the meshing (and clashing) of technology, place, people, nature, culture, and ideology gave the world its most astounding example of twentieth-century brute industrial power. Now, the Ford Motor Company is proactively reprogramming the Ford Rouge Center into a model of 21st century sustainability.

The existing residential communities are a second layer of this zone. The predominantly Arab American community of Salina, immediately east of the Rouge Manufacturing Complex, has played an integral role in the story of automotive history. Southwest Detroit's Latino community is adjacent to Salina. These and other areas represent a population cut off from the river by the impassable industrial riverfront. A safe greenway connection from these neighborhoods to the existing and proposed recreational and tourist destinations upriver would benefit the entire region.

A tremendous opportunity exists to interpret Michigan's story of industrial evolution through existing industry and the history of the area's people. Topics such as reuse of the land, new technology, and efficient use of resources, energy, and wastes will emerge as examples of green engineering, biocompatibility, and industrial ingenuity.

Themes

Analysis of current conditions within each zone provides basis for a central concept. Each zone has a unique character: natural, cultural, urban, and industrial. The extension of these traits leads to four corresponding themes; all of which should be nurtured within each zone. In this framework, the management of the corridor will be guided by the melding of environmental stewardship, cultural heritage, recreation, and economic development. The balance and integration of these themes has established the Rouge as a national model for urban waterway revitalization.

Environmental Stewardship: The Rouge River Gateway Corridor is home to various pockets of natural wildlife habitat. The intrinsic value of the flora and fauna is captured in the theme of "Environmental Stewardship." The essence of this theme is to protect and restore the natural environment throughout the corridor's eight-mile length.

A healthy environment is the foundation for the other three themes, essential not only to the activities of wildlife but to those of people. Culture, recreation and economic development should be embedded in a setting of diverse ecology. This is important to the quality of life in Southeast Michigan. It is essential to preserve and enhance existing natural areas such as the lake and wetland adjacent to the Tournament Players Club Golf Course. These habitats are not found elsewhere locally, and their rarity enhances their value.

Research and education are important in the ongoing efforts to restore the river's environment. The University of Michigan - Dearborn and Henry Ford Community College utilize campus facilities and educational programming to service both the academic community and the greater public.

Cultural Heritage: The Cultural River Zone gives rise to the theme of "Cultural Heritage." The Rouge River's cultural heritage has spanned centuries. This theme respects the hopes and plans of the people who have historically lived on the banks of the river. The story of the area's first peoples, European settlers, and manufacturing legacy can be expressed through interpretation and preservation. Initiatives such as the Automobile National Heritage Area Designation will emphasize the role of the corridor in manufacturing and the industrial evolution of the nation. Closely linked to the corridor's automotive history is the region's diverse ethnic background and labor history.

Recreation: The Urban River Zone and the "Recreation" theme, recognizes the importance of connecting people to the river. Convenient opportunities for exercise and relaxation are critical to contemporary lifestyles. As local population increases with new residential and office park developments, the demand for recreational amenities will also increase. Melvindale's Ice Arena, Dearborn's Recreation Center, and the Tournament Player's Club Golf Course are steps in meeting this demand. Other potential activities using the river and its banks include: sculling, skateboarding, walking, jogging, rollerblading, and biking.

Economic Development: The Industrial River Zone and the "Economic Development" theme symbolizes maximum economic development, without the benefit of the integrated themes described above. This zone has had a huge impact on Michigan's economy and on the entire world. Goals for sustainable manufacturing and revitalization of the old industrial waterfront for public access will drive new economic development initiatives.

Integration of Themes

Within each zone, the character recognized during analysis predominates. However, the zones also share the themes as connective threads strengthening the overall identity of the corridor. For example, the habitats found in the Natural River Zone will be reinstated, to the greatest extent possible, within the cultural, urban and industrial zones. Interpretation of the cultural heritage will expand beyond the Cultural River Zone. Human activity, although most concentrated in the Urban River Zone, will return to the entire corridor via

recreational amenities including a non-motorized path and riverboat service. A strong relationship between cultural activities, environmental programs, and recreational amenities is essential to the corridor's economic success and to the perpetuation of high quality life in the Rouge River Gateway Corridor.

ROUGE RIVER GATEWAY MASTER PLAN

There are a wide variety of projects discussed in the Rouge Gateway Master Plan. All of these projects are in different phases of development ranging from conceptual to complete. The *Rouge Gateway Master Plan* contains a timeline for each project containing the following phases: preliminary concept, approved conceptual design, schematic design, funding actively being pursued, funding in place, construction drawings underway, construction underway, and project complete. Impact, interest, priority, and funding ability are determining factors in moving projects forward from preliminary concept toward completion.

High interest and priority projects have the support of the Partnership and are beyond the approved conceptual design. These projects have a high impact on the corridor's ecology, heritage, recreation, and economy. Several projects that are considered to be high interest, medium priority have conceptual designs completed, but depend on the completion of the high priority projects to move forward. Lower priority projects are those that are in preliminary conceptual design stage and may or may not be further developed. Projects include:

A pathway system will extend from the Wayne County Parks trail system at Edward Hines Drive to the proposed Detroit River Greenway. By making this connection, a critical link in the Southeast Michigan Greenways Initiative will be accomplished. The main trail will connect neighborhoods, regional attractions, and destinations along the river *(Figures 3, 4)*. This will allow tourists and local residents alike to safely and conveniently access the natural, recreational, and cultural opportunities afforded by the river. What follows is a walking tour of the initiatives and projects that comprise the Gateway Partnership.

Commercial Tour/Water Taxi Service: In addition to the pathway system along the shoreline, the Master Plan explores the feasibility of a commercial tour/water taxi service. A boat tour of the Rouge could offer tourists a unique venue to experience the attractions of the Gateway Corridor. Cruising has re-emerged as a viable and growing market throughout the Great Lakes. The Detroit/Wayne County Port Authority is proposing a multiuse public passenger terminal facility on the Detroit River just upstream from the mouth of the Rouge. Chicago, Cleveland, Milwaukee, Toronto, and Green Bay have all built or restored passenger ports. Along the Rouge, potential docking points include the Henry Ford Estate - Fair Lane, Henry Ford Museum & Greenfield Village, the Ford Rouge Visitor Center, Melvindale, and Historic Fort Wayne.

Figure 3 – Map of Interpretive Points, Visitor Destinations, Trail Route, and Dock Locations

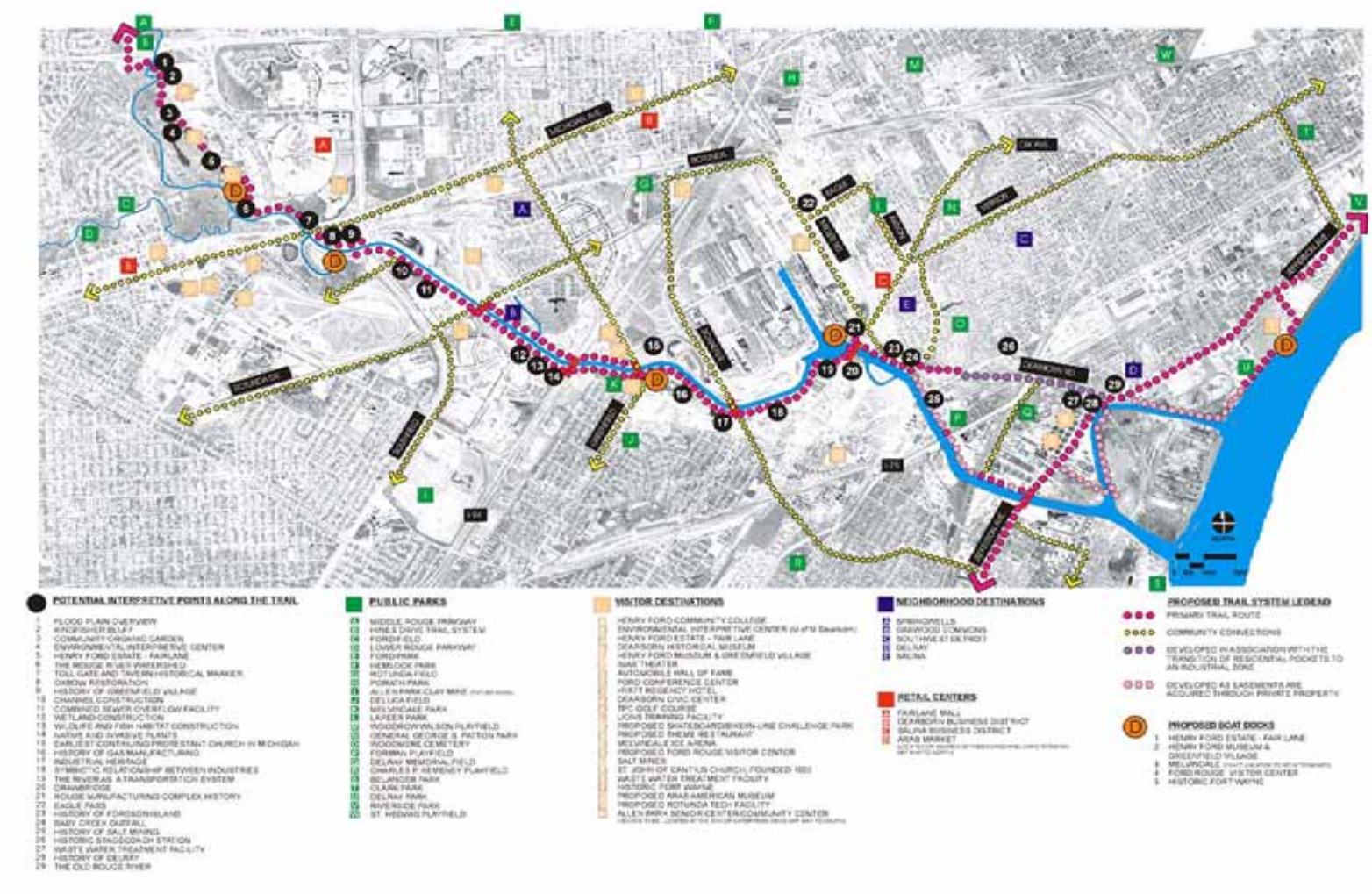
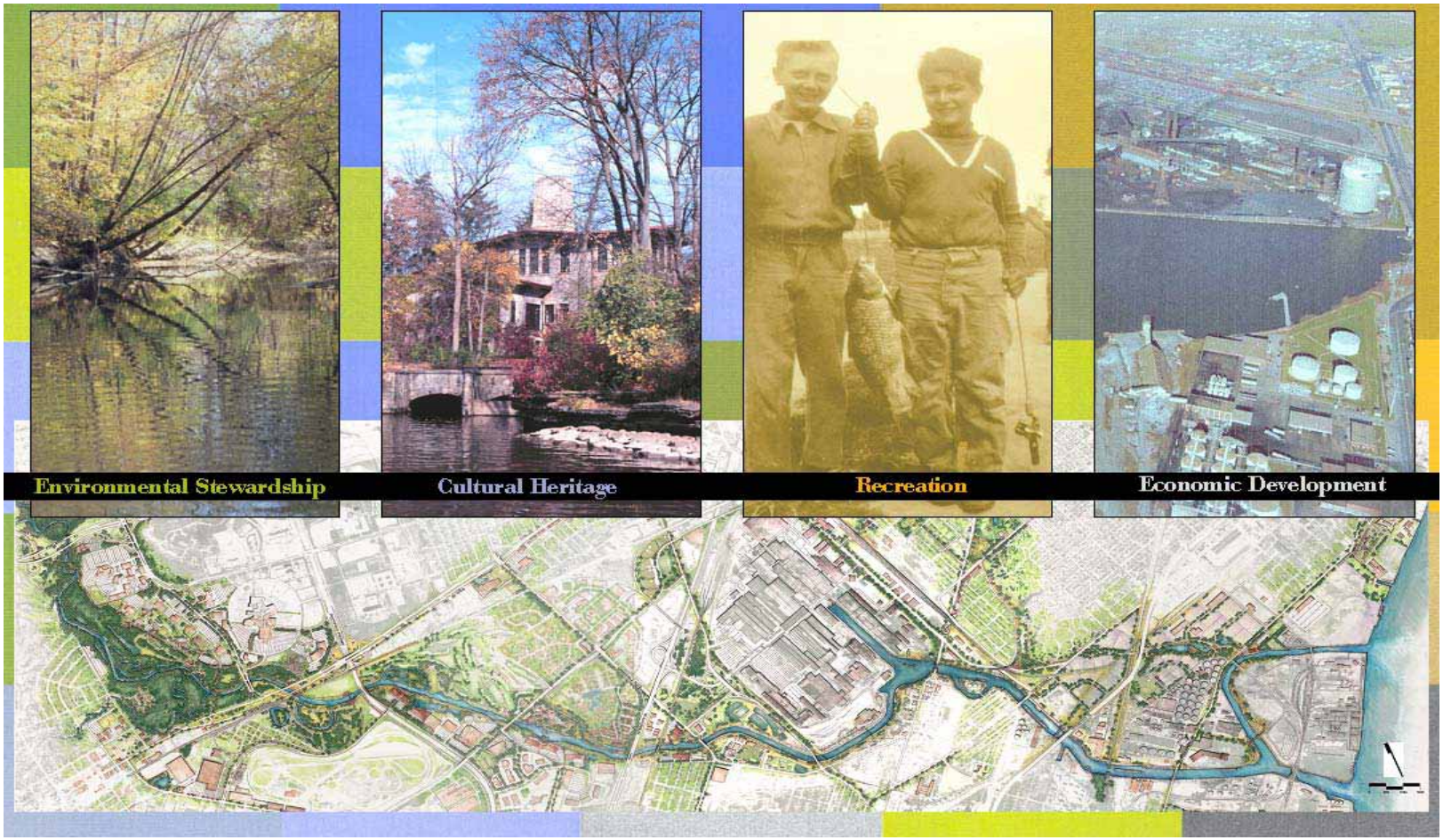


Figure 4 – Rouge River Gateway Master Plan

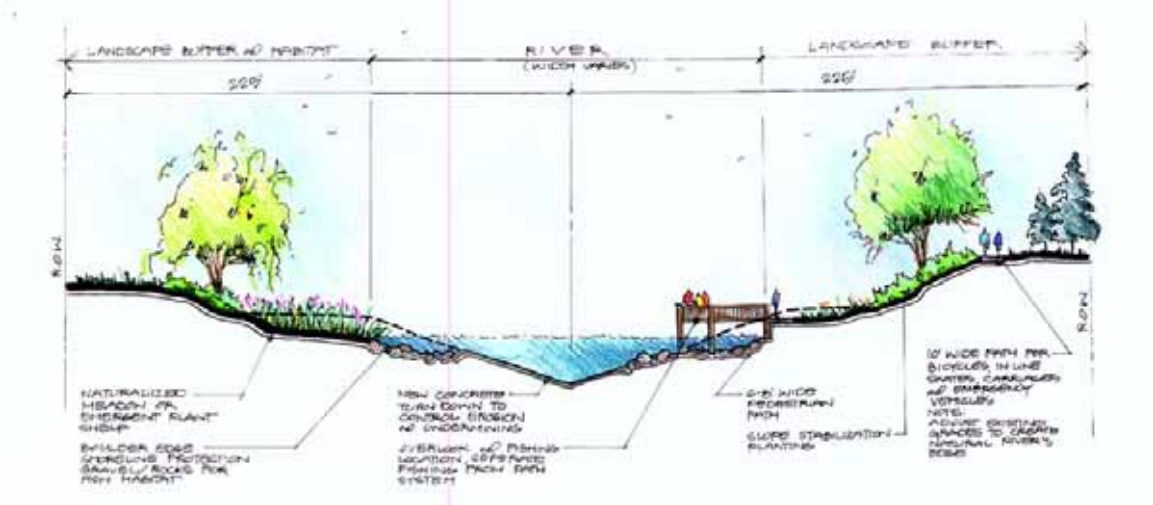


Recreational watercraft will become supportable on the Rouge River as a result of ecological restoration efforts, tourism, and new recreational development proposed for the corridor. As an entry point for tourists or a way to go to lunch on pleasant summer days, the river taxi could be a major amenity for the corridor.

Re-naturalization of the Concrete Channel: One of the most important restoration efforts involves removal of the concrete channel. Re-naturalization of the river's banks will enhance habitat and greatly improve the river's appearance. Strategies to remove portions of the channel are currently being studied by the Rouge Program Office and the US Army Corps of Engineers. A commitment by the Corps to provide funding for a first phase implementation project is also in place.

Concepts for removing concrete to approximately three feet below ordinary water level include using stone riprap and deep-rooted plantings to stabilize banks and to enhance aquatic habitat *(see Figure 5)*. Earth excavation immediately behind the new bank will mitigate the potential of increased flooding due to the removal of the concrete surface.

Figure 5 – Proposed Channel Cross Section



The additional space created by earth removal will provide storm water storage area in the event of a major flood.

Boardwalk Overlook: The proposed public path will begin at Edward Hines Drive, where a connection will be made to Wayne County's existing Hines Park pedestrian/bike path. The proposed path will head south under the existing Ford Road underpass and progress to the Rouge River through a bottomland forest. It is intended that an elevated boardwalk will be built in this environmentally sensitive area before bridging to the river's east bank. The trail will come to a head on the campus of Henry Ford Community College, where the river makes a hairpin turn thirty feet below a grassy area known as Kingfisher Bluff. The eroding bank is slowly moving toward a nearby visitor parking lot. The college intends to stabilize the bank using soft shore engineering techniques and

construct a viewing deck cantilevered over the bluff *(Figure 6)*. The bluff's Rouge overlook provides an important point for outdoor education and interpretation.

Figure 6 – Sketch of Proposed Overlook Deck at Kingfisher Bluff



University of Michigan – Dearborn Environmental Interpretive Center (EIC): The trail will pass through a Community/Enabling Garden on the University of Michigan - Dearborn campus with minimal disruption to gardening activities. It will then converge with the abandoned portion of historic Fair Lane Drive. Here, the trail turns south and approaches the recently completed U of M - Dearborn EIC. The EIC was the first project completed from the Rouge Gateway Master Plan, and it serves as a research headquarters and provides public outreach programs. The EIC will also be an important point of orientation to the U of M - Dearborn internal trail system. Just beyond the EIC is the main U of M - Dearborn campus. The trail system will link neighboring communities to the campus and make non-motorized commutes to the university a more attractive and safe option. Campus parking will provide a valuable resource for trail users accessing the path system at the EIC trailhead.

Interpretive Signage and Landscape Restoration: The trail will proceed along old Fair Lane Drive on the University of Michigan campus, where the Henry Ford Estate, Fair Lane, is located. Numerous interpretive signage opportunities exist along the path detailing the University and the history of the Henry Ford Estate - Fair Lane. The historic riverfront landscape surrounding the estate, designed by Jens Jensen, will be accessible from the path with a welcome center as a control point. Improvements at the estate will include restoration of the historic Jens Jensen stone retaining walls, with the proposed addition of a fish passageway and canoe portage around the dam. On the estate

side of the river, additional stone terracing, wall restoration, and plantings are proposed. The concept encourages public access to the river's edge while protecting sensitive vegetation and controlling erosion.

Riverboat Dock: The trail will turn south toward the river and cross Fair Lane Drive, reentering Wayne County's right-of-way. A boat dock for riverboat tours is proposed at this location. Just downstream of the proposed dock, a bridge will connect to a path spur proposed by the City of Dearborn leading to the city's west downtown district. Once past the bridge, the path will continue east along the Rouge River through a natural wooded area to an underpass at Evergreen Road. The underpass and next segment of the trail will link the University of Michigan - Dearborn and Henry Ford Community College to numerous Dearborn amenities.

Historic Rest Stop Trailhead: The path will run along the Rouge River east of Evergreen Road, branch north to link with the Fairlane Town Center Mall, then continue to the Dearborn Hyatt Regency Hotel. Just west of the hotel, on Michigan Avenue, an existing monument with an interpretive plaque describes the Ten Eyk Tavern, a historic tollgate and rest stop dating from the early nineteenth century. The tollgate marker signifies Michigan Avenue's long highway history, beginning centuries ago as the Sauk Trail. This location is proposed as a trailhead with directional signage and parking. A nearby riverside fishing platform will provide a designated river access point for people to cast their lines.

Recreational, Historical and Commercial Connections: The path then bears south under Michigan Avenue. Here, a connection will be made up to the existing walkway that bridges the river and extends along Michigan Avenue to the east and west retail areas of downtown Dearborn. The western commercial district contains many historic buildings that were once the Detroit Arsenal. Now serving as Dearborn's Historical Museum, these wonderfully preserved buildings house interpretations of early cultural events. Nearby, the Chicago Roadhouse is proposed for redevelopment into a microbrewery. An adjacent canoe livery will give visitors the opportunity to access the Lower Rouge tributary and continue downstream to the main river. The City of Dearborn is studying the feasibility of a new rail passenger inter-modal facility adjacent to Michigan Avenue along the existing Amtrak route.

State-of-the-Art Recreation Center: The east walkway along Michigan Avenue will proceed to Dearborn's Recreation Center. This facility is currently under construction and is anticipated to be quite spectacular. Nearby, the Arab Community Center for Economic and Social Services (ACCESS) is planning the first National Arab American and Cultural Center in the United States. The museum will function as an educational institution and community center focusing on the contributions of Arab Americans to this region. Past the Recreation Center, existing walkways provide access to Dearborn's eastern retail district.

Oxbow Restoration: It is proposed that portions of the concrete channel are removed from Michigan Avenue to Greenfield Road in Melvindale. As a result, those using the

trail will see a natural looking river instead of the current concrete channel. The path will continue to a proposed bridge allowing trail users to access Henry Ford Museum & Greenfield Village through a new entry feature at the river. The original path of a former river oxbow will be restored at this location providing many ecological benefits. Newly created habitat for fish, birds, and mammals will provide areas for floodwater storage, water quality improvement, and erosion protection. This enhancement project will also furnish the village with an island for new program development.

Songbird Meadow and Improved Wetlands: The path will then pass under Southfield Road and run along the south bank of the Rouge River. Planned improvements to the opposite bank will greatly enhance views, making the site immediately east of Southfield Road appealing for expansion by Henry Ford Museum & Greenfield Village. Views will include a wetland, wildflower meadow, and the Dearborn Tournament Players Club Golf Course (TPC). The existing wetland will be improved when the concrete channel is removed to provide additional aquatic habitat and walking trails accessible by boat. Adjacent to the wetland is the Hubbell Southfield CSO facility, where a songbird meadow is proposed to conceal the recently constructed facility. A massive concrete deck currently caps the large storm water storage basin. The new meadow will complement the adjacent wetland habitat and reduce the volume of storm water runoff from the deck to the river. The scenic Dearborn TPC Golf Course surrounds the wetland and meadow and reaches to the bank of the Rouge River. The Jack Nicholas designed course was constructed in the 1980s and is one of eighteen TPC courses in the nation. It hosts the annual Ford Seniors Players Championship, a major tournament on the popular Senior PGA Tour.

Rowing and Wooden Boat Building: A connection will be made to the bridge at Rotunda Drive, allowing a branch of the path to cross to the north side of the river. From Rotunda Drive to Greenfield Road the path will follow both riverbanks, facilitating linkages to a diversity of office, housing, and recreational developments. Immediately downriver of Rotunda Drive, on the north bank, opportunity exists for the development of a boat/rowing club. Programmed activities would include the organization of rowing teams, teaching, and wooden boat building. A small pond may also accompany this facility for model boat activities. Public access to the river from this site will also be accommodated.

Lagoon Restoration: The path then continues along the north bank in front of Oakwood Commons, a senior citizens complex. Controlled linkages to the facility will allow residents access to the river while maintaining their privacy. The existing lagoon behind this development will be reconnected to the river, allowing additional fish resting area, similar to the oxbow restoration project. Southeast of Oakwood Commons is a vacant site owned by Ford Motor Land Services Corporation (FMLSC). Concepts for a multifamily housing development that will maximize riverfront opportunities are being explored. An island is proposed in front of the housing development that will separate it from the public path. This solution creates private river frontage for residents, public access over the island and an additional area of wildlife habitat enhancement.

Adaptive Re-Use of a Historic Facility: Along the north bank of the river, the pathway will connect to Dearborn's current Department of Public Works (DPW) yard. The existing waste compaction station is proposed to be relocated to the east of Greenfield Road adjacent to the city's new DPW facility. The historic pumping station is no longer operative and provides an opportunity for the city to explore adaptive reuse options such as a riverfront restaurant and skateboard park on the adjacent site.

Riverfront View: On the south bank of the river, FMLSC has constructed a new office complex. With the Gateway Partnership encouragement to embrace the river and the anticipated re-naturalization of the river's banks, the buildings have been sited facing the water. A public promenade is planned to connect the new office park to the riverfront. An additional feature near the south bank includes the new NFL Detroit Lions football training facility in Allen Park, already under construction.

River Festivals: The south leg of the trail will run southeast to Melvindale Park, where a riverfront park is planned adjacent to the existing ice arena *(Figure 7)*. Proposed amenities include river-oriented festival programming with a terraced lawn, an elevated wood deck for senior activities, a boardwalk, gazebo, picnic pavilion, new restroom building, and other traditional park improvements. There are also opportunities for boat docking at this location. A second ice rink has recently been added to Melvindale's Ice Arena.

Figure 7 – Sketch of the Proposed Melvindale Riverfront Park Improvements



Greenway Link: Once past Greenfield Road, the path will proceed only along the south edge of the river. At Schaefer Road, there will be an option to head northwest and circle the Rouge Manufacturing Complex. This loop will lead to the Ford Rouge Visitor

Center. Also following Schaefer Road, heading southeast, a link to the future Detroit River Greenway is proposed. The main path will continue past MichCon, Darling International, and Levy Corporation. Connections to these industrial developments are not currently appropriate because of security risks. Wayne County's right-of-way ends at the turning basin. Therefore, the path would be cantilevered over the basin's south edge, or constructed as a floating boardwalk Upon reaching the bridge at Dix Road, the path user would cross over the river and arrive at Ford's historic gas collection tower. Here, path users may access the river taxi via a Ford Rouge Visitor Center dock, visit a new industrial interpretive facility, patronize the Salina retail district, or continue along the trail system.

Ford Motor Company Visitor Center and Tours: Ford Motor Company is planning a phased environmental cleanup of the Rouge Manufacturing Complex in conjunction with the development of its new manufacturing and interpretive facility. The Ford Rouge Visitor Center is being planned in conjunction with this redevelopment. The assembly plant will include mezzanines and glass walls in anticipation of public tours. Tours drew over 500,000 visitors a year before they were eliminated in the 1970s. The new Visitor Center and updated assembly plant will provide the necessary setting for the return of visitors to see the history and future of the automobile industry.

Celebrating Diversity and a Historic Overpass: In the shadow of Ford's historic gas collection tower the trail will fork, the main path crossing Dix Road and a spur of the trail continuing north on Dix. This spur will underpass the rail beds and proceed through the Salina Arabic retail district with markets and a mosque. This is one of two path spurs that converge at the intersection of Dix and Riverside Drive in Patton Park. The pathway will continue northwest past Patton Park to Lapeer Park. Following Eagle Road southwest from Lapeer Park on its approach to the Ford Rouge Visitor Center, the path passes beneath the Railroad (Eagle Pass). A historic standoff between labor and management took place on a pedestrian bridge over Miller Road very near this location. An interpretive exhibit commemorating this event is proposed for the Eagle Pass area.

Connecting Neighborhood Attractions: The main path will continue from the gas collection tower, now following the river's north side. A bridge is proposed that will span Miller Road, Dearborn Road, and the elevated rail bed that runs parallel to the river. This will take the trail user to the southwest corner of historic Woodmere Cemetery. A spur of the trail will proceed north up Riverside Drive along the edge of the cemetery using the Baby Creek utility easement. This path accesses the Salina residential neighborhood and terminates at Patton Park. Here, the two pathway spurs servicing Salina will converge.

Patton Park has served thousands of residents in Southwest Detroit. The Detroit Recreation Department, Detroit Water and Sewerage Department (DWSD), and Southwest Detroit Business Association are currently developing a master plan for park improvements. A new screening and disinfection facility is being planned for the site by DWSD that will clean the existing Baby Creek combined sewer overflow (CSO). Here,

visitors will experience an interpretive display describing the importance of eliminating untreated CSOs into the Rouge River.

High-Tech Industrial Park: The main trail will continue east from the pedestrian bridge toward the Detroit River Greenway path system. An old stagecoach station is located nearby on Fort Street. It represents a potential interpretation site and is being explored as a center for the Southwest Detroit Historical Society. The trail will then follow a realigned Dearborn Road through the Delray neighborhood. A clean, high-tech industrial park benefitting the region's economy is proposed as part of a long-range vision associated with the decline and transition of the Delray neighborhood in Southwest Detroit *(Figure 8)*. To accommodate the path's continued movement toward the Detroit River, a public greenway will bisect the industrial park. This green passage will include a series of filtering ponds to responsibly handle storm runoff generated by the new development.

Figure 8 – Aerial Sketch of Delray "Clean And Sustainable" Industrial Park



Public Fishing: The path will continue along Dearborn Road, reconstructed to intersect Jefferson Avenue, where the Rouge River Gateway Corridor meets the proposed Detroit River Greenway. Here, a trailhead will be developed at the historic Jefferson Avenue Screen House. This facility pumps millions of gallons of water per day to the Rouge Manufacturing Complex through a huge conduit running beneath Dearborn Road. A new park with public fishing access is proposed to grace the grounds of the screen house and serve as an important trailhead.

Wastewater Treatment Plan Modernization: The trail will continue southeast along Jefferson Avenue to the City of Detroit's Wastewater Treatment Plant. DWSD is currently developing plans to expand and modernize this facility. The plant will provide public tours and a destination for school field trips. From this location it may eventually be possible to create a trail linkage that will cross the Rouge River to Zug Island. National Steel is promoting the naturalization of limestone deposits along the riverbank to provide habitat for wildlife. Recently, Boy Scout groups have enhanced the island's

western edge with new plantings. There have also been recent reports of fox in this area. The trail would follow this natural edge in a northerly direction and cross back over the river to the Jefferson Avenue Screen House. By way of walkways along Jefferson Avenue, the path would then connect to nearby historic Fort Wayne.

Detroit Motor Speedway: A high point of all new and existing amenities in the corridor is reached at the confluence of the Rouge and Detroit Rivers. This site has great cultural and historical resonance. It is where crowds of people came together in the past to share ideas and be entertained. The Detroit International Exposition was held here, complete with ornate pavilions, an enormous exhibit hall, fairgrounds, and a large racetrack. Tour boats shuttled visitors to and from downtown Detroit and other places such as Port Huron and Toledo.

While the old exposition site is vacant and degraded by twentieth century industrial use, it marks the intersection of an Automobile National Heritage Area Corridor and an American Heritage River. Fortunately, the site is scheduled for renewal. The City of Detroit is actively pursuing a strategy for industrial related redevelopment. These industrial activities will not allow public access to the river but Detroit's effort to bring this critical site back into active use will help revitalize this area of the corridor.

In the circumstance that the proposed industrial related development does not materialize, a number of innovative concepts could be explored for this important site. A 1.5 mile oval racetrack and multipurpose outdoor event facility is just one example of an idea that could be developed. Such a facility would benefit the area culturally, economically and historically. Construction of a Detroit Motor Speedway on the old exposition grounds would feed economic growth and improve the national image of the City. A grandstand overlooking the Detroit River and downtown Detroit would offer spectacular views for network television. Buildings at historic Fort Wayne could be activated and sustained by serving as event staging and ancillary support facilities. Auto racing at the juncture of the Rouge and Detroit Rivers would support and reinforce the significance of the region's automobile heritage.

A revised plan could also allow for public access to the river. This would be achieved by securing an easement from the Jefferson Avenue Screen House, along the north bank of the Rouge, to the Detroit River, then along the Detroit River's edge for safe passage to historic Fort Wayne. Such green space at the edge of the river would create potential for the area to benefit ecologically as well.

CONCLUSION

The Rouge River Gateway Master Plan seeks to maximize natural, recreational, and cultural resources in balance with economic development. As a guideline for future development, this plan draws its cues from existing assets.

The primary asset is the Rouge River itself. As water quality improves due to the efforts of the National Wet Weather Demonstration Project, new life will come to the river. Fish populations will increase and naturalized river banks will provide the breeding habitat, cover, and food for a wide range of animals. This restored ecosystem will attract nature lovers, sportsmen, educators and residents seeking relaxation. Providing public access to the river is a central concept of this Master Plan.

Opportunities for commercial development are increasing throughout the corridor as communities and stakeholders join the momentum of the Partnership's planning efforts. Linking destinations through the proposed riverboat tour and trail system will provide new opportunities for economic growth. Additional points of tourist interest will continue to fill in around major locales. The probability that visitors will take time to visit more than one venue increases with destination connectivity, publicity, and convenience - all goals of the Master Plan. The wealth of successful destination-oriented programming currently found in the Rouge River Gateway Corridor is reason enough to encourage new tourism development.

Several projects from the Rouge Gateway Master Plan, such as construction of the State of Michigan Environmental Interpretive Center at the University of Michigan-Dearborn, are complete. Re-construction of an oxbow of the Rouge River is underway at Henry Ford Museum & Greenfield Village (*see Figure 9*). The U.S. Army Corps of Engineers

Figure 9 – Rouge River Oxbow Reconstruction





has committed $10 million to developing and implementing a strategy to remove portions of the concrete channel. These projects will create new aquatic habitat, new tourist destinations and connect residents and visitors to a forested oasis.

Industrial stakeholders are backing up their words with investment. Ford Motor Company will spend nearly $2 billion to renovate the Rouge Manufacturing Complex into a sustainable manufacturing facility with a visitor center. They have teamed with Michigan State University biochemists to identify native Michigan plants that will break down soil pollutants into harmless by-products, a relatively untested process known as phytoremediaton. The greening of the Rouge Complex will have a positive impact on the character of neighboring communities due to its sheer size.

The Master Plan is changing how developments relate to the river. For example, Roush Industries has oriented the front door of their $37.5 million research park toward the river in anticipation of the proposed riverbank restoration and public greenway. Most importantly, the planning process built an alliance between stakeholders that have often seen themselves on opposite sides of the fence.

The Detroit Free Press has called the Gateway Partnership perhaps "…the most comprehensive partnership of government and private interests ever assembled to restore life to a damaged river and its urban surroundings." Private companies, universities, cultural institutions, and city and county governments are represented. This project demonstrates how a concerned group with diverse interests can achieve incredible momentum to accomplish seemingly impossible, yet obviously right undertakings.

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For more information about the Rouge River National Wet Weather Demonstration Project and the *Rouge River Gateway Master Plan*, please visit our website at www.waynecounty.com/rougeriver.

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Planning for Green River Corridors



Environmental Stewardship Program

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A Resource Guide for Maximizing Community Assets Related to Rivers

These guidelines were prepared by Oakland County Planning & Economic Development Services as a part of the Rouge Green Corridor Identity Demonstration Project. Funding was provided by the Rouge River National Wet Weather Demonstration Project (U.S. EPA grant #XP995753-01-09) and was awarded to Oakland County Planning & Economic Development under L. Brooks Patterson, County Executive.

Project partners included Southeast Oakland County Water Authority (SOCWA), Friends of the Rouge, Oakland Land Conservancy, City of Southfield, Village of Beverly Hills, City of Birmingham, and the Oakland County Drain Commissioner's Office. Project consultants included Carlisle/Wortman Associates, In Site Design, and Margot Campos Design.

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Overview

Why This Manual?

The information and tools provided in this manual are designed to assist communities blessed with river corridors to take a fresh look at their riparian resources. By using these techniques and approaches, communities can begin to leverage the opportunities a river or stream flowing through the landscape provides their residents.

The information is targeted to community officials, planners, engineers, environmental groups, and citizens. Additionally, those who own land along the river, as well as river enthusiasts such as anglers, paddlers, and nature-lovers can benefit from this information.

Riparian (Ri*pa"ri*an)
Adjective
1. Of or relating to or located on the banks of a river or stream; "riparian land".

This manual includes the following chapters:

1. **Riparian Corridors: An Opportunity to Connect to Nature** An introduction to the opportunities presented by riparian corridors.

2. **Riparian Corridors in the Landscape of Southeast Michigan** Information about the geography, ecology, and history of riparian corridors.

3. **Land and Identity: A Planning Process for Riparian Corridors** Options for planning for riparian corridor enhancement and protection.

4. **Conservation and Restoration of Riparian Corridors** References to best practices for the preservation and ecological management of riparian resources

5. **Cultural Resources: Building Awareness and Connecting with the River** Options for bringing people and the river together.

6. **The Role of Community Planning in Riparian Corridor Protection** Information about the role of local community planning and regulatory measures that can help protect riparian resources.

7. **Funding Riparian Initiatives** Information about funding opportunities for work in riparian areas.

8. **Case Study: Riparian Planning and Management in the Rouge Green Corridor** Discussion and lessons learned from a riparian corridor project in southeast Oakland County.

9. **Summary & Additional Resources** The importance of developing and building river identity and communications tools are discussed. A case study of riparian corridor planning and management in the Rouge Green Corridor in Southeast Oakland County is presented. Finally, a summary and additional resources are given.



The Clinton River flows through urban, suburban, and natural landscapes in the cities of Rochester and Rochester Hills, providing community amenities that can be leveraged through planning and promoting the river as a resource.

Riparian Corridors: An Opportunity to Connect to Nature



Chapter 1 Includes:

- Riparian Corridors: A Missed Community Asset and Opportunity
- What Makes Riparian Corridors So Special?
- River Corridors Provide Valuable Benefits to People
- Rivers Connect Us With Our History and Culture
- Rivers Cross Boundaries and Tie Communities Together
- No Two Are Alike: Urban, Suburban, and Natural Rivers

A river seems a magic thing. A magic, moving, living part of the very earth itself.
Laura Gilpin

Riparian Corridors: An Opportunity to Connect to Nature

Riparian Corridors: A Missed Community Asset and Opportunity

Not every community is fortunate enough to have a significant river or stream flowing through it's landscape. Too often in the past, riparian resources have fallen into a state of decay because they were not managed as a community asset. River corridors were the primary economic asset in early town development, providing water and power for agricultural and industrial activities. Impacts caused by these activities, or the subsequent neglect that often followed the end of river-based economic activities, often make it challenging to preserve riparian resources or utilize them as community assets today.

In the past, river corridors have been:

- Used as waste places or dumping grounds
- Used for less desirable, polluting industrial land uses (out of sight, out of mind)
- Cleared of valuable riparian forests
- Drained and filled
- Built up inappropriately in the floodplain or too close to eroding banks
- Built with road crossings that erode and contribute sediment to the river
- Applied with "hard" methods for stabilizing stream banks that are unsightly and detrimental to habitat
- Delivered untreated sewage
- Had their channels straightened or placed in concrete pipes
- Had their hydrologic regimes altered through impoundment, groundwater withdrawal, and increased stormwater runoff from impervious surfaces
- Missed opportunities to enhance recreation
- Had community development oriented away from the river instead of taking advantage of the river

In addition, neglect and natural processes have resulted in some of the following:

- Invasion of riparian corridors by invasive, exotic species
- Decay of archaeological and historic resources
- Destruction of scenic resources



The banks of the Paint Creek in the City of Rochester Municipal Park are stabilized by gabion baskets.



This home is threatened by bank erosion along the Clinton River in Rochester Hills.

What Makes Riparian Corridors So Special?

Riparian areas provide critical wildlife habitat. Because of their location in the transition zone between aquatic and terrestrial ecosystems, riparian areas provide access to food, water, and shelter creating diverse habitat types. This diversity in turn supports a great number of unique species found nowhere else in the landscape.

Because riparian areas form corridors in the landscape, they serve as pathways for species movement. Even when the surrounding landscape does not provide adequate habitat for many species, migratory birds, mammals, and fish use rivers and associated riparian habitat to travel upstream and downstream to patches of better habitat. Thus, riparian corridors provide a key component of the green infrastructure of a landscape, maintaining ecological integrity by providing connections between patches of higher quality habitat in fragmented landscapes.



River Corridors Provide Valuable Benefits to People

Intact river corridors and associated wetlands provide ecological functions that are important to human health and safety and save us money. These benefits include water filtration, storage of stormwater, flood control, protection of water quality, and protection of shorelines and stream banks. When any of these functions are compromised, costly engineering solutions are often required.

In addition to these functions, intact riparian corridors provide exceptional resources for passive and active outdoor recreation that can benefit local economies. River corridors are ideal for hiking and biking as well as for quieter activities such as nature study and birding. Intact fisheries can attract many anglers to a river, providing a significant boon to the local economy.



Rivers Connect Us With Our History and Culture

Like plants and animals, humans have historically utilized river corridors for food, water, and transportation. Discoveries of Native American artifacts are often concentrated along riparian corridors, providing evidence that early peoples used these areas as hunting grounds and for settlement sites. River banks were the sites of many early European settlements in southeast Michigan, including Rochester, Holly, Milford, Howell, Plymouth, Mt. Clemens, and the City of Detroit. These villages grew up around rivers as agricultural and milling communities. Later, industry took advantage of the resources that the rivers had to offer.

Because of this rich past, historic structures and stories are clustered around river corridors, providing fertile ground for connecting with our history and culture and rich opportunities for historic preservation and interpretation. Local mill sites, native village sites, sites of first landing, as well as structures such as historic bridges, farmsteads, and dams can help to piece together vivid details of life in past centuries.



Urban: The Rouge River is highly urbanized near its mouth and has been lined with concrete to prevent flooding in downstream communities.



Suburban: The Clinton River is lined with suburban housing in Rochester Hills.



Natural: Stretches of the upper Huron River are natural and pristine, flowing through wetlands and natural areas.

Rivers Cross Boundaries and Tie Communities Together

Rivers know no political boundaries. They respect only natural boundaries such as the fluctuating lines between stream and wetland, or topographic boundaries that confine rivers to their valleys. They also respect, for a time, structural boundaries created and enforced by humans such as dams, levees, and hardscape shorelines, although time and the power of nature often erode these boundaries.

When one floats down a river by kayak or canoe, it is often difficult to get a bearing on one's location because the usual cues are missing; there are no signs telling us when we have left one country, state, county, or municipality and entered another. The resources provided by a river and the impacts of human activity upstream are carried downstream through the river system, regardless of the political jurisdiction through which the river flows. Because of this, rivers present a great opportunity for tying communities together, as they are oblivious to the political boundaries that separate communities.

No Two Are Alike: Urban, Suburban, and Natural Rivers

Every river is a unique system, influenced by its geological history and setting, the historical land uses and impacts in the watershed and along the corridor, and the current state of the land, water, and vegetation that surround it today. The character of rivers in populated areas often varies from very urbanized rivers that have been heavily impacted by humans, to suburban rivers that retain many high quality features but are being rapidly affected by a changing landscape, to natural rivers which are relatively unaffected by human impacts and retain pristine natural features. Each river is unique and presents it's own set of challenges and opportunities.

Following is a description of the attributes, threats, and opportunities of three distinct river characters: urban, suburban, and natural. It is important to understand that these three characters are really a continuum and blend into one another. Just as a river's natural and physical character gradually changes as it flows from upland headwaters to lowland mouth, so a single river in different parts of the same watershed may be natural, suburban, urban, or somewhere in between, depending on the surrounding and upstream landscape.

River Type	Descriptive Characteristics	Challenges	Opportunities
Urban Rivers	Rivers flowing through communities with densely populated residential areas or commercial or industrial areas	• Surrounding land uses are likely to be sources of impacts and pollution, such as industrial or commercial landscapes • Physical, biological, and water quality conditions are often highly degraded • Riparian vegetation is often removed or dominated by exotic invasive species • High amounts of impervious surface in the watershed contribute to high volumes of stormwater runoff, rendering most channels unable to support a diversity of aquatic life • Hardscape structures or culverts have often removed the river from view or made it very unsightly • Years of neglect and damage have resulted in a negative perception in residents' minds about the river	• Rich historic resources provide ample opportunity for storytelling and interpretation • Redevelopment of blighted industrial or commercial areas provides opportunity to tie the river into revitalization projects • Opportunities to "daylight" buried rivers can add vitality to urban areas • Communication programs can improve public perception regarding positive aspects of the local river system • Use of innovative stormwater management techniques in watershed redevelopment projects may improve stormwater volume impacts
Suburban Rivers	Rivers flowing through developing communities usually dominated by medium to low-density residential land use with some commercial or light industrial and remnant agricultural and natural landscapes	• Changing land uses are likely to become more detrimental to the river as development progresses • Physical, biological, and water quality conditions are often somewhat degraded • Riparian vegetation is often patchy as residents mow to the river; vegetated areas are threatened by exotic invasive species • Increasing amounts of impervious surface in the watershed contribute to high volumes of stormwater runoff, causing instability and negative impacts in river channels	• Physical, biological, and water quality conditions are often relatively intact and can be prevented from degrading further if correct management practices are incorporated as development occurs • Opportunities for restoration and stewardship of the riparian corridor in residential areas and along parkland can improve the river system • Use of innovative stormwater management techniques in watershed development projects may prevent further deterioration due to increased stormwater volumes • Conservation along the riparian corridor may still be possible in some areas
Natural Rivers	Rivers flowing through rural, undeveloped areas dominated by intact natural landscapes, with some agricultural areas and low-density residential	• Agricultural land uses may contribute to impacts such as nutrient and bacterial loading and channel straightening for drainage • Riparian vegetation is often intact but may be under threat by exotic invasive species	• Significant intact natural areas within the riparian corridor provide opportunity for proactive preservation and development of recreational opportunities • Rural communities have a great opportunity to incorporate strong planning goals and policies for protection of the riparian corridor as a community asset

Summary

This manual provides information and tools designed to assist communities blessed with river corridors in taking a fresh look at their riparian resources. Riparian corridors are a community asset that is often neglected or underutilized. They provide critical ecological habitat, provide valuable ecological functions that provide economic benefits, and connect us with our history and culture. Rivers cross political and ecological boundaries and tie communities together. No two rivers are alike; they reflect the nature of the landscape they drain, whether it is natural, suburban, or urban.

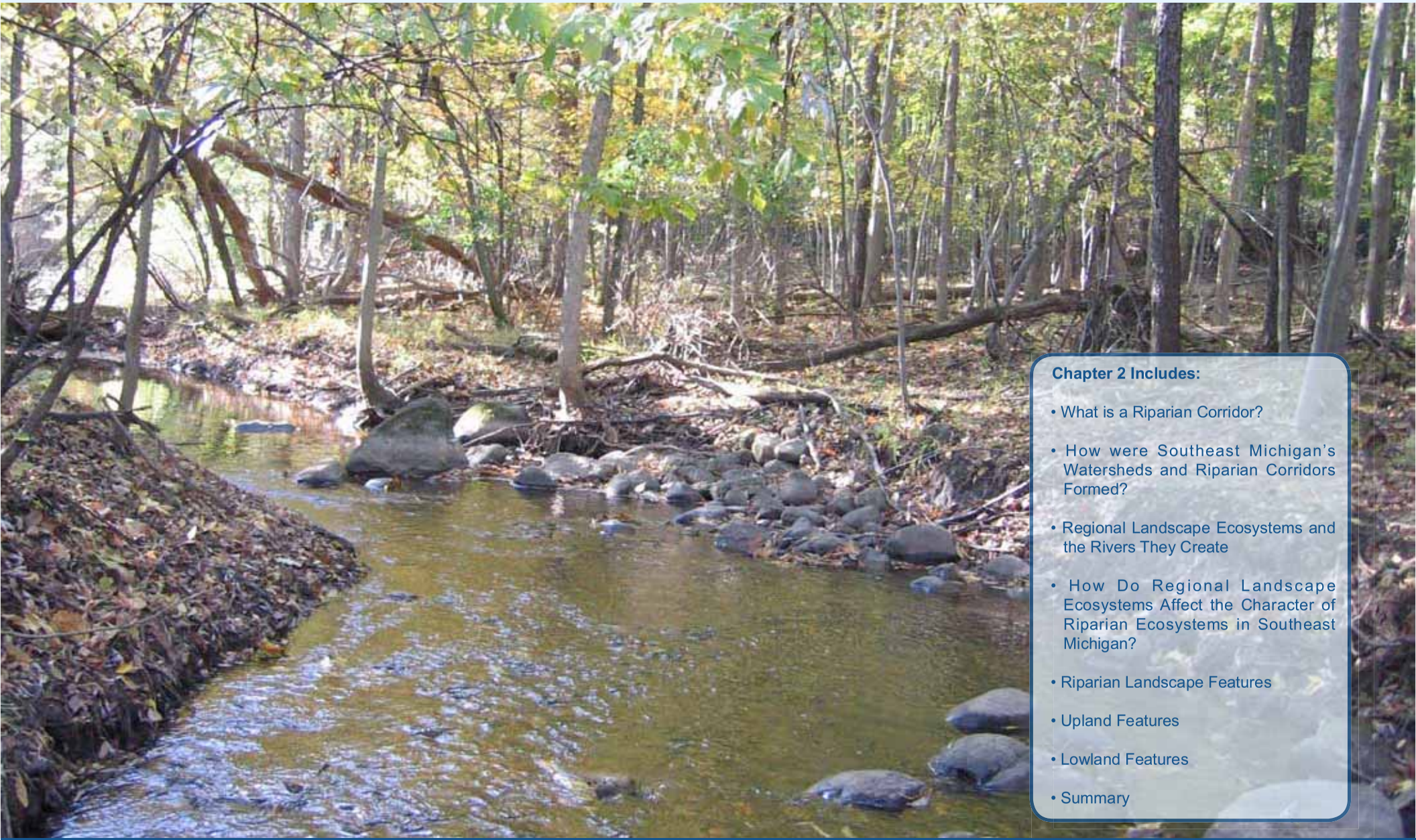








Riparian Corridors in the Landscape of Southeast Michigan



Chapter 2 Includes:

- What is a Riparian Corridor?
- How were Southeast Michigan's Watersheds and Riparian Corridors Formed?
- Regional Landscape Ecosystems and the Rivers They Create
- How Do Regional Landscape Ecosystems Affect the Character of Riparian Ecosystems in Southeast Michigan?
- Riparian Landscape Features
- Upland Features
- Lowland Features
- Summary

Rivers are the natural highways of all nations, not only leveling the ground and removing obstacles from the path of the traveler... but conducting him through the most interesting scenery, the most populous portions of the globe, and where the animal and vegetable kingdoms attain their greatest perfection.

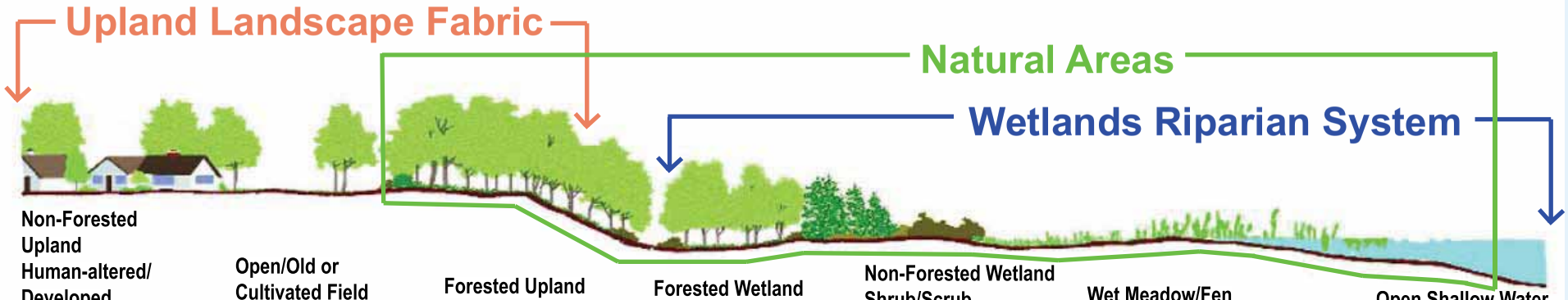
Henry David Thoreau

Introduction to Riparian Corridors in Southeast Michigan

What is a Riparian Corridor?

The area of land that exists between low, aquatic areas such as rivers, streams, lakes, and wetlands, and higher, dry upland areas such as forests, fields, cities, and suburbs are called riparian landscapes. Because these lands travel along the paths of flowing water, they are called riparian corridors.

Riparian lands are sensitive, critical components of the landscape, providing ecological and cultural value to the communities through which they travel. The function of riparian landscapes is governed by their dual roles as ecotone transition zones between aquatic and terrestrial environments and as corridors. They often have steep or moderate slopes, sensitive vegetation and soils, provide critical wildlife habitat, and protect the water quality of streams, rivers, lakes, and wetlands. When these lands are altered or developed, unique opportunities and challenges arise.



Non-Forested Upland Human-altered/ Developed
These are areas currently developed with residential and commercial land uses.

Open/Old or Cultivated Field
These herbaceous areas are usually dry and support grasses and shrubs. They consist of old cultivated fields and have been altered.

Forested Upland
These areas consist of dry to mesic forests dominated by beech and sugar maples as well as dry-mesic oak hardwood forests on drier sandy loams.

Forested Wetland
These areas consist of relict conifer swamps or bogs as well as southern swamp plant community, a wetland deciduous type forest.

Non-Forested Wetland Shrub/Scrub
These areas are characterized by fluctuating water levels and poor drainage. They are dominated by dogwoods and willows that are successionally intermediate between a wet meadow/fen or emergent marsh and a forested wetland.

Wet Meadow/Fen
These areas are consist of a wet meadow sedge and grass dominated wetland. A fen is also dominated by a herbaceous layer through which flows groundwater rich in calcium and magnesium carbonates. Fens are rare because they are restricted to the southern oak region and are absent from the glacial lakeplains.

Open Shallow Water
Open shallow waters include areas characterized by emergent and submergent vegetation including broad leafed herbs and grasses as well as floating herbs.

Riparian Corridor Cross Section from the Shiawassee & Huron Headwaters Project

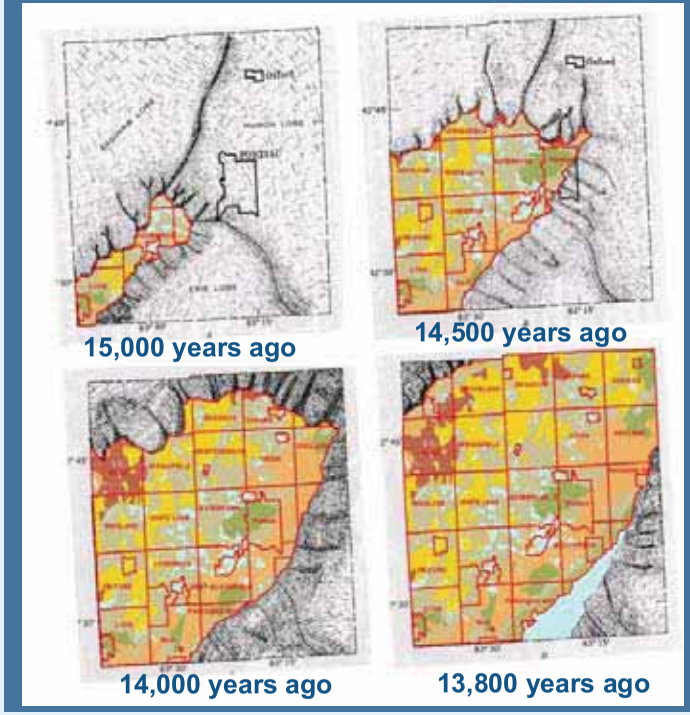
How were Southeast Michigan's Watersheds and Riparian Corridors Formed?

To begin to understand how the riparian landscapes in southeastern Michigan were formed, go back about 20,000 years ago during the Pleistocene when Michigan and most of the continent were engulfed in a massive sheet of ice.

Over the past million years or so, the Earth's climate shifted from a tropical/ temperate climate to a much colder one, resulting in circumpolar ice sheets periodically extending from northern latitudes to cover more than one-third of the Earth's surface[1]. Approximately 14,500 years ago, the last glacier to cover the State of Michigan began to melt away. In Michigan, this ice sheet was over a mile thick, extending southward from the Arctic through Ohio and Indiana.

The retreat of this last ice sheet gave rise to the major river drainage systems in Michigan. As the glaciers retreated in Southeast Michigan, they separated into 3 lobes (the Saginaw Lobe, Huron Lobe, and Erie Lobe) which split apart from one another in a northeast to southwest orientation. As these glaciers melted away from one another, enormous quantities of glacial melt water drained away from them, depositing vast amounts of sediment and debris across the landscape.

Glacial Retreat Timeline



- **18,000 years ago:** A mile-thick glacier covered all of Michigan, extending into Ohio and Indiana
- **14,500 years ago:** Global warming- the ice sheet begins to retreat
- **12,500 years ago:** Mammal mega fauna (mastodon, mammoth, giant beaver), muskeg and spruce forest inhabit Southeast Michigan
- **11,500 years ago:** Prehistoric Native Americans (Paleo-Indian) cultures inhabited the Great Lakes area
- **9,000 years ago-400 years ago:** Modern Native Americans (Woodland Indian) cultures inhabited the Great Lakes area, the modern landscape takes form
- **400 years ago:** European settlement begins

As the glaciers withered away, large chunks of ice broke off from the ice sheets, forming the kettle lakes that today form a band dotting the landscape from northeast Oakland to southwest Jackson Counties. Finely sorted sand and gravel was deposited by the glacial meltwater and fanned out over the landscape, forming the sandy outwash plains.

During several intervals, the climate stabilized for a time, and the glaciers remained stationary. During this time, long, steep-sided hills called moraines were formed at the edges of the ice sheets. By examining the map of the moraine systems of Michigan, the stationary position of glaciers all over the state becomes evident.



Morainic Systems of Michigan

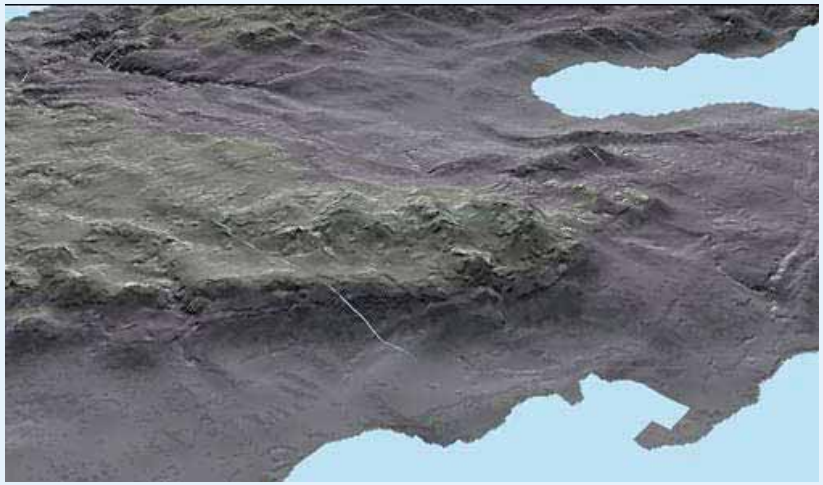
The end result of this activity in Southeast Michigan was the formation of the interlobate area, a landform running southwest to northeast between the former seam lines of the three glacial lobes. The Interlobate area is approximately 500 feet higher than the surrounding landscape, and is a distinct geological feature extending from the far northwest corner of Macomb County, through the centers of Oakland, Livingston, and Washtenaw County, ending in Jackson County.

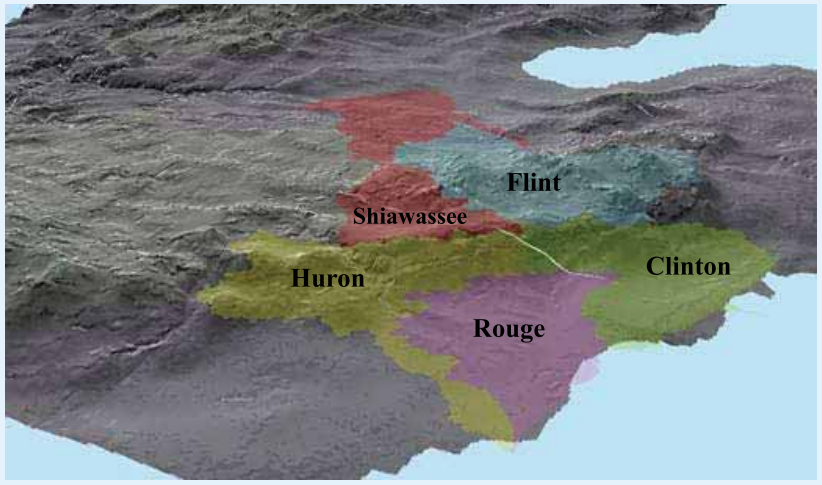
The surface geology of the area is a deep layer of glacial outwash, sand and gravel, rimmed by the terminal moraines that formed during stationary periods of glacial retreat. Water in the numerous wetlands and lake systems across the interlobate area drain through the major river systems of Southern Michigan.

Fluctuating water levels during the various glacial lake stages had a significant impact on the shape of river valleys as they flow down from the interlobate area[2]. During certain periods as the ice receded, lake levels dropped dramatically, forcing the rivers draining to them to undergo a process called base-level adjustment. During this process, streams and rivers cut down deeply into the underlying landscape in order to adjust to the change in elevation of their receiving waters. This action created deep river valleys, such as those along the Clinton River in Rochester and the Huron River in Ann Arbor, with associated features such as ravines and abandoned terraces.



Deep ravines along the Clinton River valley in Rochester Hills provide evidence that the river incised deeply into the landscape as it adjusted to a dramatic change in base level.



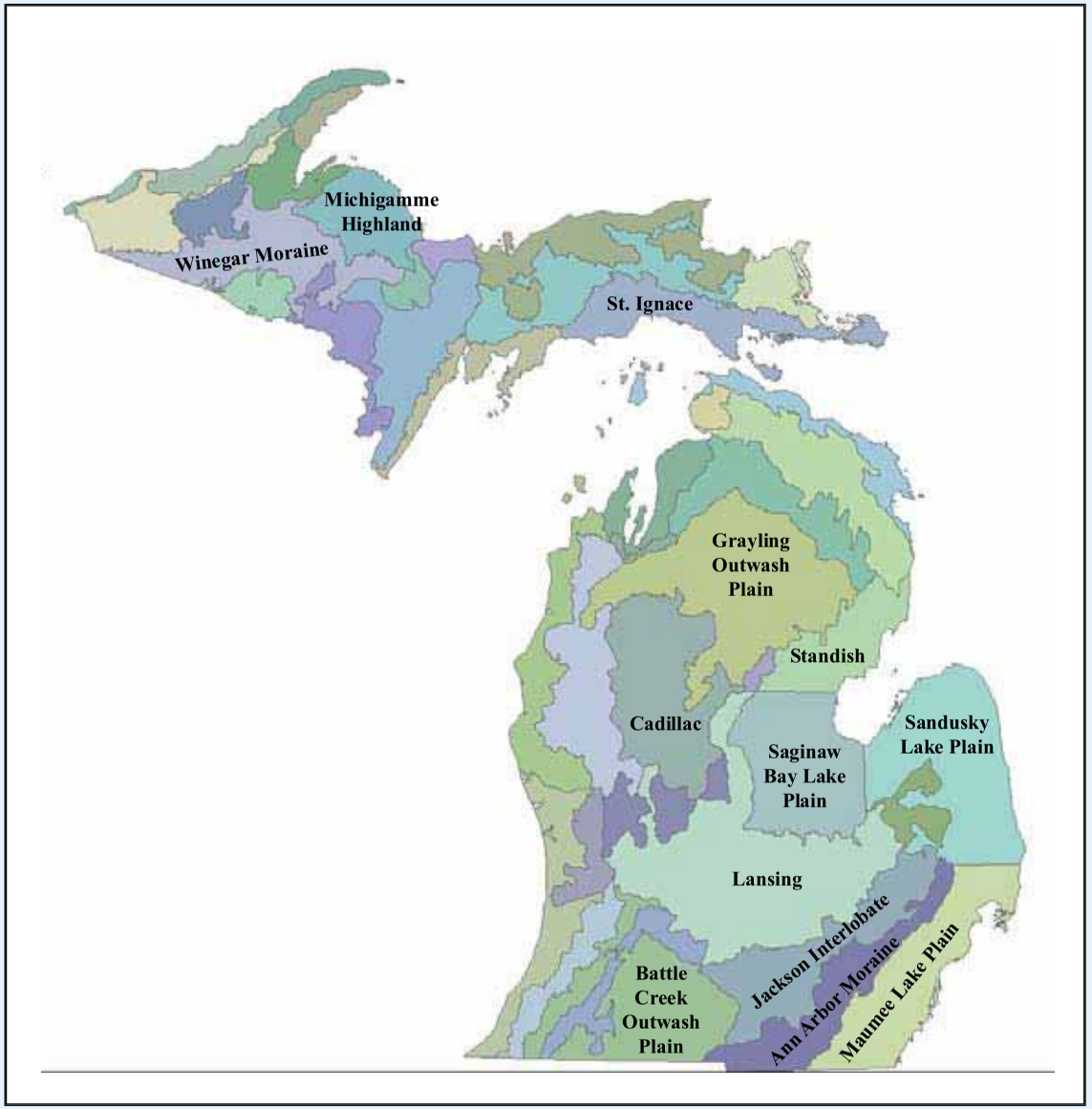


Headwaters of southeast Michigan's river systems: The Interlobate Area

Regional Landscape Ecosystems and the Rivers They Create

The characteristics of riparian ecosystems in Michigan are closely associated with the type of landscape through which they travel[3]. Surface and bedrock geology, soils, vegetation, climate, and land use on both a watershed and local scale are factors that influence riparian ecosystem characteristics. Dennis Alberts at the Michigan Natural Features Inventory has used these factors to map and describe regional landscape ecosystems for Minnesota, Wisconsin, and Michigan[4].

In southeast Michigan, three landscape ecosystems have been described. These landscapes run parallel to one another in a southwest to northeast orientation across the landscape: the Jackson Interlobate, Ann Arbor Moraines, and Maumee Lake Plain. These landforms provide a useful framework for understanding many aspects of the region's river resources. Understanding the origin and character of the major regional landscape ecosystems of southeast Michigan supports a better understanding of the resources, threats, and opportunities that exist in local natural systems, particularly in riparian corridors.



The regional landscape ecosystems of Michigan, as defined by the Michigan Natural Features Inventory. For more information, visit www.npwrc.usgs.gov/resource/habitat/rlandscp/

Jackson Interlobate

The Jackson Interlobate was formed as three lobes of the Pleistocene glacier- the Saginaw, Huron, and Erie lobes- receded away from one another along a southwest to northeast axis, depositing vast amounts of outwash in the process. This area is characterized by Alberts as "coarse-textured end moraine, outwash, and ice-contact topography; oak savanna and oak-hickory forest, hardwood swamps, prairie fens, bogs"[5]. The elevation range is between 750 and 1,280 feet. Landforms are dominated by broad outwash plains surrounding sand and gravelly end moraines, which rise above the outwash plans like islands. Near the margins, linear end moraines lie parallel to the receding glacial positions, and are often broken by narrow outwash channels. Ice-contact landforms such as kettles, kames, eskers, and outwash channels are featured in this type. Soils in this area are typically very well-drained. Presettlement vegetation varies by landforms, with oak savanna and oak-hickory common on sandy moraines and ice-contact features, and hardwood swamp, bogs, and prairie fens in outwash areas.



Ann Arbor Moraines

The Ann Arbor Moraines were formed as the Huron and Erie lobes stalled in their recession and became stationary for a time, depositing vast amounts of poorly sorted materials along the same southwest to northeast axis, to the southeast of the Jackson Interlobate. This area is characterized by Alberts as "loamy end and ground moraines; oak-hickory forest, beech-sugar maple forest and deciduous swamp forest"[6]. The elevation range is between 750 and 1,150 feet. Landforms are dominated by fine- and medium-textured end and ground moraines. End moraines may form distinct ridges or may be broken by outwash channels, while ground moraines form low, broad hills. Soils are moderately well-drained sandy loams on moraines to poorly drained mineral soils at lower margins of ground moraines. Presettlement vegetation consisted of oak and oak-hickory forest or beech-sugar maple on uplands, and swamp forests in lowlands.

Source: Michigan Natural Features Inventory



Maumee Lake Plain

The Maumee Lake Plain was formed in the most southeastern portion of Michigan as glacial meltwaters formed vast lakes trapped behind the receding glacier to the east. As the glaciers receded and the water eventually drained away from the area, a flat landscape composed of sand and clay with low topographic features and beach ridges was left behind. This area is characterized by Alberts as a "flat, clay lake plain dissected by broad glacial drainage ways of sandy soil, with beech-sugar maple forest, elm-ash forest, deciduous swamp, white oak-black oak savannas, wet prairies, coastal marshes"[7]. The elevation range is between 580 and 750 feet. Landforms include very flat clay lake plains with several water-lain end moraines that have been reworked by water. Beach ridges corresponding to the fluctuating positions of the glacial lakes are common. Soils are generally poorly drained, clayey loams. Presettlement vegetation consisted of forests on clay lake plains while sandy lake plains supported oak barrens in uplands and wet prairies or marshes in lowlands. Beach ridges and dunes supported oak savannah and small dry prairie areas.



How Do Regional Landscape Ecosystems Affect the Character of Riparian Ecosystems in Southeast Michigan?

The geomorphology of southeast Michigan's rivers changes as watercourses pass through the various landscape ecosystem types. Geomorphology literally means the morphology (or shape) of the geosphere (or earth). The following table summarizes several aspects of the region's riparian resources and describes how they are affected by the landscape ecosystem type in which they are found:

Regional Landscape Ecosystem	River Network Position	Description of Riparian Systems	Challenges
Jackson Interlobate	Headwaters with a low to medium stream gradient	Riparian systems in the area comprise the headwaters of most of the major rivers of Southern Michigan, including the Saginaw, Clinton, Rouge, Huron, Grand, Kalamazoo, and St. Joseph Rivers. These rivers have their origins in extensive wetlands. Kettle lakes, ponds, and depressional wetlands predominate. Streams are generally small, groundwater-fed channels associated with wetlands. River valley topography is not well-developed as these areas were relatively unaffected by base-level adjustment. Due to the permeable soils, groundwater flow is very dynamic with significant aquifers and many groundwater-fed lakes, wetlands, and streams.	Because this area is so rich in sensitive headwaters, groundwater resources, and wetlands, water resources are highly sensitive to surface and subsurface sources of pollution. Extensive residential lake developments present a major source of nutrient pollution in the form of leaking septic tanks and fertilizer misuse. Urban and suburban development started reaching this area in force during the 1990s; SEMCOG projects that a large portion of the region will be developed by 2030. Residential and commercial development is one of the most important threats in this area as the attractive topography and rural landscape attract more residents.
Ann Arbor Moraines	Mid-river with a medium to high stream gradient	This area has very few lakes, and those that exist are generally of human origin or oxbow lakes, with a few kettle depressions on moraines. Headwater drainage systems converge in this area, so rivers enter the landscape type as smaller streams and emerge as larger rivers. Interesting river valley topography related to glacial lake base-level adjustment, such as terraces, ravines, deltas, are found in these areas.	Steep topography in these areas presents a threat in terms of river erosion and an opportunity in terms of scenic vistas and geologic interpretation. These areas have been heavily developed, so lack of a riparian forest in many areas reduces the value of river corridors as wildlife conduits. Stormwater runoff and illicit connections are also concerns.
Maumee Lake Plain	Lowland river and mouth with a low stream gradient	No natural lakes exist in this landscape type. Rivers reach their largest size as they flow to the Great Lakes and connecting channels. Due to the low topography and increasing amounts of impervious surfaces in the watershed, river flooding is a serious issue in these areas.	This area was the first to be settled and mainly altered by agriculture and urban development. Extensive floodplain forests, lake plain prairies, and coastal wetlands in this region have been largely destroyed with a few precious remnants remaining. Streams are perhaps the largest casualty of these areas as many natural streams were straightened and ditched to service the drainage of tiled farm fields. In urban areas, many streams have been buried in culverts or otherwise heavily degraded.

Characteristics of riparian ecosystems in southeast Michigan landscapes; based on Albert, 1995

What Types of Ecosystems and Natural Communities are Found in Riparian Ecosystems?

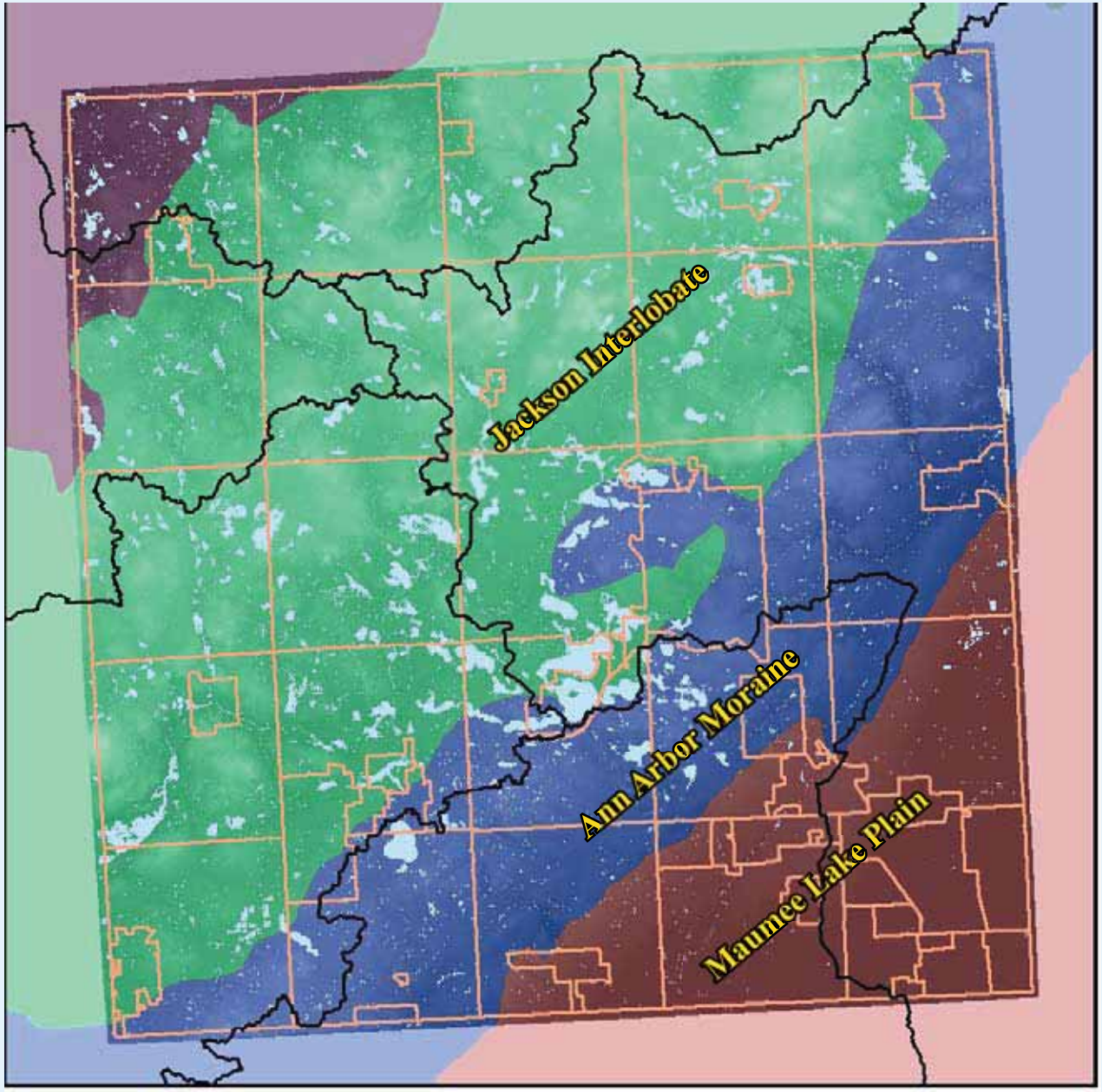
The Michigan Natural Features Inventory (MNFI) has described and abstracted 60 distinct natural community types within the State of Michigan. Twenty-nine of these are likely to occur in riparian ecosystems in the State of Michigan. According to MNFI, the following 12 occur in Southeast Michigan[10]. These include:

- Bog
- Coastal Plain Marsh
- Hardwood-Conifer Swamp
- Intermittent Wetland
- Prairie Fen
- Relict Conifer Swamp
- Southern Floodplain Forest
- Southern Swamp
- Southern Wet Meadow
- Emergent/Submergent Marsh
- Wet-Mesic Prairie

Teams of MNFI scientists conduct field surveys to locate and identify threatened and endangered species and communities throughout the state, create and maintain a database of all relevant species and community locations, and provide data summaries and analysis in support of environmental reviews.

P.O. Box 30444
Lansing, MI 48909-7944
Phone: (517) 373-1552
Web: web4.msue.msu.edu/mnfi

Michigan Natural Features Inventory



This graphic displays the regional landscape ecosystems in Oakland County with the hydrologic network. Lakes, wetlands, and slow-moving streams predominate in the headwaters area of the Jackson Interlobate. Moderate to high-gradient flowing streams predominate in the Ann Arbor Moraines, and low gradient streams an wetlands in the Maumee Lake Plain.

Riparian Landscape Features

Several distinct features are commonly found in southeast Michigan's riparian systems because of the retreat of the glaciers, the pathways of pro-glacial rivers, and the resulting regional landscape ecosystems and local geology[2]. These include features confined to uplands (areas above the modern floodplain elevation) and lowlands (areas at or below the elevation of the modern floodplain).



The Clinton River is an enclosed channel beneath the City of Pontiac. Current studies are evaluating the feasibility and opportunity for "daylighting" the river.

Upland Features

The following three features are usually found in association with one another in the Ann Arbor Moraines landscape ecosystem type, below headwaters but above the lower sections where rivers reach the lake plain. They reflect the action of pro-glacial river systems exerting great force as they incised their river valleys and adjusted for the episodically receding base levels of the glacial lake stages, in a process called base-level adjustment. Examples of these upland riparian features are found along the Clinton River in Rochester, the Rouge River in Southfield, and the Huron River in Ann Arbor.

- **Valley walls** are steeply sloped lands that enclose the entire river valley. Valley walls are often steeper than may be explained by the size of the modern river, providing evidence of much larger pro-glacial systems that did most of the work carving out the valley.

- **Terraces** are abandoned floodplains reflecting a former (higher) river base elevation during a historical lake stage. As the elevation of the glacial Great Lakes receded, rivers cut deeper into the underlying substrate, abandoning their floodplains and creating new ones at a lower elevation.

- **Ravines** are steep-sided tributary channels often found in association with valley walls. The streams in these ravines may be much smaller than suggested by the size of the ravines, or even non-existent. This discrepancy provides evidence for rapid down-cutting during episodic lake-level lowering.

In addition to these naturally occurring features, many features occur within riparian corridors that have been significantly altered by human encroachment, development, or management.

- **Altered riparian areas** are areas in which the topography has been extensively altered.

- **Enclosed channels** are channels that have been encased in metal or concrete and diverted through an underground path.

- **Straightened channels** are river channels that have been straightened to accommodate development or facilitate drainage.

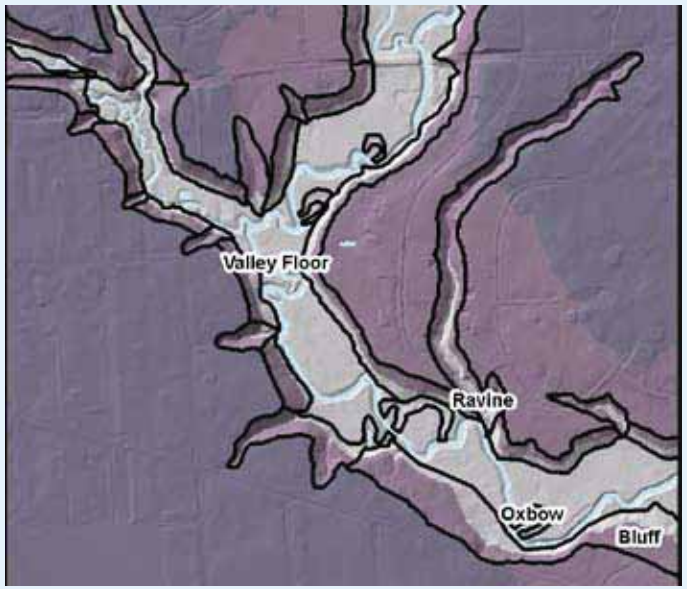
Lowland Features

Lowland features are very diverse; some are confined to specific areas within a particular landscape ecosystem type while others may be found in all three. These features are "lowland" relative to surrounding topography; some features, such as interlobate lakes and wetlands, are actually at a much higher elevation than river floodplain features. Abundant examples of each type can be found in southeast Michigan.

- **Oxbows** are old channels that were abandoned as the river migrated that are still hydrologically connected with the modern river and may be inundated during wet seasons or flood events. They typically represent an abandoned meander. They may be filled with slow-moving or stagnant water and are often in a process of converting to soft-bottom floodplain or wetland. They can provide important habitat and nursery areas for fish, herpetile, and waterfowl. The restoration of an oxbow along the Rouge River at The Henry Ford in Dearborn, Michigan provided for these amenities.

- **Abandoned Channels** are old channels within the floodplain that have been abandoned as the river has migrated and are hydrologically connected to the modern river only minimally or not at all. Abandoned channels may be found in any of the three landscape ecosystem types.

- **Confluence** areas are areas where two streams coalesce to flow together as one. They may represent the joining of two small stream systems, or larger subwatershed drainage systems. The City of Rochester contains the confluence of three major streams: the Upper Clinton River, the Paint Creek, and the Stony Creek.



The Rouge River in the City of Southfield exhibits several upland and lowland riparian landscape features.

- **Deltas** are depositional areas formed as pro-glacial streams or rivers slowed in velocity as they formed confluences with other tributaries or flowed into glacial lakes or estuaries. They are usually formed near the transition between the Ann Arbor Moraines and the Maumee Lake Plain, representing areas where deltas formed as pro-glacial rivers flowed off the higher moraine areas into the glacial lakes at their various stages.

- **Wetlands Areas** may exist in any of the landscape types. Many types of wetlands may exist depending on local conditions as described by the Michigan Natural Features Inventory.

- **Lakes Areas** are primarily a feature of the Jackson Interlobate area where lakes were formed in pitted outwash plains and glacial depressions. Kettle lakes, also referred to as "ice-block depressions" were formed as ice-chunks broke away from the receding glaciers and were buried in sand and gravel. Other lakes are formed in old glacial drainages, while still others were formed by beavers. Many artificial lakes and ponds exist in all three landscape types.

Summary

The area of land that exists between low, aquatic areas such as rivers, streams, lakes, and wetlands, and higher, dry upland areas such as forests, fields, cities, and suburbs are called riparian landscapes. The watersheds that are drained by riparian landscapes were created by the retreat of glaciers as they melted away over 10,000 years ago. Fluctuating water levels in the pro-glacial Great Lakes created dramatic topographic features in Southeast Michigan river valleys such as bluffs, terraces, and deltas. Regional landscape ecosystems delineated by the Michigan Natural Features Inventory are largely influenced by the legacy of the glaciers. The character of riparian corridors is heavily influenced by the type of regional landscape ecosystem through which they flow. The Jackson Interlobate, Ann Arbor Moraines, and Maumee Lake Plain regional landscape ecosystems predominate in Southeast Michigan. Riparian corridors present many ecological, cultural, and economic values to communities, with associated challenges and stewardship opportunities.

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Land and Identity: A Planning Process for Riparian Corridors



Chapter 3 Includes:

- How Riparian Ecosystems Function in the Landscape
- A Framework for Planning: Values, Challenges, and Stewardship Needs
- Approaches to Riparian Corridor Planning
- Planning for Riparian Corridors: A Dual Process
- Land-Based Planning Process
- Branding and Identity Planning Process
- Relationship of Riparian Corridor Planning to Federal Phase II Stormwater Requirements
- Summary

Planning is bringing the future into the present so that you can do something about it now.
Alan Lakein

Planning With Riparian Landscape Ecology

How Riparian Ecosystems Function in the Landscape

Riparian ecosystems are critical components of landscape ecology. Riparian ecosystems are both an ecotone (a transition area between aquatic and terrestrial ecosystems) as well as a corridor (a connector between habitat patches and landscapes across regions, through fragmented landscapes, and from upland headwaters to lowland areas)[11].

Ecotones are important because they serve as a transition between two distinct ecosystem types. Corridors are important in landscape ecology because they connect landscapes across regions. Corridors have four critical ecological functions[12]:

1. **Corridors provide habitat,** especially in fragmented landscapes. Riparian corridors provide access to the food, water, and shelter that species require.
2. **Corridors act as wildlife conduits,** providing protected pathways between larger habitat patches. If the riparian forest remains intact, the effective habitat is greatly increased in agricultural, suburban, and urban landscapes.
3. **Corridors act as filters and barriers to species movement,** preventing the flow of species across landscapes. Riparian corridors can act as barriers or filters to the movement of native or invasive species, however they can also facilitate their transport.
4. **Corridors act as sinks and sources of wildlife, nutrients, and energy,** providing such critical services as nutrient and carbon sequestering and recycling and providing important breeding habitat.

The discipline of landscape ecology has identified three elements which compose the landscape: patches or "hubs", corridors, and the matrix[13]. Patches are small areas of a particular ecosystem or landscape type surrounded by areas with a different structure. Corridors are linear patches that differ from their surroundings and connect patches. Together, patches or hubs and corridors comprise the "green infrastructure" of the landscape. The matrix is the background landscape within with patches and corridors exist. Within Southeast Michigan, several types of land uses typically dominate each of these types:

- **Patches:** Intact natural areas, remnant woodlots, wetlands, and other natural areas.
- **Corridors:** Riparian ecosystems, rail trails, parkways, tree rows or any other corridor connecting patches.
- **Matrix:** The human-altered landscape surrounding the natural or "green infrastructure": urban and suburban landscapes, or agriculture.



Examples of landscape ecological components along the Clinton River corridor in the City of Rochester Hills.

A Framework for Planning: Values, Challenges, and Stewardship Needs

Each riparian corridor provides unique values to local communities that are ecological, cultural, and economic in nature. In landscapes affected by human activity, unique challenges to these values can be addressed through stewardship opportunities tailored to the specific needs of a river corridor. An important step includes identifying the critical values in a riparian corridor, existing and potential challenges to those values, stewardship opportunities to address the challenges, and responsible parties and resources needed to implement best stewardship practices. The table below is a sampling of typical riparian values and their associated challenges and stewardship opportunities. The values are described in terms of whether they are ecological, cultural, and/or economic in nature.

Value	Potential Challenges	Stewardship Needs	Ecological Value	Cultural Value	Economic Value
Generate Biodiversity	Habitat destruction and fragmentation, exotic invasive species	Protection and restoration of habitat, exotic management	✓		
Provide Wildlife Corridors	Vegetation destruction and fragmentation	Protection and restoration of land along riparian corridor	✓		✓
Filter Surface Runoff Pollutants	Direct piping of stormwater to river; inadequate riparian vegetation	Protection and restoration of riparian buffers, innovative stormwater management	✓	✓	✓
Provide Recreational Opportunities	Lack of public access to river, lack of available land, flooding, poor water quality	Acquisition and development of public access and park land, flood control, water quality improvement		✓	✓
Provide Drinking Water	Water quality/quantity degradation, alteration of natural hydrologic regime	Best practices to improve water quality and hydrologic regime			✓
Water Supply to Wetlands/Lakes	Alteration of natural hydrologic regime	Best practices to improve hydrologic regime	✓		✓
Stormwater Detention and Treatment	Alteration of natural hydrologic regime	Best practices to improve hydrologic regime	✓		✓



Value	Potential Challenges	Stewardship Needs	Ecological Value	Cultural Value	Economic Value
Provide Fisheries/ Waterfowl Habitat	Destruction and fragmentation of natural vegetation, alteration of natural hydrologic regime, invasion by exotic invasive species	Best practices to improve hydrologic regime, protection and restoration of habitat	✓	✓	✓
Provide Floral Diversity and Wildlife Habitat	Destruction and fragmentation of natural vegetation, invasion by exotic invasive species	Protection and restoration of habitat, management of exotic invasive species	✓	✓	✓
Protect Shoreline and Streambank from Erosion	Alteration of natural hydrologic regime, hardening of natural shorelines, removal of riparian buffer, development too close to water's edge, filing of riparian wetlands and floodplains	Best practices to improve hydrologic regime, protection and restoration of natural shoreline and riparian buffers	✓		✓
Recharge Groundwater Aquifers	Alteration of natural hydrologic regime	Best practices to improve hydrologic regime, protection of recharge areas	✓		✓
Provide Unique Geological Resources, Topography, and Scenic Vistas	Grading, development too close to water's edge, erosion	Protection of unique areas, interpretation of geological origins of river valley		✓	✓
Provide Historical Resources	Destruction or neglect of historic resources	Protection and interpretation of historic resources of river valley		✓	✓

Why Plan for Riparian Corridors?

Approaches to Riparian Corridor Planning

River corridors are fantastic opportunities for unifying communities, connecting residents with nature, and orienting development in a way that provides a focal point for civic life. However, rivers in our communities are vulnerable to neglect and mismanagement. Ecological degradation is due to impoundment, channelization and culverts, removal of riparian vegetation, erosion and sedimentation due to stormwater, streambank failure, exotic invasive species, dumping, and litter. When combined with cultural degradation such as destruction of historic resources and restricted access, the quality and potential of river corridors are reduced. Whether a river corridor is pristine or degraded, it can benefit from a little careful thought, promotion, and planning to maximize its benefit as a community asset.

Riparian corridor plans should focus on how to best utilize the diverse ecological and cultural aspects of river systems as they flow through communities. As a result, a riparian corridor plan is by necessity multi-dimensional[1]. It should identify the range of functions and values, as described in the previous section, provided by a river system and how those benefits can be best managed and leveraged so that the river corridor truly becomes a community asset.

Riparian corridor plans can vary significantly depending on unique, local planning needs and the degree of planning detail required or desired. A very pristine river corridor flowing through a rural area may benefit from preservation-focused planning, concentrating on the pristine aspects of the river system and how to best maintain those over time. A much degraded system would benefit from restoration-focused planning, identifying opportunities and needs for habitat restoration, streambank stabilization, and buffer rehabilitation. A riparian corridor that is hidden behind alleys and under roads away from public view will benefit from public access planning and a community awareness campaign. Many riparian corridors will vary in character and need along their lengths and will require unique planning approaches.

Plans can also vary with respect to the amount of detail required. Depending on the desires and goals of the communities, an "opportunities plan" may meet local needs. This type of plan does not go into great depth but instead focuses on identifying and describing local assets, broad goals, and general opportunities. Such a plan is a precursor to further, more in-depth effort and implementation. Communities may want to go further and prepare a comprehensive corridor plan, which looks at the full range of needs and identifies tools and techniques necessary to meet specific goals and objectives, responsible parties, required resources, timelines, and tracking methods.

Examples of Riparian Corridor Plans



- **Lower River Rouge Gateway Master Plan**

www.rougeriver.com/pdfs/wetlands/WATERSHED2002-02.pdf



- **Charting the Course: An Assessment of Assets and Opportunities on the Lower Detroit River**

www.mac-web.org/GreaterDetroitAHR/Charting_the_Course_poster.pdf

Planning for Riparian Corridors: A Dual Process

A riparian planning process may be initiated by a watershed group, local government, river friends group, fishing club, or any other group that has a stake and interest in the riparian corridor's future. Planning for riparian corridors presents a unique challenge; in many communities, river corridors are inaccessible and have been hidden from public view and use. Thus, the public may be unaware of the resource and uninterested in efforts to plan for it. Because of this, an effort to raise public awareness and reconnect people with the river needs to either precede or run concurrently with planning for the corridor itself. A dual approach of river corridor planning must include two components: planning for protection of the functional values of the corridor itself (land-based planning) and planning for public awareness and engagement (branding and identity planning).



This public meeting was held to gain input on greenway connectivity in Southeastern Michigan.

The Dual Riparian Planning Process

1. Identify a planning need and project area
2. Identify the project stakeholders and initiate a stewardship group
3. Map the corridor

Land-Based Planning Process

1. Divide the corridor into unique sub-areas
2. Identify special places along the corridor
3. Inventory ecological and cultural assets and opportunities within sub-areas and in special areas
4. Create a Riparian Corridor Plan

Branding and Identity Planning Process

1. Describe the corridor and create an identity concept
2. Develop a logo and media products to communicate the identity
3. Plan & implement an outreach campaign

Step # 1 : Identify a Planning Need and Project Area

The type and character of riparian resources in local communities may vary from large, wooded river systems to open concrete-lined ditches. It may not be feasible or necessary to prepare a Riparian Corridor Plan for each and every river or stream in a community. To prioritize efforts, several criteria may be evaluated to determine whether a particular river corridor is a good candidate for a riparian planning effort:

- The riparian corridor has been identified as significant and worthy of protection and additional planning in existing community comprehensive plans, watershed plans, or natural features plans.
- Current and future land use changes and other threats represent significant changes and challenges to the riparian resource in coming years.
- The riparian resource has significant cultural and ecological functional values associated with it.
- The riparian resource is currently utilized by a particular interest group that wants to enhance and improve the resource.
- The river flows through several communities that are interested in working together, increasing the potential for a successful multi-jurisdictional partnership.

Step # 2: Identify Stakeholders and Initiate a Stewardship Group

This step is critical. Without a strong core of engaged, committed, motivated stakeholders, any plan is not worth the paper it is printed on. The development of a strong and diverse stakeholder group will garner strong political support, carry the project forward, and set the stage for unique opportunities and partnerships.

The strongest stakeholders are local interests; however it can be important to include others who may bring insight, expertise, and resources from larger regional, state-level, and federal groups. A good cross-section of interests is vital to ensuring that a plan will be embraced and implemented by the larger community.

Key stakeholders in riparian corridor planning projects include:

- Local river advocates (anyone who is a passionate angler, paddler, nature lover, or other type of river enthusiast)
- Riparian property owners (both commercial and residential)
- Local businesses (especially those interested in connecting to the river for business enhancement)
- Local developers (especially those who are interested in developing land along the corridor)
- Local officials (especially those responsible for setting local policy related to riparian resources)
- Local government recreation, planning, and public works staff (especially those responsible for municipal management of riparian resources)
- Like-minded partner group representatives (watershed councils, land conservancies, angling groups, trails groups, etc.)







The Natural Areas Advisory Group shares information about issues related to the preservation of natural lands and resources.

Step # 3 : Map the Riparian Corridor

Once a planning need and stakeholder group for a particular riparian corridor have been identified, it is important to carefully map and delineate the boundaries of the riparian area, the actual area of land that is included within the "riparian corridor" to be considered. There are various approaches to accomplishing this task, using different levels of mapping expertise and technology, each with their own advantages and disadvantages.

	Geomorphic Mapping	Buffer Mapping	Property Selection Mapping
Advantages	• Accurate rendering of riparian geography and geomorphology • May uncover unique topographic features that will be useful in watershed planning	• Very simple and easy to accomplish with minimal GIS mapping skills	• Very simple and easy to accomplish with minimal GIS mapping skills
Disadvantages	• Requires high-resolution digital topography, geology maps, and aerial photos • Requires medium-level GIS skills and familiarity with topographic mapping and riparian systems	• Difficult to determine useful buffer width • Single buffer width does not take into account full range of riparian lands; important land may be left out; unimportant land may be included	• Requires land parcel data set • Property mapping does not take into account full range of riparian lands; important land may be left out; unimportant land may be included

Mapping Option 1: Geomorphic Mapping Procedure

1. **Create a definition for the riparian corridor.** This step is critical for maintaining consistency and objectivity in the mapping process and will also assist the stakeholders in understanding the riparian landscape.

Many different riparian definitions are found in the literature. For community planning, a broad and consistent definition is required. As an example, the definition offered in the U.S. Fish and Wildlife Services System for Mapping Riparian Areas in the Western United States was modified as follows:

Riparian areas are areas of the landscape that connect to and influence or are influenced by the surface and subsurface hydrologic features of perennial or intermittent waterbodies (rivers, streams, lakes, ponds, drainages, and wetlands).

Features of riparian areas include bottomlands containing the geomorphic floodplain, oxbows and abandoned channels, and uplands, containing valley walls, bluffs, terraces, and ravines.

Due to human development, encroachment, and management, riparian areas may contain altered features such as altered riparian areas, enclosed channels, and channelized (straightened) channels.

2. **Select the segment of river to be mapped**

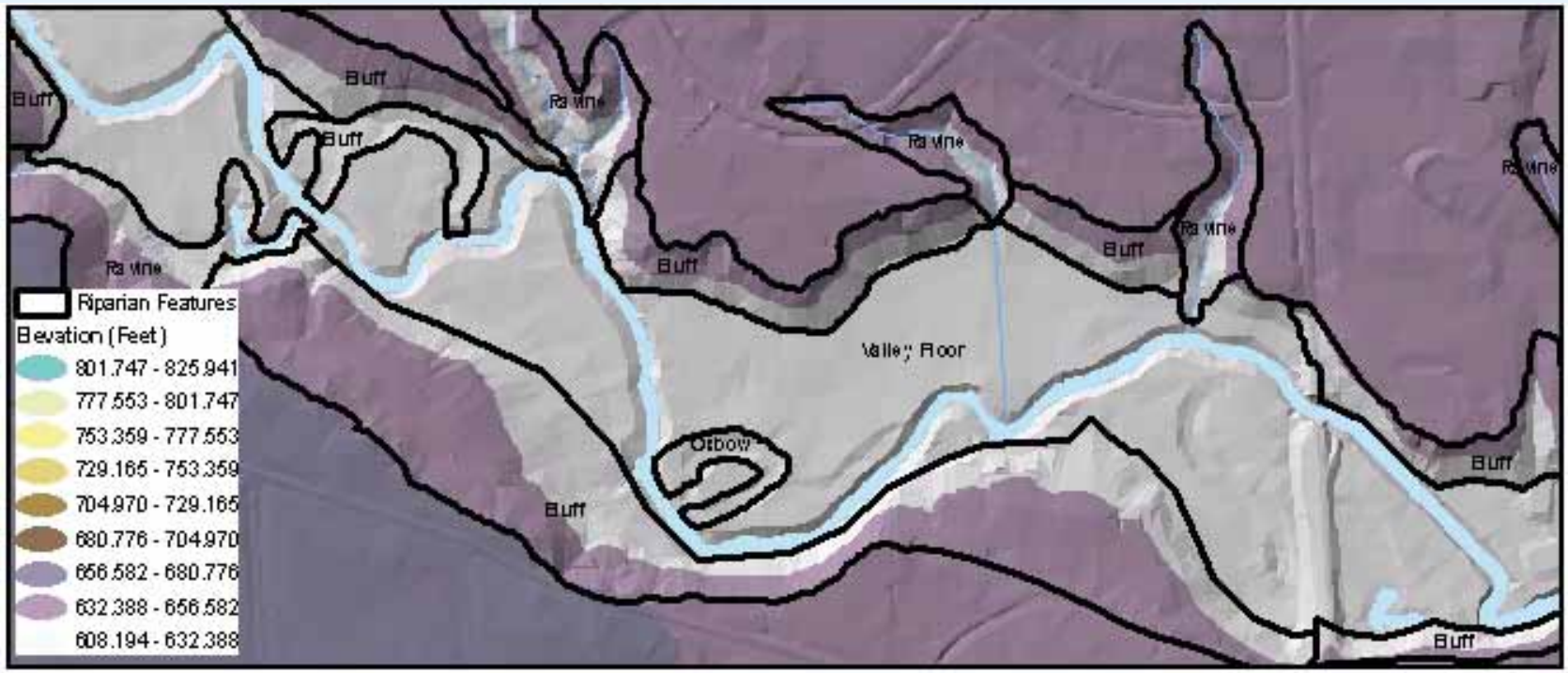
3. **Consider the landscape ecosystem that the riparian corridor flows through.** Based on this, define the landscape components that comprise the riparian corridor and decide which of these are valuable for mapping (*See "Riparian Corridors in the Landscape of Southeast Michigan" pages 9 and 10*).

4. **Create a data model** that will allow the identified riparian feature components in the riparian corridor to be mapped.

5. **Assemble layers of information in a Geographic Information System (GIS).**
   - High resolution digital hydrography
   - High resolution digital topography
   - Slope layer based on topography
   - High resolution aerial photography
   - Surficial geology and/or soils mapped by permeability

6. **Carefully delineate the entire river valley landscape using heads-up digitizing.** Using the digital topography, this land area may be easy or difficult to discern depending on the landscape. Become familiar with the system and use the slope, geology, and layer as an aid.

7. **Carefully delineate the riparian features within the river valley** components using the digital topography.



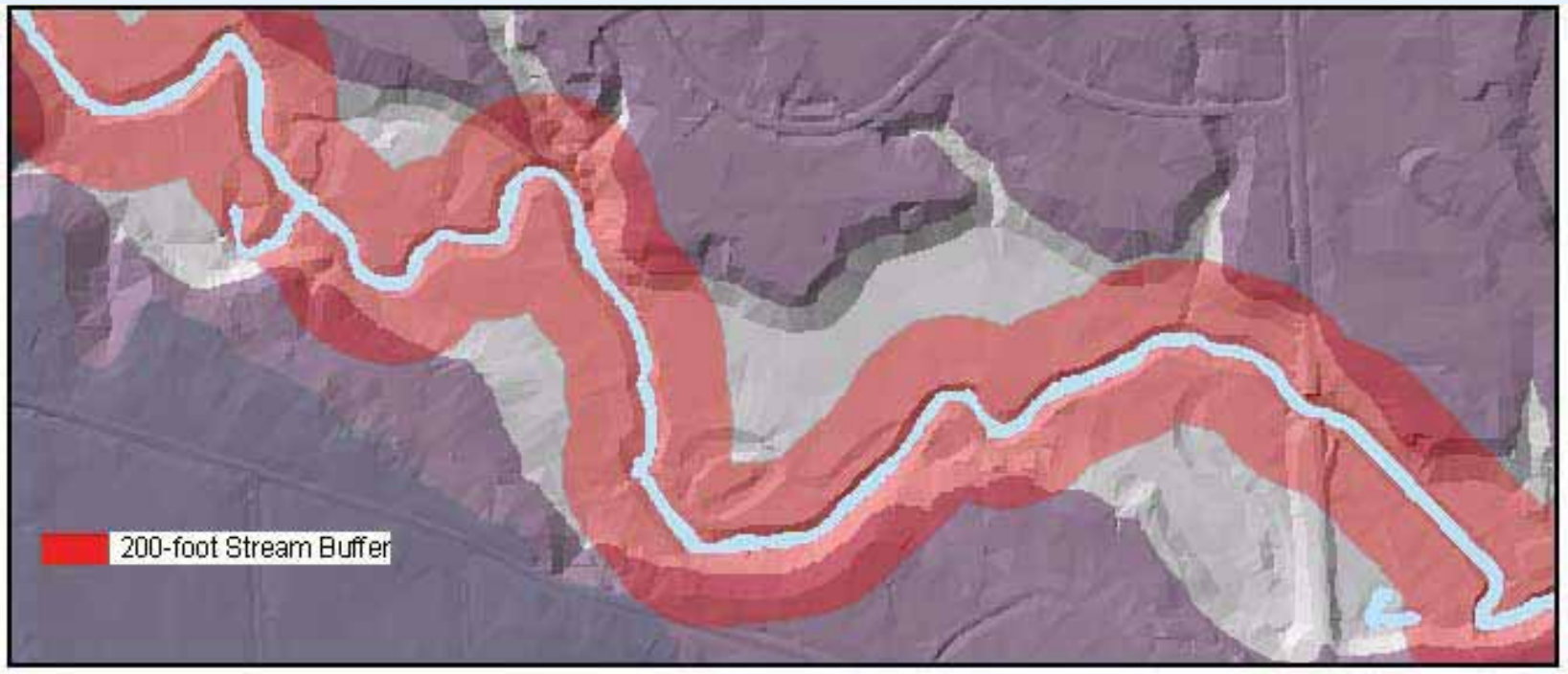
A geomorphically delineated riparian corridor map based on digital topography.

Mapping Option 2:
Buffer Mapping Procedure

1. **Decide on a buffer width for your riparian corridor.** Deciding on a static buffer width is not an easy task; there are no simple criteria on which to base such a decision. Consider the character of the river system. A very developed or degraded river that does not function as a wildlife corridor might necessitate a smaller buffer width than one which does. If wildlife corridor function is important, consult guidelines related to wildlife corridor width based on particular species of interest.

2. **Select the segment of river to be buffered.**

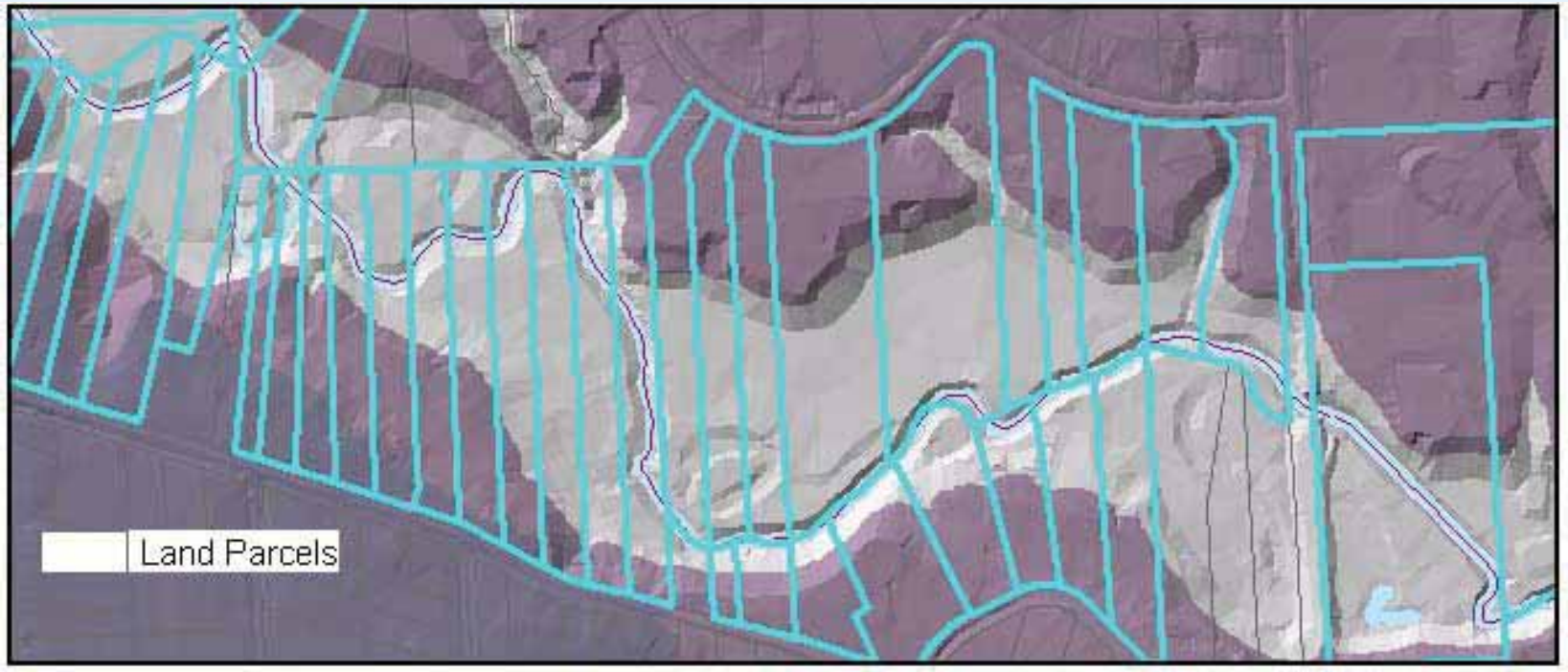
3. **Create a map using the GIS buffer function.**



A riparian corridor map delineated using a GIS buffering process.

Mapping Option 3: Property Selection Mapping Procedure

1. **Decide on a property selection method.** The GIS tool will give you several options, including selecting properties that intersect the river system or are within a certain distance of it. It is possible to choose to combine this method with the geomorphic mapping or buffer methods.
2. **Select the segment of river to be selected.**
3. **Create a map using the GIS selection function.**



A riparian corridor map delineated using a GIS parcel selection process.

Land-Based Planning Process

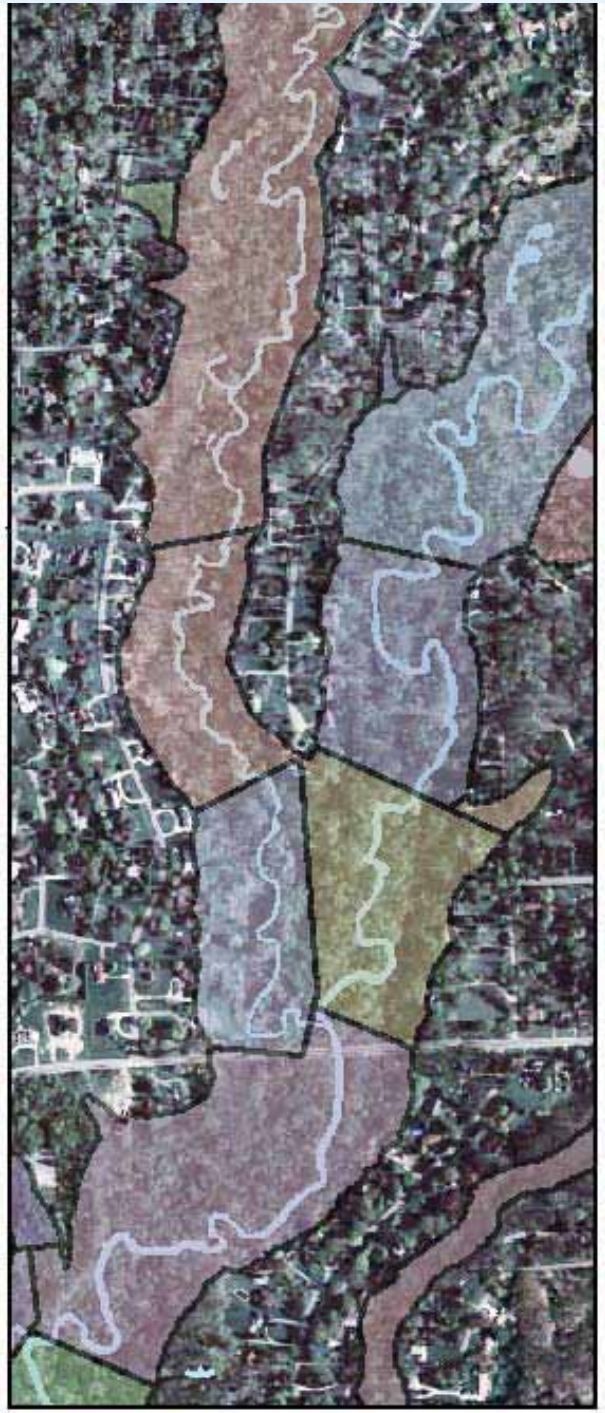
Many planning processes exist. The selection of a planning process will depend upon available resources and the desired level of detail. The following process is adapted from the 5-S Conservation Planning Process developed by The Nature Conservancy (TNC). (http://conserveonline.org/docs/2002/01/cbd.pdf) The 5-S process looks at Systems, Stresses, Sources of Stress, Strategies, and Success measures. This approach was modified to adapt to multi-objective riparian management planning. This method can be further adapted to the particular needs of your project.

1. OPTIONAL: Divide the corridor into unique sub-areas

This optional step involves taking a closer look at the entire length of the riparian corridor and identifying points where the character and context of the riparian corridor changes significantly. These may be areas along the river where there is a discernible change in physical/ecological or cultural character, context, or function that result in different assets, functional values, and ultimate goals and objectives. Depending on the size and complexity of the river system and the complexity of your planning needs, the corridor may be divided into many, few, or no unique sub-areas.

Examples of things to look for include:

- A transition into a new landscape ecosystem type
- A point of confluence where two streams join together
- A significant change in river valley width or slope
- An area where the river character changes significantly, such as becoming channelized or enclosed
- A change in hydrology or ecosystem type; such as transition from stream to marsh to lake
- Below a dam, impoundment, or lake level control structure
- A significant change in underlying or surrounding geology
- An area where riparian land use changes in character and/or intensity
- An area in which land ownership patterns change, such as transition into a large state park area



The Rouge River corridor divided into several subsections.

2. Identify special places along the corridor

This step involves taking another look at the entire length of the riparian corridor to identify special and unique areas that deserve special attention and planning.

Examples of things to look for include:

- A known high-quality natural area in need of special protection or stewardship
- An area of particular historical interest
- Publicly owned riparian lands
- Areas of stunning or expansive views
- Areas presenting unique opportunities for connecting people with the river such as urban waterfronts
- Significantly degraded areas presenting great restoration challenges



3. Inventory ecological and cultural assets and opportunities within sub-areas and in special places

Carefully evaluate each sub-area and special area identified in steps # 1 and # 2 to assess what is valuable in these areas. In some areas, these assets and opportunities may be only a potential.

Riparian assets and opportunities may include the following:

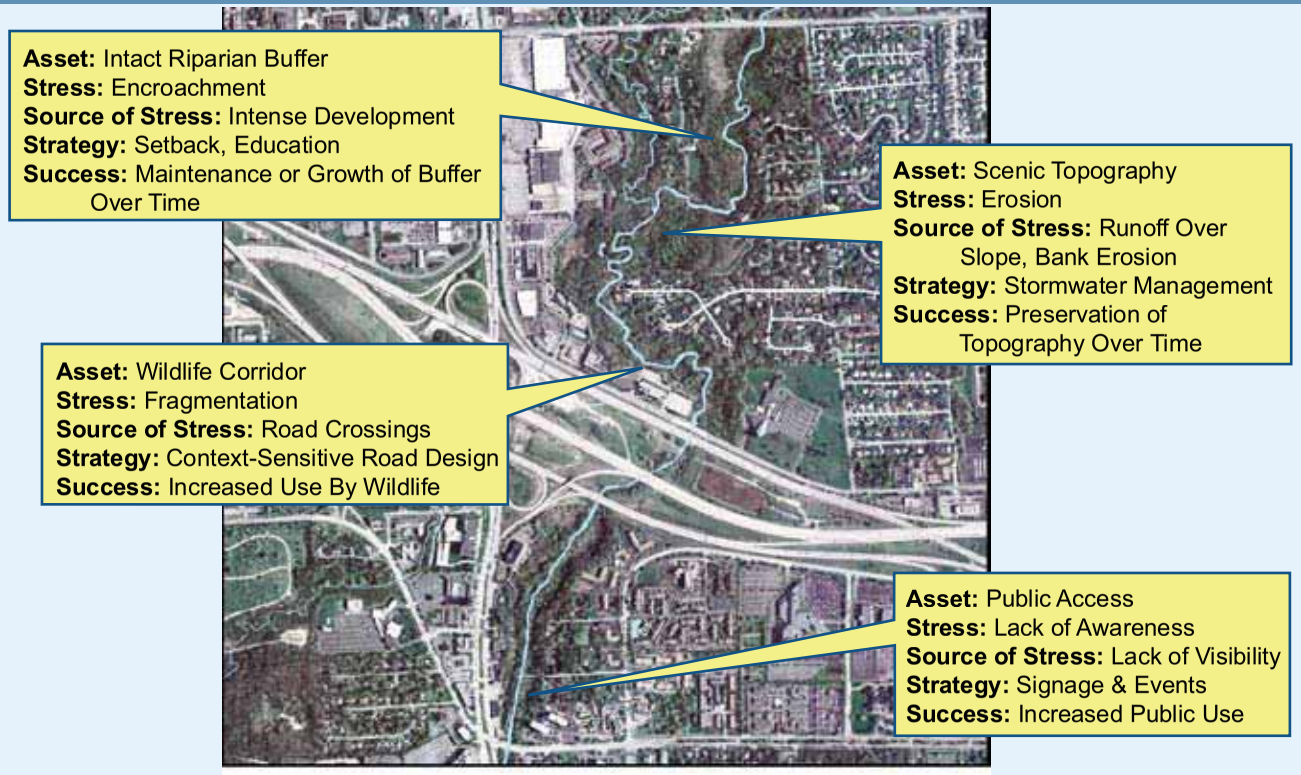
- Generation of biodiversity
- Provision of wildlife corridors
- Filtering of surface runoff pollutants
- Provision of recreational opportunities
- Provision of drinking water
- Water supply to wetlands/lakes
- Stormwater detention and treatment
- Provision of fisheries/waterfowl habitat
- Provision of floral diversity and wildlife habitat
- Protection of shoreline and streambank from erosion
- Recharge of groundwater aquifers
- Provision of unique geological resources, topography and scenic vistas
- Provision of historical resources
- Connecting people with nature
- Focal point for economic development and revitalization

The TNC 5-S method terms these assets and opportunities “conservation targets”. These are the things you want to preserve, restore, or improve in your river corridor.



4. Create a Riparian Corridor Plan

By this point in the planning process, a project area has been identified, a group of stakeholders has been assembled, the corridor is mapped, sub-areas and special places have been identified, and the ecological and cultural assets and opportunities have been identified within each of these areas that are worth planning for protecting. The "5-S" process is now initiated. The first "S" involves looking at the ecological system, which is inherent in the process of planning for the riparian corridor system. The following steps continue the process by addressing the issues and solutions associated with each "target".



4a. Identify Stresses

Once you have identified the assets and opportunities for the sub-areas and special areas in your riparian corridor, examine each for stresses— what is threatening the asset or opportunity? For example, are fisheries being threatened by sedimentation or habitat loss? Is an opportunity for a recreational trail being threatened by a road development that is not sensitive to the local context?

4b. Identify the Sources of Stress

Look more deeply at each stress identified. What is the ultimate source, or root cause, of that stressor? If sedimentation is the issue, is it caused by a specific road-stream erosion problem upstream? If context-insensitive development is a stressor, is it caused by lack of awareness and coordination between planners, and engineers responsible for road projects?

Multiple sources of stress may exist for each stressor, and may cause more than one stressor. Prioritize the sources of stress that have been identified to see where the most "bang for the buck" can be found to address these threats.

4c. Identify Strategies

Identify strategies that directly address the most important sources of stress. If a particular erosion problem is of concern, streambank stabilization of a particular area may be required. If lack of coordination or awareness is a problem, an initiative to facilitate dialog and educate planners and engineers may be necessary. Strategies may occur at the local, corridor, and watershed levels.

Part of identifying strategies involves identifying the responsible parties, time frames, and resource needs necessary to implement them. The stakeholder group will be invaluable in identifying these resources.

4d. Identify Success Measures

How will you know when goals are met? It is critical to develop a set of criteria that enable you to measure the success, evaluate progress regularly, and communicate progress to the stakeholder group and the public. For example, success measures may evaluate whether land is conserved over time, erosion has abated, or increased public use of riverside facilities has occurred.

Branding and Identity Planning Process

1. Describe the corridor and create an identity concept based on the unique geology, ecology, and cultural history

This planning process is based upon steps taken and lessons learned in the Rouge Green Corridor Identity Project in Southeast Oakland County. It is designed to assist stakeholders and partners in identifying the unique story told by their river corridor, and then turning that story into a brand identity and promotional tool.

It is difficult to care about something you have not experienced. To deeply care about something— whether it is a person, place, animal, or object— most people need to be able to either see, hear, touch, smell, or taste it. Even more, they need to be able to identify with it, to know something about its history and character, and its relationship to their own lives and the larger world. This is true for most things, including preservation of the environment.



Getting people to care about the environment requires that they identify and experience that environment in a personal way. Riparian corridors are excellent opportunities for doing this: they are distinct geographic features on the landscape, are accessible to people because they flow through nearly every community, and are rich in many attributes that can be used to create an identity and sense of place.



Riparian corridor identity begins with some basic elements: unique geography, ecology, history, values, challenges, and stewardship opportunities. All of these can come together to tell a story. When the details of these elements are sketched out, something special materializes that people can grasp with their hearts and minds.

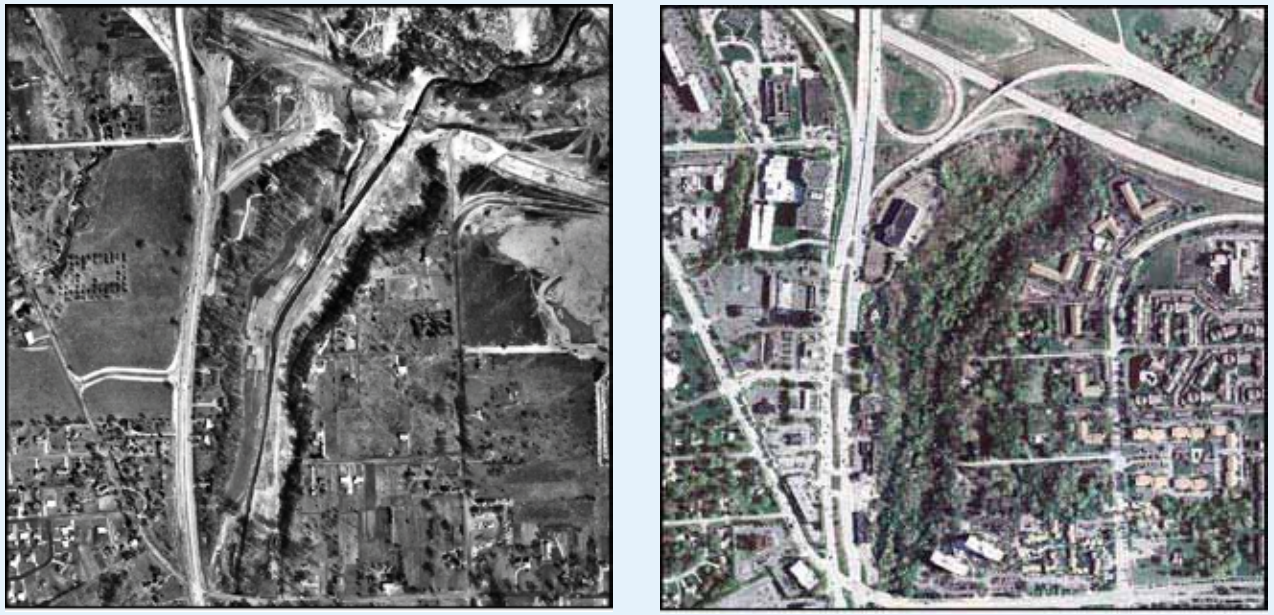


The Geographic Story

Each river corridor has a unique geography composed of many aspects. These characteristics change as a river flows from headwaters to mouth, as things such as topography, elevation, geology, landscape ecosystem type, and land use change. It is useful to construct the geographic story of the river corridor.

By answering the following questions, the story can be revealed:

- How did the watershed originate geologically? When and how did glaciers retreat, and what drainage patterns evolved as a result?
- What geographic features existing along the riparian corridor today provide evidence for the glacial origins of the river system?
- How did ecological succession take place in the time between the glacial melting and the modern day?
- What types of plants and animals once inhabited the area? What types of plants and animals inhabit it today?
- Is the river valley steep or shallow; is the surrounding landscape rolling or flat? How did the landscape affect the people, plants and animals who have inhabited this place?
- What types of riparian features exist in the river valley? Are there bluffs, oxbows, or ravines?
- Does the riparian corridor area being considered lie within the entire drainage network? Is it a tiny headwaters stream, a medium sized creek, or part of the lower river's main stem?
- What geographic factors were important in the economic and cultural history of the river, attracting or providing obstacles to native or European settlers?
- Did the location of the river affect how land was developed around it? Are there intense industrial land uses, a lot of private residences, or large parks and preserves?
- How does the geography play into modern recreational or interpretive opportunities? Are there any special viewsheds or overlooks?



The soils and low, wet floodplain along this stretch of the Rouge River allowed it to be farmed for celery in 1963 (left). Later on, the forest regenerated and it is now used as a public park (right).

The Ecological Story

The ecological story of a river changes in parallel with the geographic story, from headwaters to river mouth. Telling the ecological story provides a deeper understanding of the environmental resources of a river corridor.

Start with the broad overview:

- Which landscape ecosystem does the area fall in?
- Is the riparian area a functional wildlife corridor?
- How does the river relate to the larger landscape?
- How are the existing ecological resources impacted by modern land use and recreational patterns?

Next, move to the river corridor:

- What types of unique ecological communities exist in the riparian corridor? Are there any high quality natural areas?
- Are there any areas that have been severely impacted by removal of vegetation or by exotic invasive species? Has the vegetation along the river corridor been altered by human use: farming, mowed lawns?

Finally, consider the stream channel:

- How healthy is the river? What do studies of water quality, fish, and macroinvertebrates tell us?
- How does this information relate to the type of geology and land use in which the stream flows? Is the stream corridor impacted by stormwater inputs from surrounding impervious surfaces?
- Are there significant direct sources of pollution (illicit discharges)?



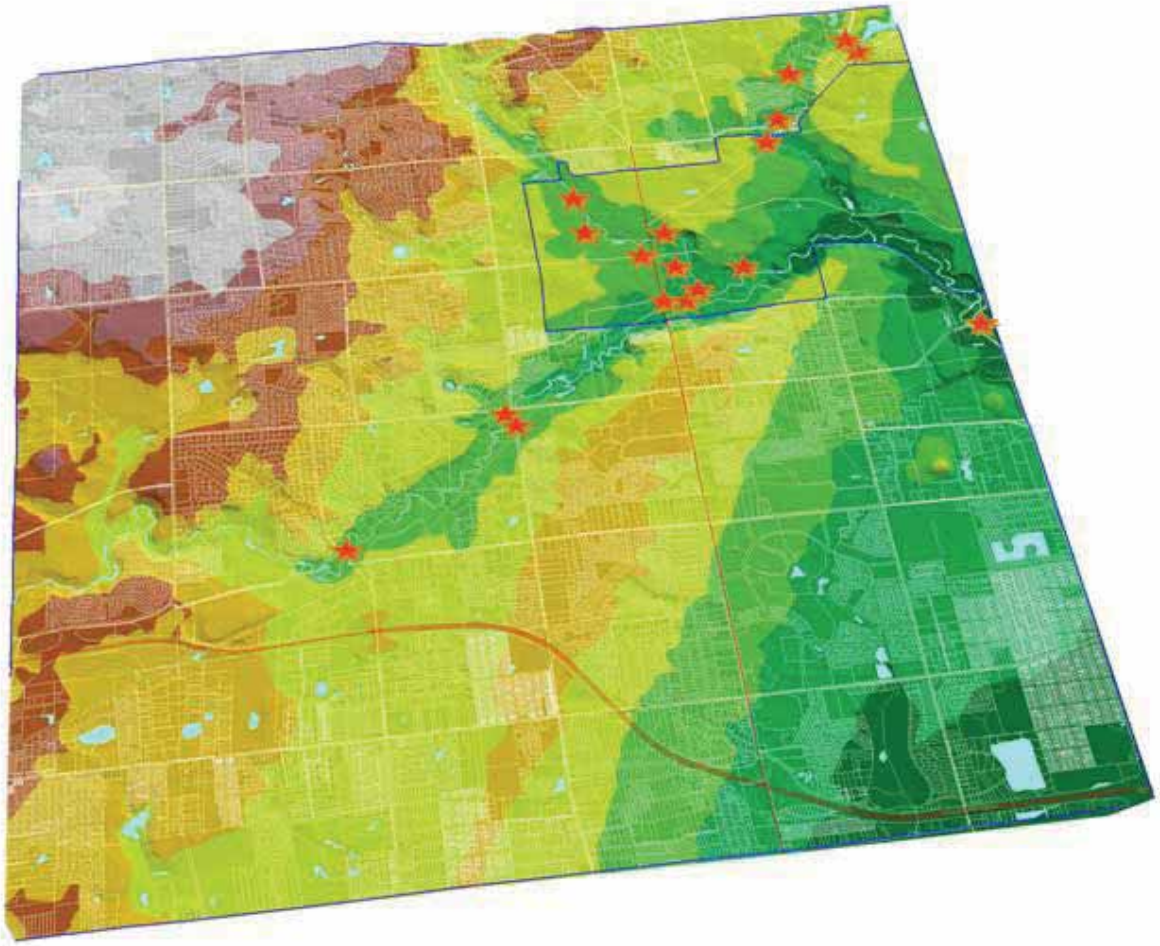
This area of the Rouge River is impacted by intense surrounding land uses and narrow buffer vegetation.

The Human Story

Humans have always made great use of river systems; rivers are sources of food, water, transportation, and energy.

Consider any historical human activity in the area:

- Is there any evidence of Native American settlement or movement along the river corridor?
- What ecological or geographic factors may have attracted or discouraged aboriginal activity?
- Are there any early European settlement sites? Were there any mills or early villages along the river?
- How are modern development patterns influenced by early European settlement patterns?
- Has development centered around or radiated from compact villages along the river?
- Do existing park lands reflect the vegetation of old farmsteads, with orchards and tree rows?



The steep gradient of the Clinton River and its tributaries in the Cities of Rochester and Rochester Hills made it the ideal locale for construction of mills. Each star on the map represents a historic mill site.

Photo Credit: Rochester Hills museum at Van Hoosen Farms

2. Develop a Brand Identity Concept

Once the appropriate questions have been asked and the story constructed, vehicles to communicate that story to the public will be needed. A brand identity that captures the essence of the riparian area's unique character will assist in communication and help to create a recognizable concept for the corridor.

Brands are commonly applied to consumer products like toothpaste and cereal, but brands can be applied to anything that one wants people to become familiar with. A good brand identity for a natural resource should do the following:

- Symbolically represent the resource
- Generate a positive feeling about the resource
- Raise the visibility of the resource
- Clearly communicate what the resource is
- Promote an expectation or promise about the resource
- Inspire people to want to connect with and protect the resource



This logo was developed for a stretch of the Rouge River that is considered special because of its unique natural character. The logo combines the colors blue and green to denote the natural elements of water and vegetation that combine in the corridor.

3. Plan & Implement an Outreach Campaign to Communicate the Brand Identity

Once the brand identity concept is created, an outreach plan needs to be implemented to get the brand out into the public eye. The brand logo needs to be bold, recognizable, and have a minimum need for explanation on all applications.

The following ideas may be useful:

- Conduct a public reception to unveil the identity concept and get the public out into the corridor.
- Create a website that communicates the corridor identity, updates the public on the planning process, and asks for comment and input.
- Hold a series of outdoor "ecotourism" events that highlight the corridor identity and require participants to provide input into the planning process.
- Work with local reporters and media outlets to create newspaper articles and TV spots about the corridor. When working with the media, know their deadlines and give plenty of advance notice when seeking event coverage. Follow up with a personal phone call, and thank the reporter.
- Create and distribute a colorful brochure or poster than includes the brand identity and encourages the public to visit the corridor.
- Use the brand in a series of printed advertisements: distribute bumperstickers, t-shirts, window stickers, etc. to the public.
- Use the brand in signage program.
- Use the brand in all communications relating to the river corridor.



Outdoor "ecotourism" events help the public become acquainted with the nature in their own backyard.

Relationship of Riparian Corridor Planning to Federal Phase II Stormwater Requirements

All riparian corridors exist within the context of a watershed. No amount of management at the stream corridor level can fully mitigate the impacts of stormwater. A watershed that is out of balance hydrologically will have degraded stream corridors. Successful watershed management includes stormwater management, including provisions for impervious surface reduction, low-impact development techniques, and preservation of critical natural areas and wetlands.

Management of riparian corridors is a key component of compliance with the federal Clean Water Act Phase II Stormwater Regulations. Many communities in Southeast Michigan have prepared local subwatershed plans to comply with Phase II. Virtually all of these plans identify management of riparian corridors as a specific goal and/or objective. In addition, the Michigan Department of Environmental Quality requires "education of the public concerning management of riparian lands to protect water quality."

Finally, each community must implement a program to eliminate illicit discharges of pollutants into their waterways.





Stormwater runoff from impervious surfaces such as pavement causes serious impacts to waterways. Stormwater is now regulated under phase II of the Clean Water Act.

Summary

Riparian corridors present many ecological, cultural, and economic values to communities, with associated challenges and stewardship opportunities. Whether a river corridor is pristine or degraded, it can benefit from careful thought, planning and promotion to maximize it as a community asset. A planning process for riparian corridors is a dual process; planners must communicate the identity of a river corridor while at the same time planning for management of the riparian landscape itself. Riparian corridor planning is related to and satisfies many requirements of federal Phase 2 stormwater regulations. A riparian corridor planning process begins with identifying the project area, initiating a stewardship group of relevant stakeholders, and mapping the corridor. Mapping options may incorporate geomorphic, parcel-based, or buffering methods. The 5-S planning approach developed by The Nature Conservancy may be appropriate. This method asks planners to identify conservation (or restoration) targets, and then identifies stresses, sources of stress, strategies, and success measures for each. For the branding and identity planning process, a brand identity concept for the river corridor is developed based on its unique geology, ecology, and cultural history. An outreach campaign to communicate the brand identity is then implemented.

Conservation and Restoration of Riparian Corridors



Chapter 4 Includes:

- Prioritizing Efforts to Protect the Natural Ecosystem
- Land Preservation Tools
- Connecting the Landscape Through Green Infrastructure
- Conserving and Restoring the Riparian Corridor
- Protecting and Restoring Stream Banks & Instream Habitat
- Unbalanced Flow: Stream Bank & Instream Habitat Degradation
- Benefits of Stream Buffering
- Stemming the Tide: Stream Bank Stabilization
- Managing Instream Habitat
- Stewardship, Invasive Species, Land Trusts, and Native Landscaping
- Partnerships, Volunteering, and Community Involvement
- Summary

Plans are only good intentions unless they immediately degenerate into hard work.

Peter Drucker

Conservation & Restoration Opportunities

Prioritizing Efforts to Protect the Natural Ecosystem

Land use planning and other land use management programs can have a major influence on the future of natural landscapes. Municipalities have a responsibility to prepare official planning and zoning documents. Through these documents, they can protect the integrity of this very valuable natural resource system. Knowing which lands are ecologically important can assist in prioritizing preservation and restoration efforts. If avoiding significant habitat is not possible, projects can be planned that minimize the negative effects frequently associated with development.

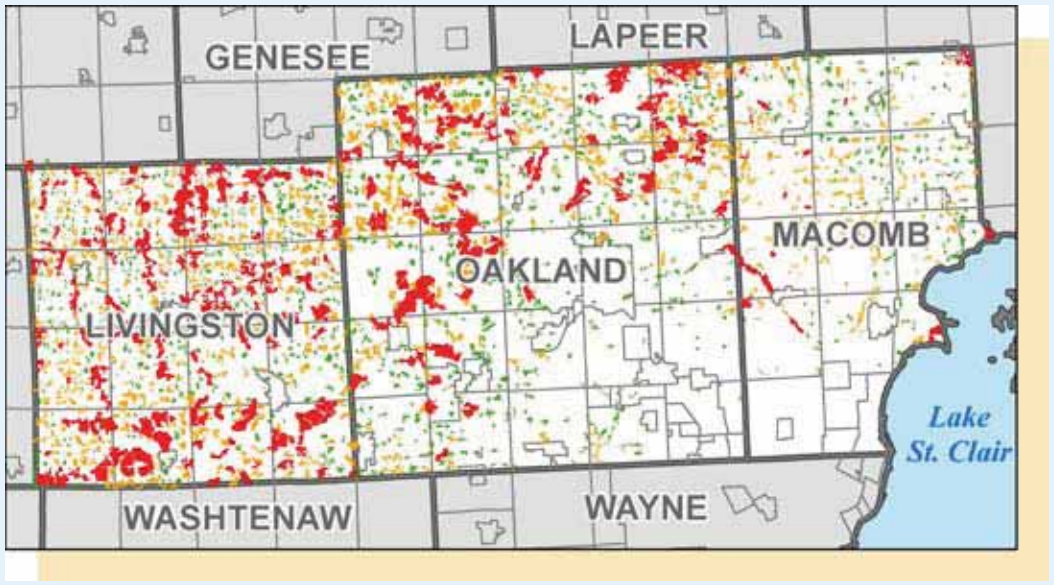
County planners within the region have been working with the Michigan Natural Features Inventory (MNFI) to create comprehensive natural area mapping that identifies and prioritizes natural resources and critical ecosystems. This mapping is readily available within several southeast Michigan counties and is in the process of being developed in several others. This comprehensive mapping can help shape development and may provide a starting point from which to build a connected resource system. Streams along, with their vegetative buffers, are critical links that hold these natural areas together and should be taken into consideration whenever development occurs.



Natural areas provide community benefits such as clean air, water, and recreation when preserved and managed as part of a green infrastructure plan.



Local stakeholders join together to plan for the preservation of green infrastructure in Oakland County.



Comprehensive natural area mapping in Livingston, Oakland, and Macomb Counties assists communities in identifying and prioritizing critical natural areas.

Land Preservation Tools

Many different approaches are needed to preserve and/or restore a riparian system. River restoration is often difficult because the damage has accumulated over decades and restoration efforts may take a long time to be fully realized. It is much more cost effective to prevent the problem than it is to fix it. Forming a local conservation vision (preserve, monitor, and restore) will provide purposeful direction to guide the most appropriate actions within a given area.

Each land protection tool has pros and cons which must be weighed in context of the overall local conservation vision. Part of the overall strategy should include prioritizing the most fragile natural resource sites for acquisition or potential conservation easements by public agencies (local governments) and private organizations (land trusts).

- **Land Acquisition:** Landowners can donate lands with conservation value to land conservancies so that the land can be managed and preserved for its ecological value. Outright donation of land has several benefits including substantial income tax deductions. On occasion, lands with unique natural features are purchased by municipalities and/or conservancies.

- **Conservation Easements:** A conservation easement is a legal agreement with a landowner that permanently limits the type and amount of development that may take place on the property. Landowners retain all other ownership rights and may qualify for income tax and property tax benefits.







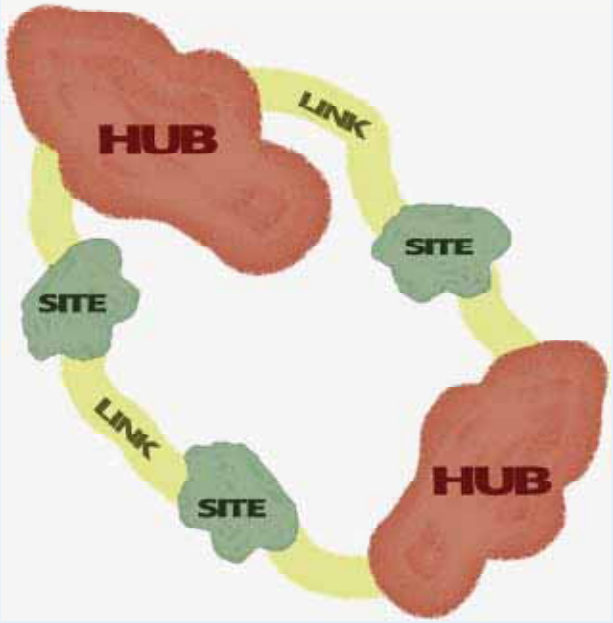




Land acquisitions and conservation easements in key areas can help to preserve riparian corridors, wildlife habitat, and viewsheds.

Connecting the Landscape Through Green Infrastructure

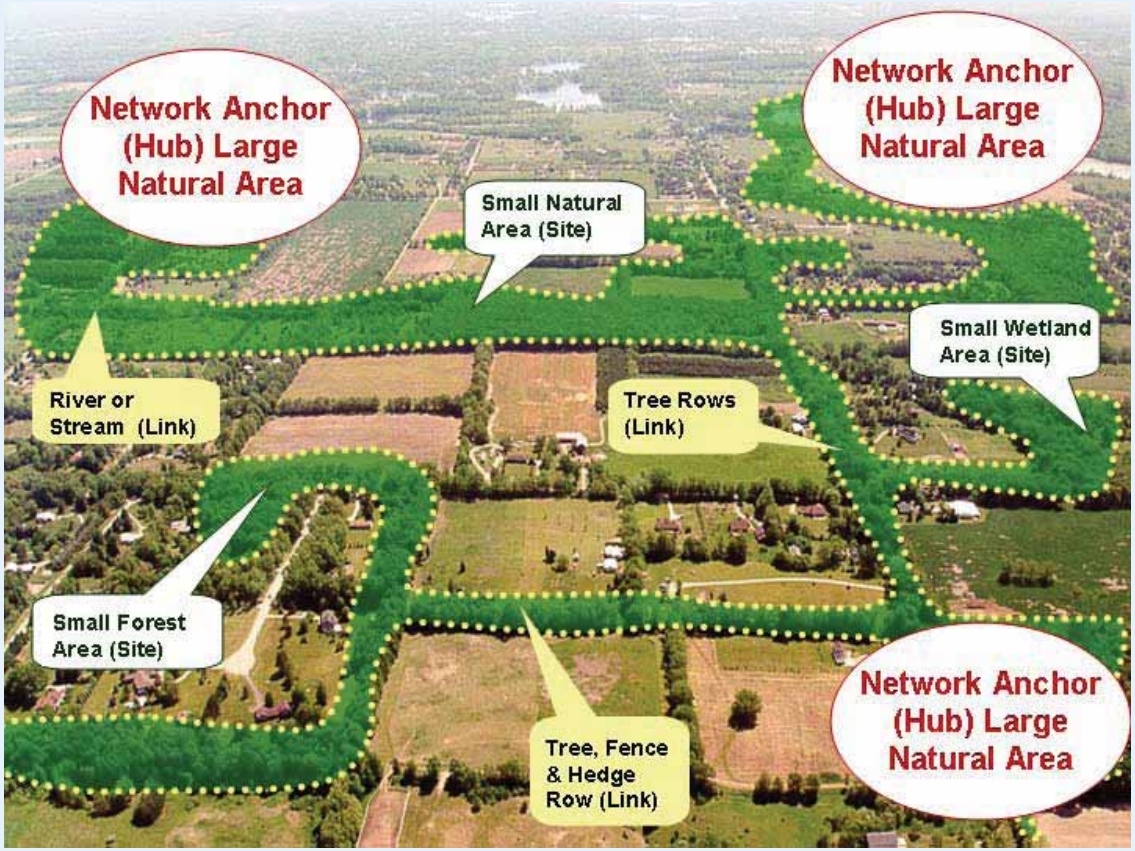
Several counties including Oakland, Macomb, Genesee, Lapeer, and Shiawassee along with various stakeholders are in the process of developing countywide Green Infrastructure Vision Plans in order to connect and protect their remaining natural lands. These visions will encompass natural and restored native ecosystems that make up a system of hubs, sites, and links. When completed, the visions have the potential to act as a guide for future development and should provide coordination for long-term ecosystem preservation and restoration efforts.



Hubs, Sites, and Links
Green Infrastructure is the interconnected network of open spaces, natural areas, and waterways.

Green infrastructure networks consist of the following components:

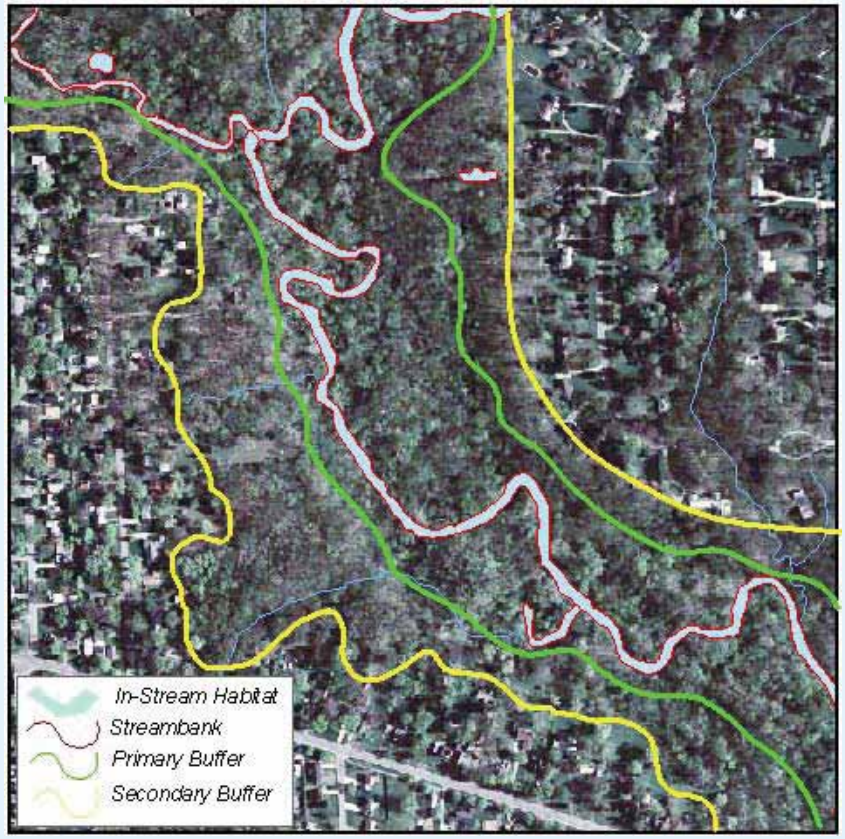
- **Hubs:** Hubs anchor the network and provide an origin or destination for wildlife. Hubs range in size from large conservation areas to smaller parks and preserves. Hubs provide habitat for native wildlife and help maintain natural ecological processes.
- **Sites:** Smaller ecological landscape features that can serve as a point of origin or destination or incorporate less extensive ecologically important areas.
- **Links:** The connections that hold the network together and enable it to function. Links facilitate movement from one hub to another.



Conserving and Restoring the Riparian Corridor

A few key points about preserving and restoring riparian corridor:

- **Wider the Better:** The wider the buffer vegetation around a water body, the more effective
- **Listen to the Landscape:** The optimal width of a buffer is not a fixed distance from the stream but varies depending on the local development pattern, natural topography, and resources.
- **Go Native:** Riparian buffer vegetation should consist of native existing or planted trees, shrubs, grasses and forbs well-suited to the site.
- **Any Buffer is Better Than No Buffer:** Even narrow strips of vegetation around a water body can stabilize streambanks and filter runoff
- **It All Adds Up:** The cumulative effects of many small restoration efforts can have a big impact.
- **Pocketbooks Benefit as Well:** Protecting natural areas and improving water quality enhances property values.



	Instream Habitat ***From water's edge to water's edge***	**Streambank** From the top of the water to the top of the bank	**Primary Buffer** From the top of the bank inland	**Secondary Buffer** From primary buffer to the nearest structure
Function	Provides aquatic habitat for fish, macro-invertebrates and herpetiles	Controls erosion, provides shade, visual screen, and noise control	Provides wildlife habitat and captures pollutants	Captures sediment and runoff, protect primary buffer from intense land uses and exotic invasive species
Action	Maintain adequate habitat through woody debris management, mitigation of erosion and sedimentation, and conservation of wetlands	Plant with native trees and large shrubs. Stabilize bank using natural methods when possible	Explore options for permanent protection such as conservation easement or acquisition. Plant with native trees, shrubs and perennial ground cover	Plant with native grasses and wildflowers
Tip	Utilize local efforts using volunteer labor from groups such as Trout Unlimited	Depending on the condition of the stream bank, hard or soft engineering approaches may be needed	Using a variety of plant species will attract more wildlife and better contribute to biodiversity	Place less emphasis on lawns and more on views

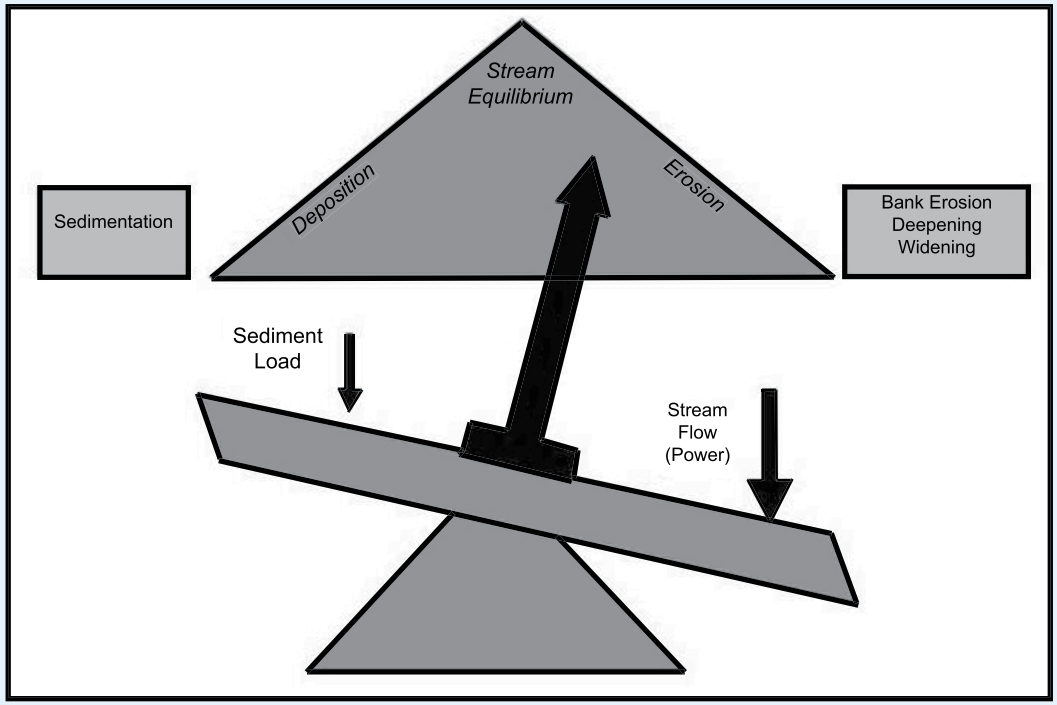
Each component of a riparian corridor has unique characteristics functions and can benefit from specific actions targeted toward that component.

Protecting and Restoring Stream Banks & Instream Habitat

Beyond the riparian buffer, the stream itself may be in need of restoration. The stream can be separated into two main components: (1) the banks and (2) the instream habitat. The banks of a stream are the immediate zone of separation between the streams and their floodplains. They are shaped by "bank full flow", which is the amount of stream flow that occurs when the river is at its full capacity (before it spills over its banks into its floodplain). The instream habitat consists of the continuously varying patterns of rocky substrate, overhanging vegetation, aquatic vegetation, and woody debris.

Unbalanced Flow: Stream Bank & Instream Habitat Degradation

An increase in stream flow resulting from large volumes of stormwater runoff from the watershed is the primary cause of stream bank and instream habitat degradation. Agricultural and urbanizing watersheds have increased amounts of stormwater runoff delivered to their streams as a result of a diminished capacity of the watershed's land surface to absorb rainfall. This diminished absorption capacity is the result of vegetation removal and increased impervious surfaces (roads, rooftops, driveways, and parking lots) that accompany agricultural clearing and urban development.



Streams must change their form in order to accommodate the amount of water and sediment they receive from their watersheds.

When the landscape of a watershed is stable, its streams have reached equilibrium with respect to the rates of erosion and deposition of sediment carried by the stream. Changes in the landscape of a watershed, such as increased impervious surfaces, cause a change in the hydrologic regime and sediment loading regime in that watershed. As a result, streams come out of equilibrium. As streams seek to establish a new equilibrium they must accommodate to changes in runoff and sediment delivery from the watershed. In doing this, they must change form, often deepening and widening, and course, often cutting off existing meanders or migrating to accommodate the increased demands from the watershed.

This rebalancing is a natural process, occurring whether the changes in a watershed's land cover are natural or man-made. Once watershed landscape changes have occurred, it can take decades to reach a new equilibrium after the landscape has once again stabilized. Natural meandering or migration of the stream has implications for development and land uses situated close to the banks. Stabilization or channelization of a stream to prevent or alter this natural migration can have permanent negative consequences for stream banks and instream habitat, but may become necessary to protect or develop property.

Throughout this process, the stream banks, instream habitat, and fish community can become seriously degraded. High flows scour the stream, uprooting vegetation and collapsing banks. Increased sediment loads settle in the stream, choking off the rocky bottom substrates that provide good instream habitat. Frequent stream-scouring flows turn the river into a homogenous conduit, destroying the variation in substrate that provides good aquatic habitat. Straightened stream channels provide less habitat. Human intervention can provide some remedy for these situations, but comprehensive watershed management is the most effective strategy.



This house is threatened by erosion of the banks along the Clinton River as the river works to stabilize itself in response to increased loads of water and sediment from its watershed.

A wealth of information and resources about stream stability and stream bank and instream habitat restoration can be found in Stream Corridor Restoration: Principles, Processes, and Practices, published by the Federal Interagency Stream Restoration Working Group. The document can be downloaded at:

http://www.nrcs.usda.gov/technical/stream_restoration/



This creek has soft-engineering stabilization methods installed to protect the stream banks from erosion.

1963



2002



The Paint Creek in the City of Rochester was straightened and re-routed near its confluence with the Clinton River, allowing the development of the municipal library along the banks.

Clinton River Geomorphology Project

This Clinton River Geomorphology Project was conducted through Macomb County and Environmental Consulting & Technology (ECT). A purpose of the project was to evaluate the stability of individual stream reaches to plan for stream restoration projects and highlight areas of the river that require planning consideration for adjacent land uses.



Reprinted with permission from
Environmental Consulting & Technology

Benefits of Stream Buffering

Riverbanks that contain natural vegetation can reduce erosion and flooding, filter pollution, and serve as migration routes and forest connectors between habitats for a variety of wildlife. All streamside landowners, whether in urban or rural areas, can work to reestablish gaps (areas lacking vegetation) along riverbanks.

To improve water quality, the design of riparian vegetative buffers must take into account the area's hydrology, topography, soils, pollutant loadings, and adjoining land uses. Riparian vegetative buffers, although very important, should be recognized as only one part of a comprehensive land management plan. Whenever possible, urban and rural parks and open spaces should be linked to form functional wildlife corridors.



This stream bank stabilization project along the Rouge River in the City of Birmingham utilized native plants and local materials. The log that is bolted into the stream bank was recovered from a dead tree that had fallen nearby just weeks before the project was installed.



This once stabilized, wooded slope is prone to erosion caused by clear-cutting the vegetation.

Stemming the Tide: Stream Bank Stabilization

Stabilization of stream banks is an increasingly common practice as urban streams erode their banks, threatening properties as well as river ecosystems. Options for stream bank stabilization depend on the nature and extent of the erosion, characteristics of the stream, and resources available to address the problem. Two main types of solutions involve "hard" engineering approaches which stabilize stream banks with hard structures such as rock, concrete, and metal, and "soft" engineering which involves the use of natural materials and plants to reinforce the stream banks.



The riparian forest is falling into the river as the Clinton River erodes its banks.

Because stream bank erosion is a natural process that involves the entire watershed, it is critical to have an understanding of what is going on along the entire length of the stream before attempting to manage banks at specific locations. The stream must not be too far from equilibrium, and future changes in the watershed landscape that might drive the stream out of equilibrium in the future must be taken into account. Attempting to stabilize a stream bank that is severely out of equilibrium or whose watershed is likely to have significant increases in impervious surfaces in the near future may prove futile. The stabilization treatment may fail within a short period of time or may cause problems elsewhere along the stream.



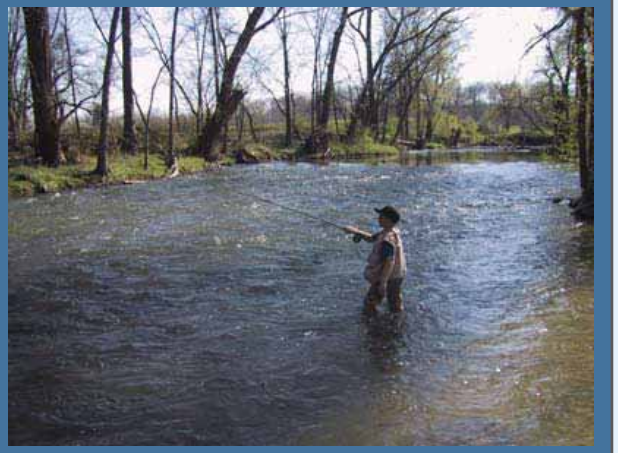
These cobbles were installed as part of a stream bank stabilization effort in a city park in the City of Auburn Hills along the Clinton River.



Rock-filled gabion baskets provide stream bank stabilization in the City of Rochester Municipal Park.

From an environmental standpoint, soft engineering methods are preferred and every effort should be made to favor soft approaches when possible. Soft engineering approaches can improve habitat and are generally more aesthetically pleasing than hard approaches. In some situations, soft approaches will not provide the desired stability. Combination approaches may be employed using harder solutions for areas under great stress and softer approaches for less threatened areas. An example may include installing live-stake fascines of woody material higher on a bank but stabilizing the toe of a bank with rip-rap or gabion baskets.

Clinton River Coldwater Conservation Project



The primary goal of the Clinton River Coldwater Conservation project was to assess and develop the coldwater potential and public access opportunities in lower Galloway Creek and the middle mainstream section of the Clinton River to become a designated trout stream. The second goal was to enhance and create trout in-stream and streamside habitat that protects and creates trout spawning habitat.

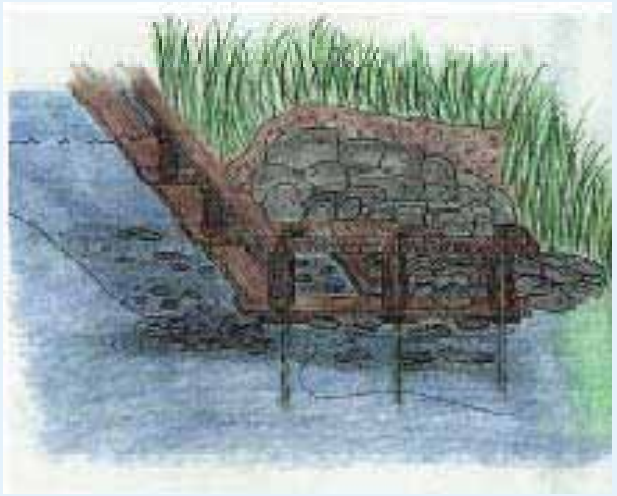
Managing Instream Habitat

Improvement of the habitat in a stream is an important part of managing for fisheries. A wide range of tools are available for managing instream habitat. Approaches concern the removal of excess sediment, installation of man-made habitat structures, and best management of existing instream habitat resources.

Sediment removal and the installation of sediment traps can improve fish habitat if done in the proper situation. The approach should only be employed when upstream sediment control methods have been implemented. Removing and trapping sediment in an unstable, severely eroding stream system is most likely a waste of resources and will not provide long-term benefit.

Man made habitat structures are designed to provide refuge, spawning habitat, and transportation pathways for fish and include lunker structures, boulders, logs, weirs, dikes, fish passage structures, and off-channel oxbows, ponds and coves. Optimally, the structures should be constructed from local materials. Man-made structures are less effective than natural structures, so maintenance and preservation of existing natural habitat should always be a top priority.

Existing instream habitat resources includes the management of woody debris and rocky habitat in a system. Principles for woody debris management include leaving most logjams in place instead of removing them to clear the stream of obstruction Excess materials from logjams can be used to create habitat structures. Management of rocky habitat focuses on preventing or managing the deposition of sediment around rocky substrates.



This artist's rendition of a lunker structure shows a type of instream habitat improvement which provides shelter and habitat for trout.

Voluntary Actions Engaging Private Land Owners

Well informed citizens not only make day to day decisions that support the river system, but can provide helpful input into the local decision making process. Additionally, these same citizens may take an interest in and support backyard habitat and funding efforts.

The collective positive actions of homeowners and businesses can make a significant difference in the larger landscape while improving the local environment. The challenge of learning about and protecting the environment may at first seem overwhelming. Environmental issues are often complex. The following opportunities should help match particular interests with positive actions that benefit the river system. Small successes can make a tremendous positive impact one home or business at a time.



A stewardship crew learns about managing invasive species.

Stewardship

Stewardship means being responsible for something and taking good care of it so that others can enjoy it, not just for today, but for many years to come. Stewardship programs help property owners protect their lands, reduce management costs, and improve the condition of natural resources. Invasive species can sharply degrade the quality of natural areas by altering natural processes and reducing biodiversity, therefore they should be included as part of the overall stewardship program. Sound Stewardship Programs Include:

- Baseline documentation
- Management plan
- Site boundary markers
- Continuous monitoring and maintenance
- Reliable funding source
- Maintaining communication with surrounding landowners

Resources for Stewardship

The Michigan Stewardship Network, a nonprofit partnership, trains, develops, and supports a core group of volunteer and professional stewardship leaders.

Michigan Stewardship Network
224 Charles Street
Ann Arbor, MI 48103
Phone: (734) 769-6981

Invasive Species

- Invasive species can seriously degrade the quality of the natural system by altering natural processes and reducing biodiversity. Being aware of potential problem species will enable stewards to conduct proactive steps to prevent their entry or to effectively control the species should it become established.

- Knowing what to plant and what to remove is a responsibility of good stewardship.

- Local conservancies can help determine which control method is most effective against the targeted invasive plant, while being the least damaging to the ecosystem.



Native Landscaping

Native landscaping refers to using plant species that are native to the area and adapted to the particular climate and soil conditions. Their root systems are highly developed, which allows the plants to use the water and nutrients available in the soil, eliminating the need for fertilizers, pesticides and watering. Homeowners and developers alike are beginning to appreciate the environmental, economic, and aesthetic benefits of native landscaping.

The benefits of native landscaping include the following:

- **Economic:** Native landscaping has the ability to strengthen community image, increase property values, improve water quality, reduce the need for detention facilities, and reduce the cost of landscaping installation and maintenance.

- **Educational**: Native landscapes are hands-on opportunities for people of all ages to learn about habitats and ecosystems. School yard programs are excellent opportunities for scientific study and can provide a greater understanding of community.

- **Environmental:** Landscaping with native plants helps to enrich the soil, decreases water run-off, and filters the pollution caused by fertilizers, herbicides, and pesticides. Native landscaping can help protect and restore the biodiversity of ecosystems, which in return provide habitat to a variety of plants and animals.

- **Aesthetic:** Native landscape designs can include dozens of species of trees, shrubs, grasses, and wildflowers, all blooming at different times during the growing season. When left standing during the winter months, they provide structure and interest that provide additional opportunities for wildlife viewing and photography.



Community based demonstration projects play an important part in raising awareness and getting volunteer involvement.











Land Trusts

Land conservancies (also called land trusts) are local, regional, or state wide private 501 (c)(3) nonprofit organizations that operate independently of government. They help preserve the character of their communities by working with various partners to preserve key high quality natural resources. Land Trusts are working closely with local communities throughout Southeast Michigan. These nonprofit groups bring a wealth of resource protection ideas to the table. The preservation tools used by the conservancies depend on the nature of the land to be preserved and the needs of the project partners.

Land Conservancies in Oakland County and Southeastern Michigan:

Oakland Land Conservancy
P.O. Box 80902
Rochester, MI 48308
Phone: (248) 601-2816

Michigan Chapter of the Nature Conservancy
101 East Grand River Ave.
Lansing, MI 48906
Phone: (517) 316-0300

Highland Conservancy
205 West Livingston Rd.
Highland, MI 48357
Phone: (248) 887-3970

North Oakland Headwaters Land Conservancy
P.O. Box 285
Clarkston, MI 48348
Phone: (248) 846-6547

Michigan Nature Association
326 East Grand River Ave.
Williamston, MI 48895
Phone: (517) 655-5655

Southeast Michigan Land Conservancy
8383 Vreeland Rd.
Superior Township, MI 48198
Phone: (734) 484-6565



Invasive Plant Species

Common reed (*Phragmites australis*) (above) and Garlic Mustard (*Alliara petiolata*) (below) are two of the most serious exotic invasive plants in Southeast Michigan's riparian ecosystems.



Partnerships, Volunteering, and Community Involvement

Individuals must work together to encourage all members of the community to increase their understanding of ecosystems and to participate in conservation and restoration activities. Public-private partnerships that include rural landowners, urban residents, public agencies, businesses and non-profit groups play an ever expanding role in the long-term protection of the resource.

Volunteer programs should be relevant, achievable, easily understood, and match interests with individual aspirations. Many opportunities exist to learn about and experience firsthand the unique natural heritage. Web-based tools are readily available and provide a wide range of local information about the natural environment. Also, local websites identify opportunities to get involved in activities within the community.

Community-based restoration demonstration projects are an excellent means of raising awareness and getting volunteer involvement. The use of permanent signs and other interpretive markers allow continuing awareness-building within the community.

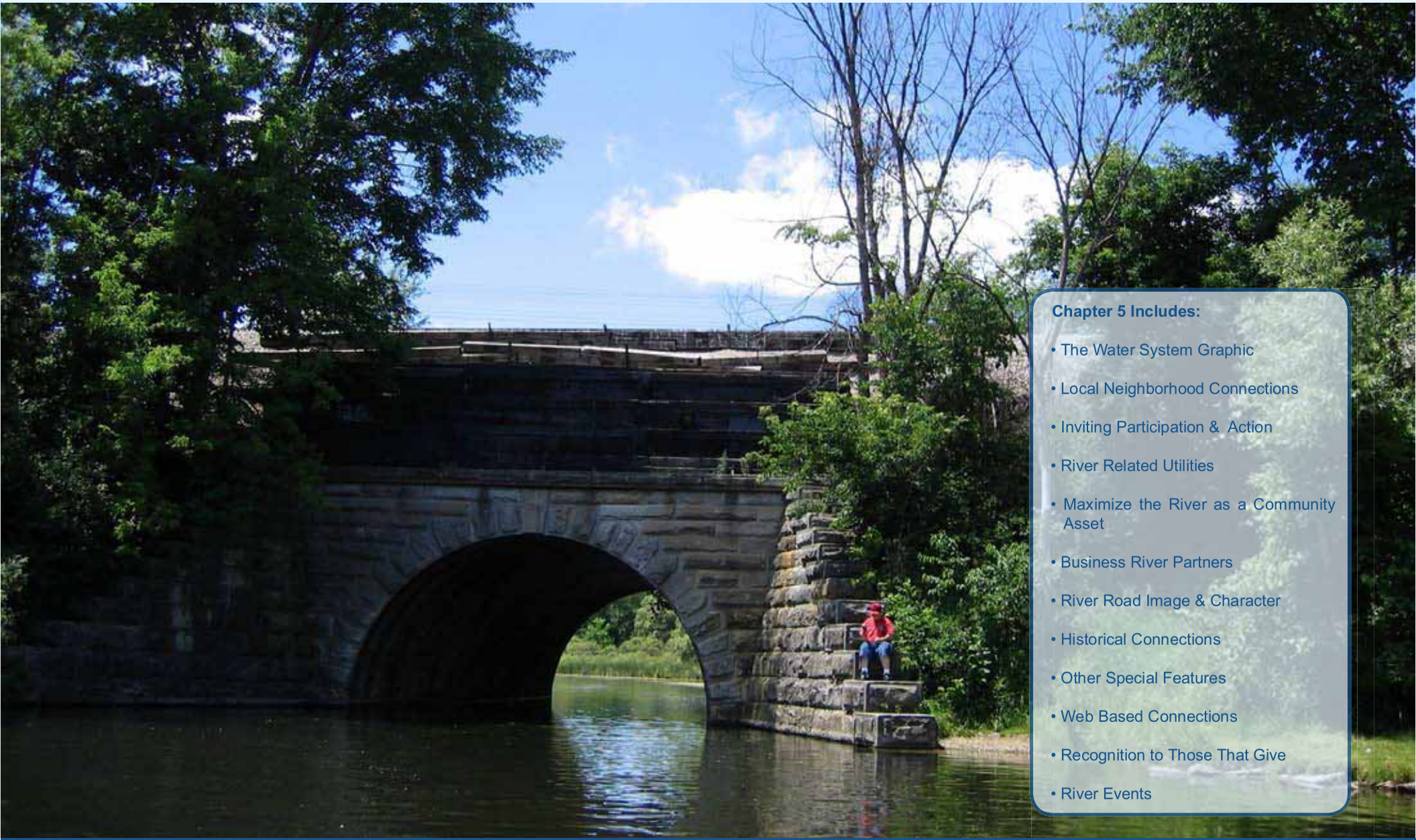
Public support and multi-agency partnerships are key components to any planning project.

Summary

Conservation of natural resources begins with identifying and prioritizing critical resources. County planners in Southeast Michigan have been working with the Michigan natural Features Inventory (MNFI) to create comprehensive natural area mapping that identifies and prioritizes natural resources and critical ecosystems. Land preservation tools include acquisition and conservation easements. Connecting natural areas through a green infrastructure network of hubs, sites, and links conserves landscape ecological integrity. Special care to protect riparian corridor complexes involves managing in-stream habitat, streambanks, primary buffers, and secondary buffers. Voluntary land management actions involving private landowner stewardship are a critical piece of the puzzle. Management of exotic invasive species and native landscaping has environmental, economic, aesthetic, and educational benefits. Land trusts and local community volunteers are important partners in land conservation and stewardship.



Cultural Resources: Building Awareness and Connecting with the River



Chapter 5 Includes:

- The Water System Graphic
- Local Neighborhood Connections
- Inviting Participation & Action
- River Related Utilities
- Maximize the River as a Community Asset
- Business River Partners
- River Road Image & Character
- Historical Connections
- Other Special Features
- Web Based Connections
- Recognition to Those That Give
- River Events

I started out thinking of America as highways and state lines. As I got to know it better, I began to think of it as rivers. Most of what I love about the country is a gift of the rivers. . . . America is a great story, and there is a river on every page of it.

Charles Kuralt

Cultural Resources: Building Awareness & Connecting with the River

Where does it come from? Where does it go?

In order to maintain the river system, it is important to bring people to the river and make it real for them as a valued resource. Without a perspective on the river's contribution to economy, community, and quality of life, collective stewardship is impossible. Listed are twelve suggestions for connecting people with the river so that it can be broadly experienced and understood as a community asset.



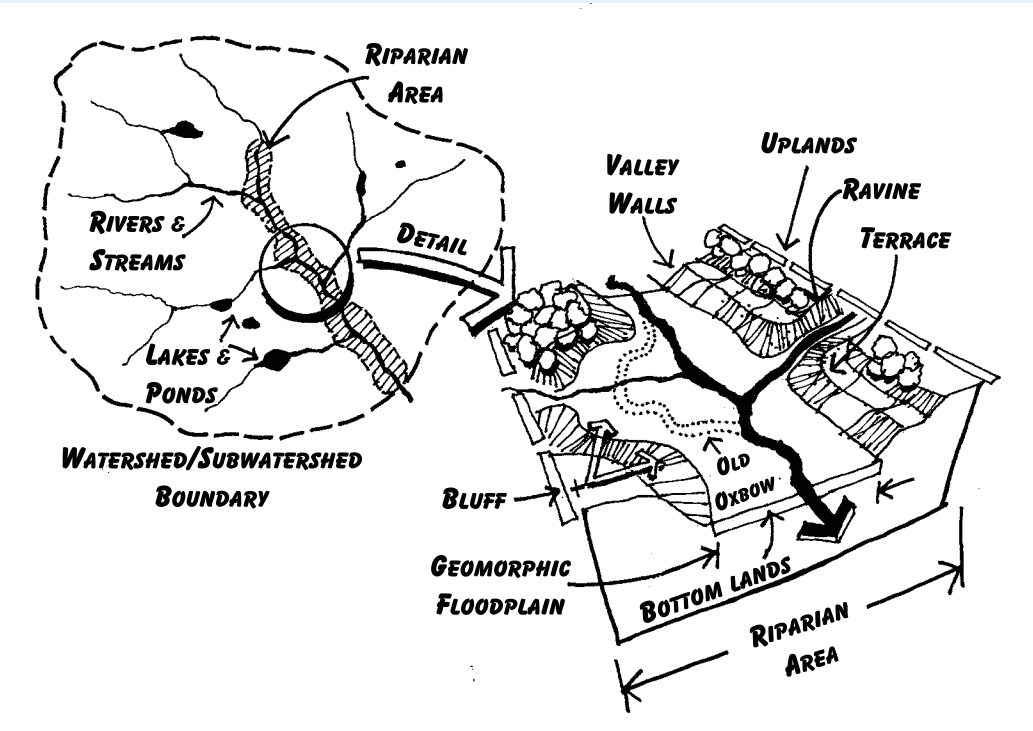
1. **The Water System Graphic**
   Where does the water come from? Where does it go?
2. **Local Neighborhood Connections**
   How do I connect with the river from where I live?
3. **Inviting Participation & Action**
   Connecting the resource with stewardship actions
4. **River Related Utilities**
   Out of site, but not out of mind
5. **Maximize the River as a Community Asset**
   Establishing a variety of place connections
6. **Business River Partners**
   River access at business locations
7. **River Road Image & Character**
   Visual opportunities at crossings
8. **Historical Connections**
   Interpretation opportunities
9. **Other Special Features**
   Use them as identity builders
10. **Web Based Connections**
    The next best thing to being there
11. **Recognition to Those That Give**
    Awards as river connections
12. **River Events**
    Come to the river to celebrate

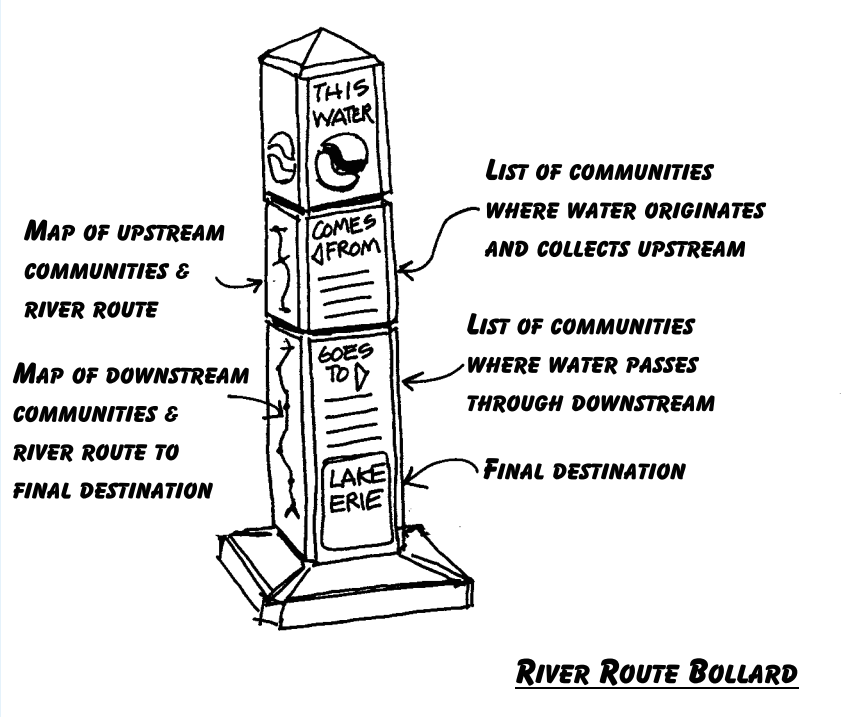
The Water System Graphic

Where does the water come from? Where does it go?

From community to community, landowner to landowner, the river is connected to and dependent upon a collective population for its health and vitality. The river water collection system connects a much larger land area than most people are aware. Watersheds and sub-watersheds are difficult concepts for the general public to grasp.

A simple graphic depicting the extent of the watershed or river corridor at specific points along the system can build an awareness of where the water flowing past a specific point comes from and where it goes.





River Route Bollard

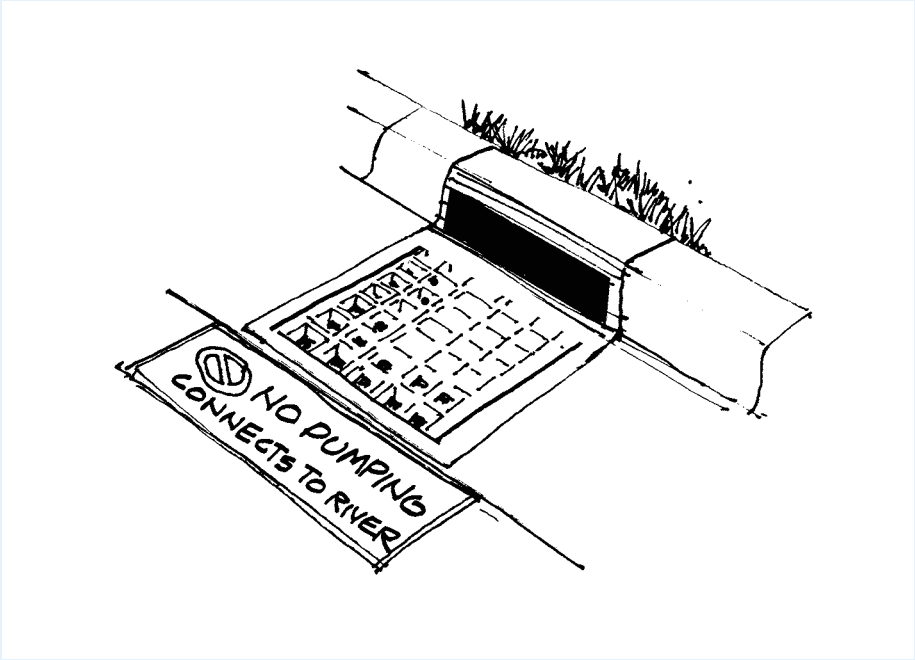
Local Neighborhood Connections

How do I connect to the river from where I live?

Building an awareness of the river system's neighborhood location and collective dependence on individual actions is an important step in inviting individual stewardship actions.



River Partner signs can be voluntarily installed in front yards or other high visibility locations calling attention to the presence of the river and stewardship contributions by individual, street, or neighborhood riparian property owners.



Neighborhood storm drain catch basin inlets can be stenciled with graphics and words highlighting connections to specific neighborhood rivers, streams, lakes and ponds.



Inviting Participation & Action

Connecting the Resource With Stewardship Actions



CONCEPT SKETCH

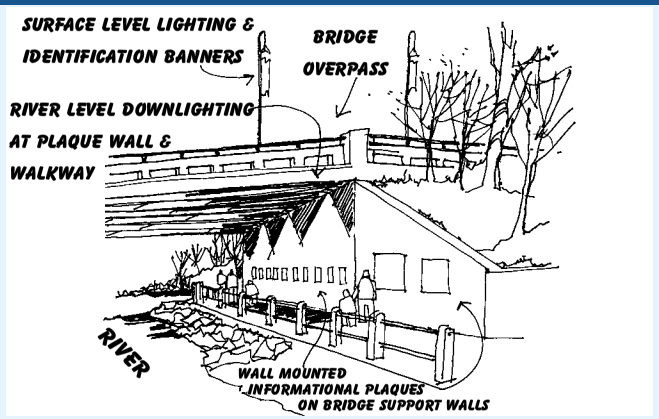
GRAPHIC RELIEF WALL-WHAT YOU CAN DO TO HELP THE RIVER

The identification of A river corridor by name and requests for stewardship action are at times removed from the presence of the river resource. The names of river resources as well as action checklists highlighting "What You Can Do" can be integrated into river corridor site amenities.

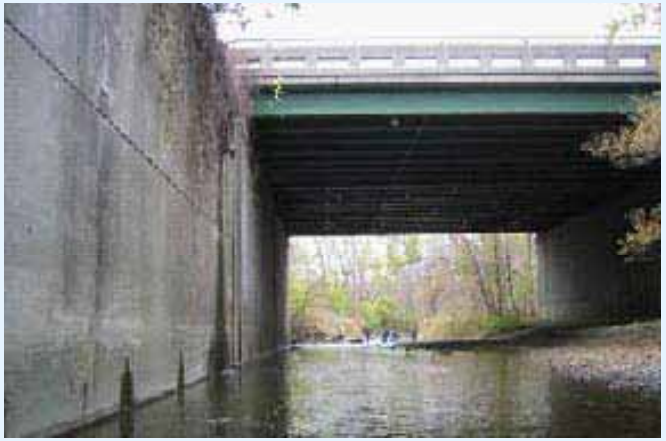
Here are a couple of examples:

1. List stewardship actions at locations where people experience the river. Directly link actions in their daily lives with the experience of the river corridor in front of them (left).

2. Sign the river or related water feature with its name at key locations along the corridor (right).









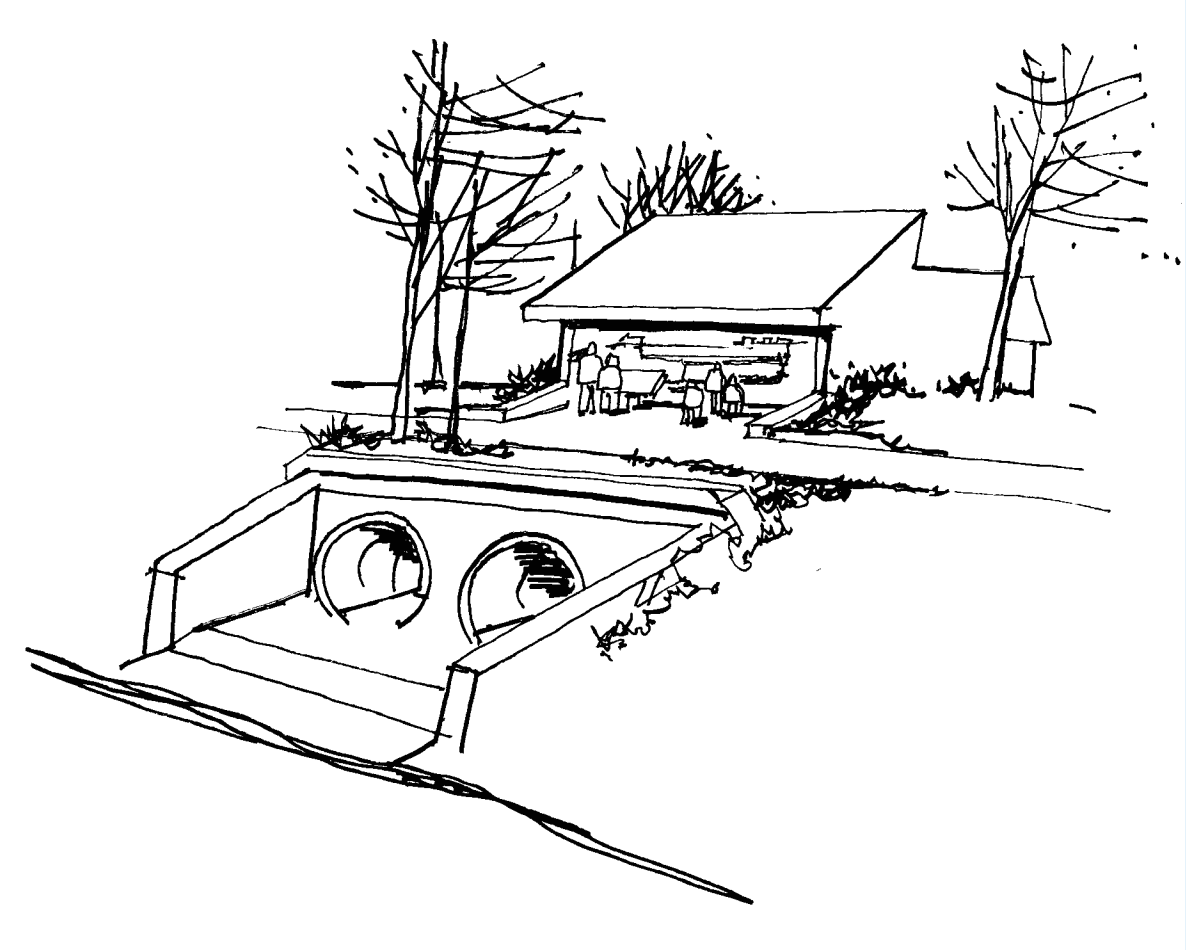


River Related Utilities

Out of site and out of mind?

Historically, stormwater related utility structures have been either buried or aesthetically disguised. The functional elements of the utility system such as underground piping, combined sewer and sanitary sewer overflow facilities, pump stations, etc. are removed from public awareness and as a result an understanding of the functional service they provide is more difficult to communicate. Water resource stewardship, including informed decision making, must begin with an awareness of the system's purpose and function.

Wherever possible communicate the function of both natural and structural water resource system components. Provide site interpretive displays highlighting the function and service of the system components and how they work together to manage water quantity and quality.

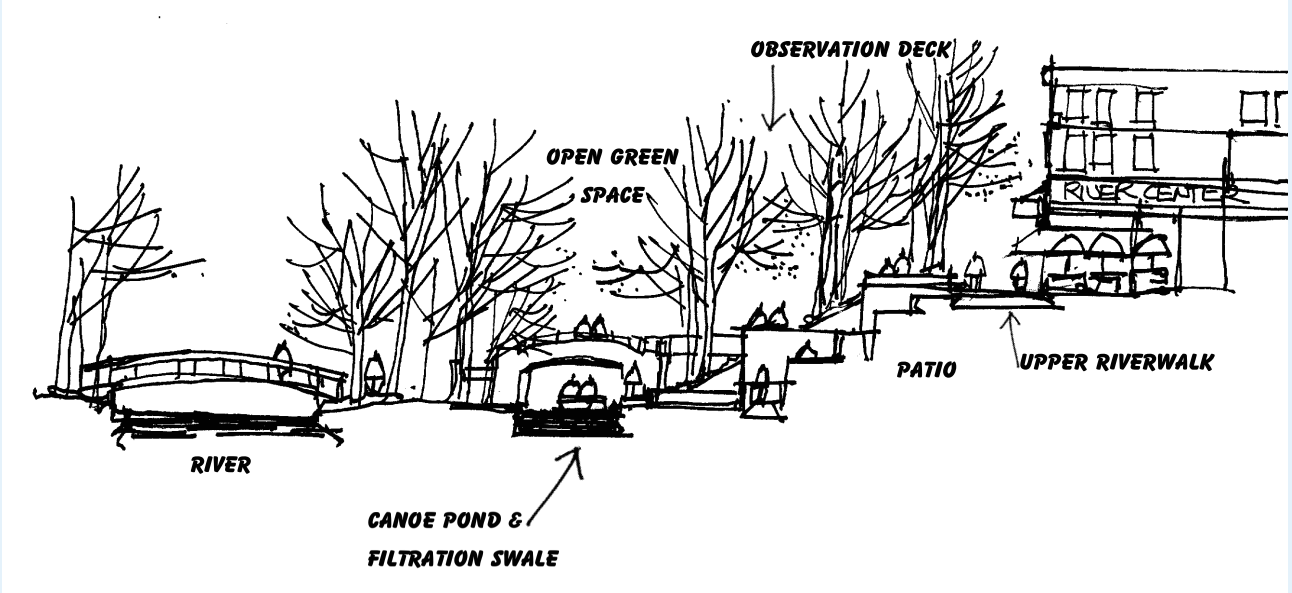


We are often unaware of the existence of utilities that play an important role in our daily lives. Many, such as this large storm and sewer drain, are located right beneath our feet.

Maximize the River as a Community Asset

Establishing a Variety of Place Connections

The economic, aesthetic, recreational, and health benefits related to the river system cannot be overstated. Connections with and access to a healthy river and its associated green space provide marketable amenities to adjacent development and promote a community's quality of life for purposes of business development and retention.





Capitalize on the river as a community asset by developing pathway connection points, parallel trails, canoe and kayak routes, and related community park, recreation, and interpretive features as appropriate.

Business River Partners

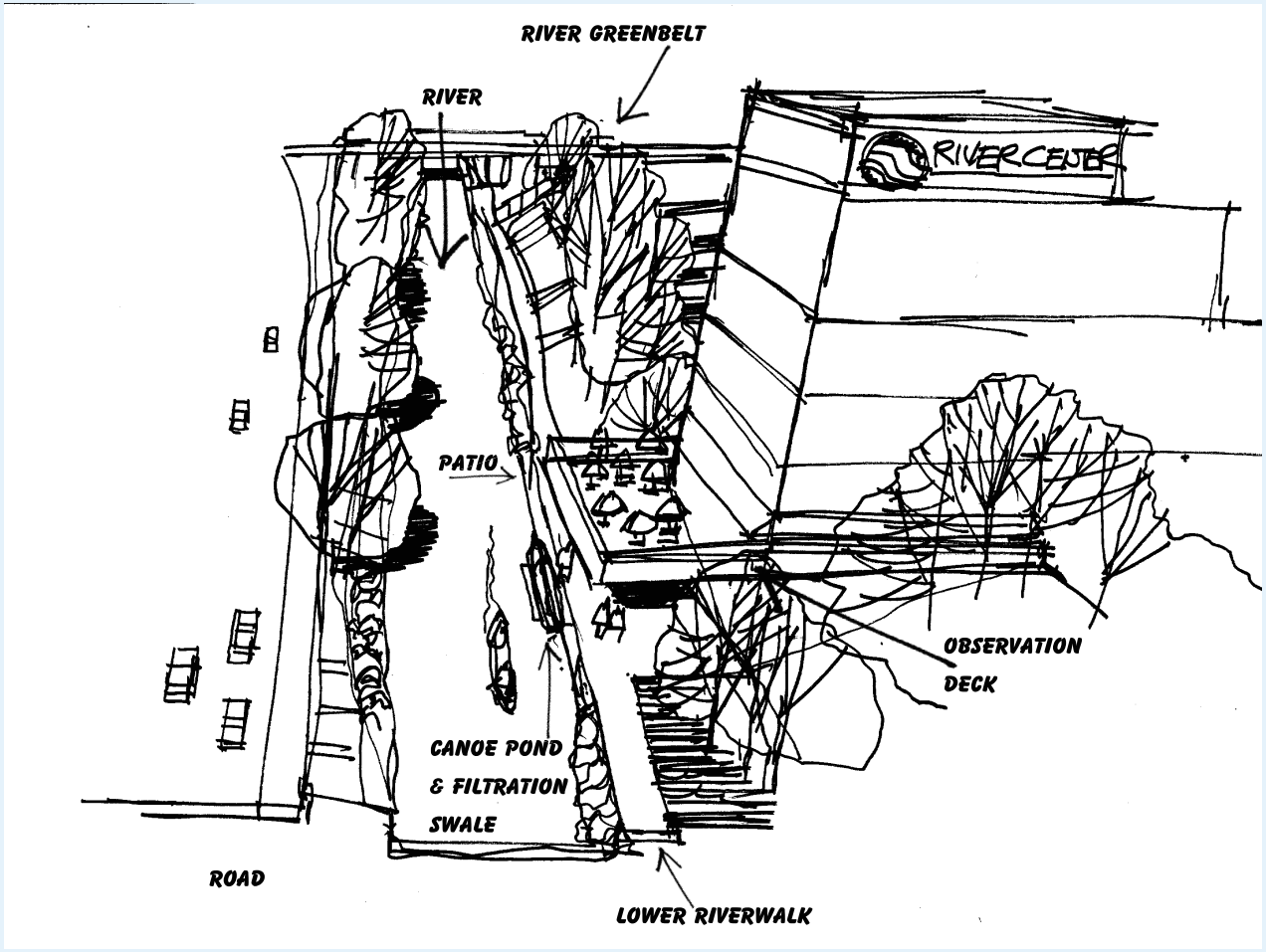
River Access at Business Locations

Historically, the river was a means of transportation and the first source of power for commerce in emerging town centers. Commercial centers formed a relationship with the river out of necessity. Today, the river offers an amenity to commercial centers and business development. To be “on the water” is both attractive and lucrative. Riparian property values are of higher value than like properties without a connection to the water. Town centers, with a water orientated amenity, have a greater appeal than those without.

Where major water tributaries have been buried, explore opportunities for “day lighting” the river.

Encourage the redevelopment of sites that have turned their back on the river. Consider people oriented facilities such as café/restaurants and book stores.

Selectively encourage new development on the river, utilizing green building Leadership in Energy and Environmental Design (LEED) principles and best management practices, to maintain water quality.



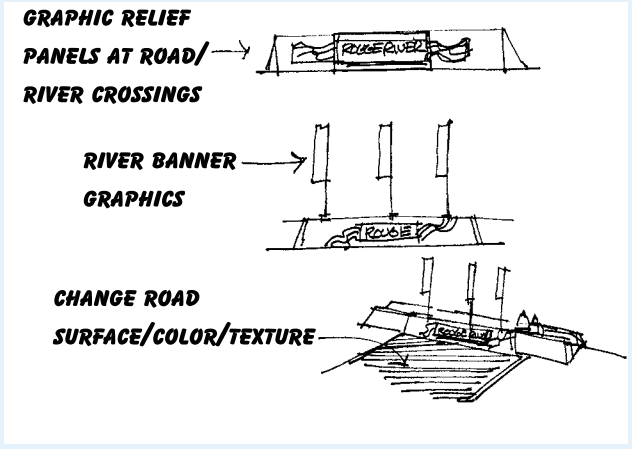
Road Image & Character

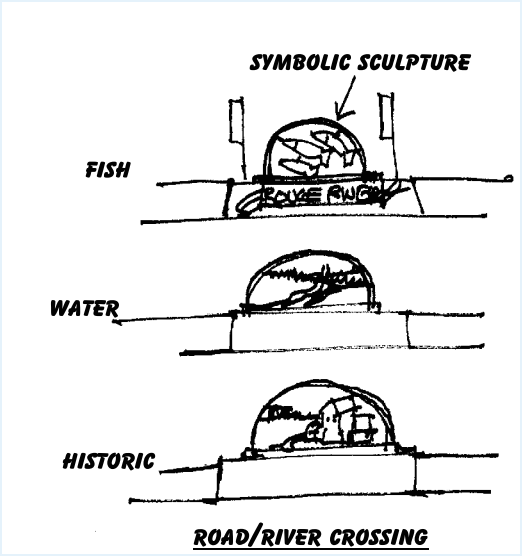
Visual Opportunities at Crossings

Natural water resources such as lakes, rivers, and streams can assist in the definition of a positive road image character. Many times however these features are either hidden from view or are framed inappropriately. The result is that the image building potential of the water feature is not realized.









Where natural water resources are found in proximity to major roads, frame or highlight the view and call attention to the presence of the resource. This can be accomplished in a variety of ways including bridge railing design, lighting, banners, name plates, and decorative relief.







Historical Connections

Interpretive Opportunities

The river is both timeless and ever changing. Since the glaciers retreated some 14,000 years ago, the flow of water has maintained its stream but the adjacent lands and even the river course itself have been subject to change. In many instances, significant natural features were formed and remain a part of the landscape. Settlement occurred and commerce related sites along the river were developed.

Today these sites and structures are parts of our historic and cultural past. They are worthy of interpretation for they tell the story of how we arrived at this point in time. Establish events, festivals, and interpretive tours to showcase these features in the community.



A rustic sign lets visitors know they are visiting a special preserve.

Riparian features and geologic features may include: valley walls, terraces and bluffs, oxbows, ravines, bottom lands, uplands, rapids, and riffles.



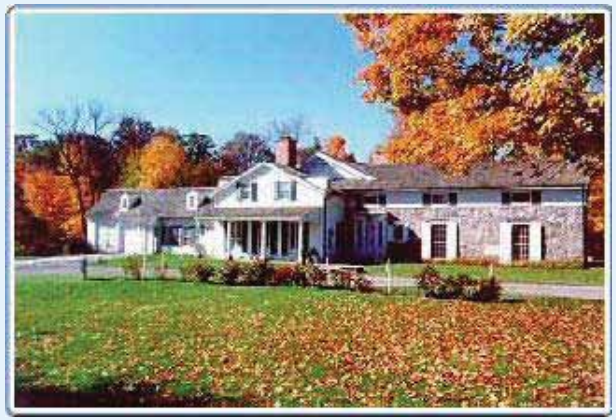
The historical Clinton River in the City of Pontiac before it was buried in a concrete channel.

Provide connections to the natural and cultural history of the river by identifying and signing the key geologic formations and historic/cultural structures and places.



A historic mill in Linden.

Historic and cultural features could include: Native American trails and villages, mills, weirs, dams, raceways, and town centers.



Stony Creek at Van Hoosen Farms in Rochester Hills connects visitors with the important historic resource (a historic farmstead) and the Stony Creek.

Other Special Features

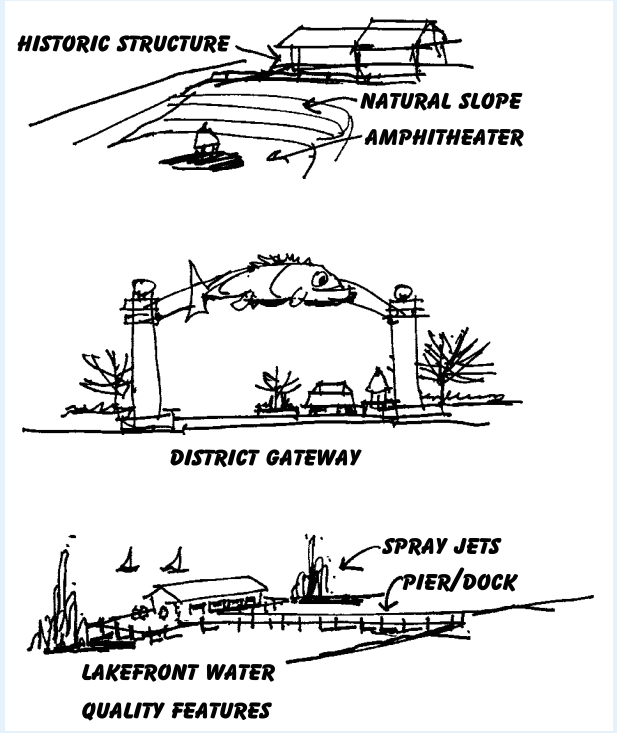
Use them as Identity Builders

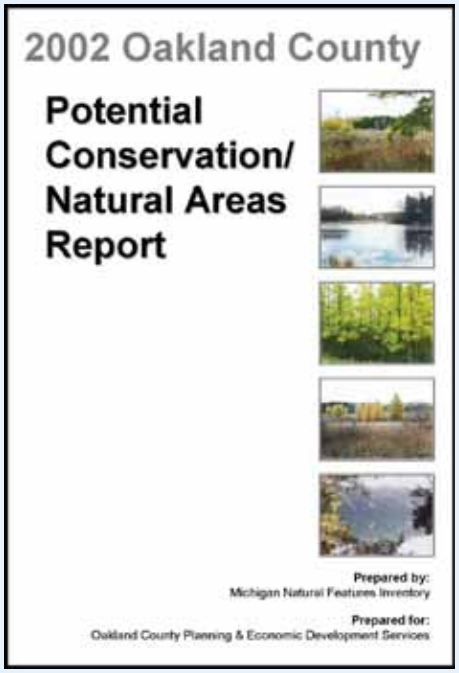
Special features in or along the river can be highlighted to create a personal identity for the river corridor. Such natural features as unique geologic formations, views and vistas, rapids and riffles, wetland fens and other intact ecosystems communities, prominent plant and tree specimens etc., can be acknowledged through signage, interpretive maps and brochures, tours, trail/path routing, and web photo logs.

Man-made features such as aeration bubblers, fountains, or river access points, can be both functional in augmenting water quality management practices and river access as well as pleasing amenities with river related design themes.

The naming of features with a character descriptor can further enhance both the feature's and river corridor's identity. For example, instead of the simple map acknowledgement of a rapids with term "Rapids", give it an identity adjective related to its character, historical significance, or person of note such as Snake Rapids, Old Mill Rapids, or Fergusson Fast Waters.







The natural areas report is a tool communities can use to help identify the location of special features. For more information, visit www.oakgov.com/es



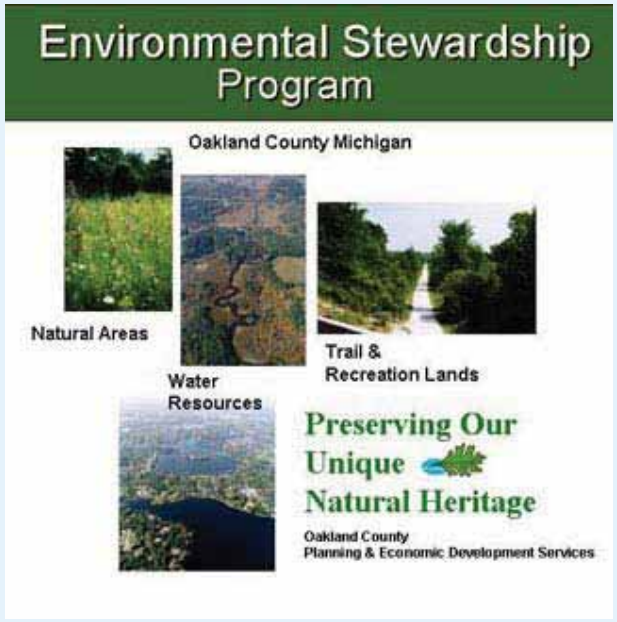
The Shiawassee River Corridor in northwest Oakland County.

Web Based Connections

The Next Best Thing to Being There

With the advancements in web technology, you can be a virtual visitor to the river. Sights, sounds, and information related to the river corridor offer the virtual visitor an experience that at times carries one to new depths of knowledge and awareness about the corridor. All the information included in the last nine suggestions, plus more can be included on the web. The web is an important tool of communication for connecting to the river.

Develop web based connections to the river corridor including sights, sounds, live cams, video, maps, event listings, partner groups, and more. The types and amount of information that can be provided is almost limitless, but be careful not to overwhelm, confuse, or frustrate the web user.







The Oakland County Environmental Stewardship web site provides information and resources designed to connect people to the natural environment.



Give Recognition to Those That Give

Awards as River Connections





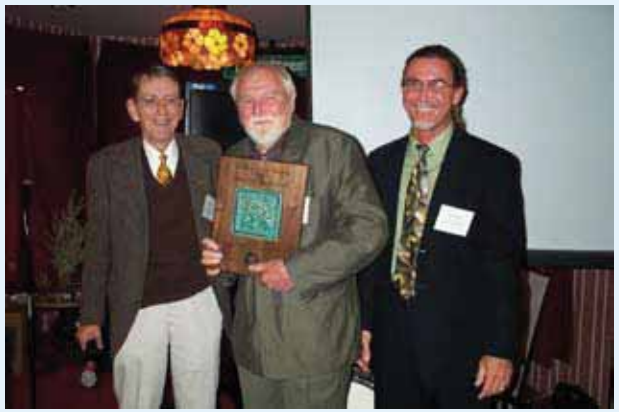
Awards and recognition ceremonies generate much good will, public awareness, and a lifetime commitment from the recipient. Awards supported and sponsored whole or in part by the business community extend ties to the river not only to the business and their employees but an awareness is engendered in their competitors.

Institutionalize a recognition awards program with joint sponsorship from river orientated businesses, public institutions, and nonprofit agencies.

Awards programs can also be established through local schools. Here the river awareness connection extend to the students' immediate and extended families.

Religious organizations offer still another possibility for stewardship recognition awards and connection to the citizen population.

A variety of certificates and awards can bring recognition and a sense of accomplishment to those who give their time.



Photographer Balthazar Korab receives a Heritage Award from Oakland County Planning & Economic Development Services for a lifetime of artistic achievement.



River Events

Come to the River to Celebrate

Events that celebrate the river are excellent ways to highlight cultural resources along rivers and connect with the public. Existing local town festivals that celebrate aspects of a community's character, such as the Rochester Heritage Festival, may be expanded to incorporate river tours, fishing derbies, and other river-centered activities.



Tours of BMPs such as this wetland mitigation project help the public understand how development impacts the natural environment.

Events such as Southeast Michigan's Water Week and River Days, River Cleanups, Creekfests, and other celebration events focused on the river may include tours of historic resources, key infrastructure such as Combined Sewer Overflow facilities, best management practice sites, and geologic features.

Bus tours are another great way to invite the public into a river corridor. Tours sponsored by Friends of the Rouge bring people to river-related locales in and around their communities that they never knew existed. Canoe tours can actually get people out on the river, giving them an entirely new perspective.



A young canoeist enjoys a fall color tour on the Rouge River.

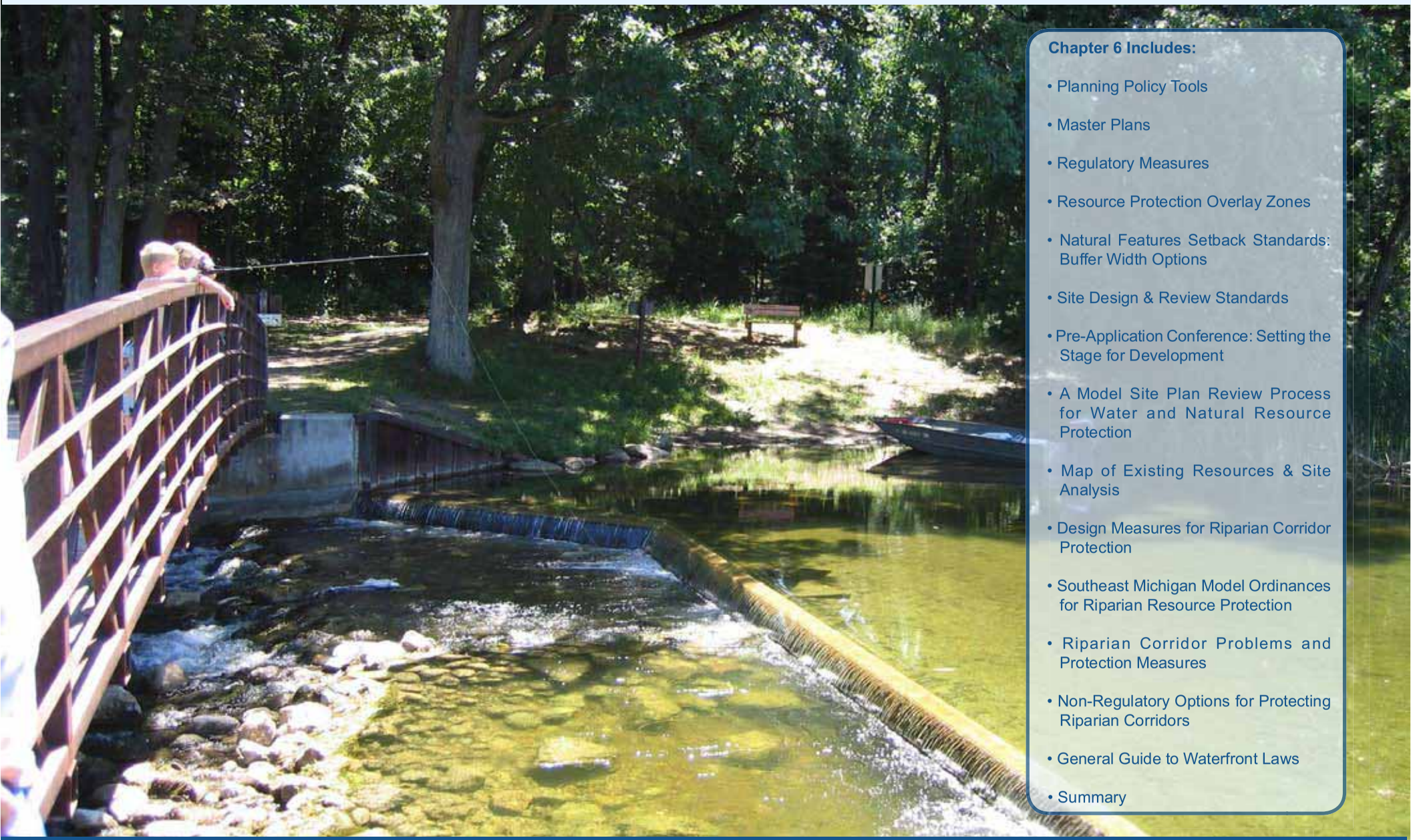


A cleanup event on the Clinton River gets people out and into the river corridor.

Summary

Building awareness of cultural resources associated with a riparian corridor is a critical step in connecting people with the river. Graphics that assist the public in understanding where water comes from and goes are useful. Signs and stencils that demonstrate how stormwater generated in local neighborhoods is directed to the river help people understand their role in protecting the ecosystem. Sign programs that offer stewardship opportunities near to water resources can provide valuable information at the right time and place. Interpretive opportunities should also be applied to water-related utility structures such as storm drains and combined sewer overflow facilities, in order to communicate the critical role such structures manage water quality. Development near river systems should capitalize on the river when possible instead of orienting away from the river. Businesses located along the river are excellent partners. Visual opportunities along roadways and at road crossings provide opportunities to connect with and engage the public. Interpretive opportunities that relate to historic resources along river corridors should also be considered. The internet is a useful tool for connecting people virtually when they can't actually be there on the ground. River events and wards are great ways to connect with and acknowledge those who celebrate and steward riparian resources.

The Role of Community Planning in Riparian Corridor Protection



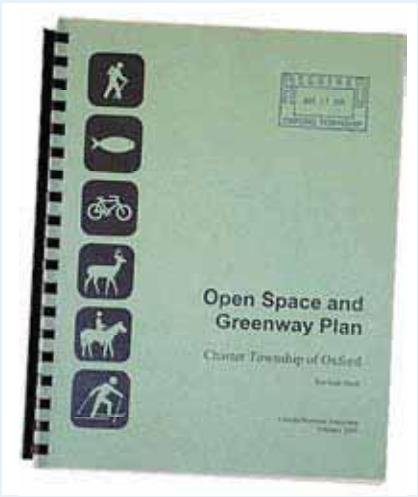
Chapter 6 Includes:

- Planning Policy Tools
- Master Plans
- Regulatory Measures
- Resource Protection Overlay Zones
- Natural Features Setback Standards: Buffer Width Options
- Site Design & Review Standards
- Pre-Application Conference: Setting the Stage for Development
- A Model Site Plan Review Process for Water and Natural Resource Protection
- Map of Existing Resources & Site Analysis
- Design Measures for Riparian Corridor Protection
- Southeast Michigan Model Ordinances for Riparian Resource Protection
- Riparian Corridor Problems and Protection Measures
- Non-Regulatory Options for Protecting Riparian Corridors
- General Guide to Waterfront Laws
- Summary

Any river is really the summation of the whole valley. To think of it as nothing but is to ignore the greater part.
Hal Borland

The Role of Community Planning in Riparian Corridor Protection

Riparian corridors represent a natural resource that offers communities an opportunity to balance the need for growth with environmental preservation. Local governments that plan for the establishment of riparian corridors as community assets can create many benefits for their community. Using innovative site design standards, developers can preserve natural areas and riparian corridors as integral components of a development. These natural features can then be used to market quality of life benefits such as access to open space, and scenic views, to prospective residents. The result is often a win-win situation for the environment, the developer, and the community as a whole. In addition, preserving riparian corridors contributes to the health, safety, and welfare of residents of the community.



Maximizing community assets related to river corridors requires good community planning.

The conservation and management of riparian corridors can benefit from proactive community planning, sensible regulatory measures, and appropriate development design standards. In Michigan, local governments play a major role in riparian corridor management. Community home rule means that the major responsibilities and choices for implementation of riparian protection and restoration initiatives rest at the local level.

Tools such as local master plans, zoning ordinances, and subdivision regulations can be used to address conservation and management needs of riparian corridors, as well as guide sustainable and profitable development within communities. Non-regulatory tools such as public education and innovative land preservation approaches may also be used by communities to protect and restore local riparian areas.



Friends of the Rouge Fall Bug Hunt Volunteers

Planning Policy Tools

Prior to addressing riparian corridor protection in local plans and ordinances, the community's riparian corridors should be inventoried and mapped (See Chapter 3 for more information on mapping riparian corridors). Inventory and map data should then form the basis for subsequent plans, policies, and ordinances designed to protect riparian corridors at the local level. Making riparian inventory and map data available to community members early in the process will clarify the location of riparian corridors, and allow property owners who may be affected by riparian regulations to understand how they may be impacted. Such efforts may assist community leaders in building public support for riparian corridor protection. In addition, mapped inventories of riparian resources may help communities understand how river corridors transcend community boundaries and make the case for a multi-community approach to protecting riparian corridors on a watershed basis.



Rouge Workgroup
(Photo Credit: Fred Cowles)

Master Plans

The Master Plan is the official document that sets forth policies to guide future land use and development in the community. It provides the legal basis for zoning and land use decisions. A community's master plan can be used to establish both the basis for preservation of riparian corridors and justification for related ordinances.

Communities interested in protecting riparian resources should include goals, policies, and objectives for protecting riparian buffers and corridors in their Master Plan. Riparian corridor protection provisions may also be listed in the Master Plan's implementation chapter. Master Plans should also include an inventory and map of riparian corridors and associated resources identified throughout the community. The riparian corridor map may be presented as a stand-alone piece with descriptive text or as a component of the Future Land Use map.



Presentation on the Cold Water Springs Nature Area Master Plan during Johnson Creek Day in 2005. (Photo Credit: Johnson Creek Protection Group)

Example Goals for Community Master Plans

Adapted from: Wetland Stewardship for Local Governments: Master Plan as a Basis. Clinton River Watershed Council

Goal: To the maximum extent possible, preserve existing riparian corridors and the hydrological systems that they support so that these ecosystems can continue to perform their vital functions of providing terrestrial and aquatic habitat for plants and wildlife, flood and stormwater storage, runoff attenuation, water quality protection, shoreline and stream bank stabilization, aesthetics, and recreation.

Goal: Enhance and restore existing riparian corridors that have suffered degradation.

Goal: Recognize the natural capacity and limitation of riparian lands to support development.

Policies pertinent to riparian preservation should address:

Land Use Intensity: The intensity of development on the land is dependent on the natural capability of the land to support various degrees of development.

Natural Resource Capability: All development respects the natural characteristics of riparian corridors and their constraints.

Site Design Policies: These policies provide model development principles that can be applied to site designs to reduce the impact of development on riparian areas.



Oakland Township Green Infrastructure Design Charrette

Park and Recreation Plans

Adapted From: The Town Planner's Toolbox.
From: Guidance for Communities in the Connecticut River Watershed.

Suggested Allowable Uses for Riparian Corridors

Encourage park and recreation areas with minimal structural development; non-motorized trails; forestry practices that use riparian best management practices (BMPs). Encourage passive use of land for recreation and nature appreciation. Maintain wetlands, flood plains, seeps, and bogs in their natural condition.

Suggested Prohibited Uses for Riparian Corridors

All uses that present a higher potential for pollution. Campgrounds other than dispersed forested tenting sites should be excluded because of their tendency toward deforestation and soil compaction. Towns may wish to guide use of ATVs and mountain biking to less sensitive locations since these higher impact uses can contribute to vegetation loss and erosion within the riparian zone. Buildings that do not depend on proximity to water should be sited outside a riparian buffer.



Early morning nature walk along Johnson Creek.
(Photo Credit: Michael Carr)



Buffer Area in Firefighter's Park in Troy, MI.
(Photo Credit: SEMCOG)

Allowable & Unallowable Uses in the Stream Buffer Zone

Use	Allowed	Denied
Footpaths	60	8
Utility Line Crossings	52	5
Water Dependent Uses	45	10
Bike Paths	30	15
Stormwater BMPs	28	10
Home Additions/Decks/Gazebos	10	55
Maintenance for Flood Control	Often Allowed	
Pumphouses	Restricted	
Sewage Treatment Plants	Restricted	
Golf Courses	Restricted	
Campground	Restricted	
Timber Harvesting	Restricted	
Hydropower	Restricted	
Roads/Bridges	Restricted	
Athletic Fields	Restricted	
Playground Equipment	Restricted	
Compost/Yard Waste	Unrestricted	
Landscaping	Unrestricted	

No Uses Permitted (30%)
No Uses Denied (15%)

Percentages of buffer programs that specifically allow or deny a given use. The "Restricted" and "Unrestricted" entries refer to other stream buffer uses that are not commonly addressed in local ordinances. (Source: Heraty, 1993)

Reprinted with permission from "Site Planning for Urban Stream Protection" (Schueler, 1995)

Park and Recreation Plans

Park and Recreation Plans can adopt the goals, policies, and objectives for riparian protection that are listed in the community master plan, or include its own park and recreation-specific recommendations for riparian corridor management. Content may focus on defining appropriate and inappropriate recreational uses for riparian areas located within parks. Park and Recreation Plans may also provide guidelines for proper construction and maintenance of river access points, and rules and regulations for public access as these topics relate to potential impacts on riparian buffers.

Regulatory Measures

A zoning ordinance provides the authority to regulate private use of land by creating land use zones and applying development standards in the various zones or districts.

Adopting a comprehensive local ordinance, or series of local ordinances designed to reduce the adverse effects of common human activities on riparian resources will better enable implementation and enforcement of the goals, policies, and objectives for riparian protection set forth in the Master Plan.

Ordinances and regulatory measures for riparian corridor protection should focus on encouraging the use of various riparian conservation techniques. Zoning ordinances might include two important riparian conservation tools: overlay zones and natural feature setback standards for rivers, lakes, floodplains, and associated riparian corridors and buffers.



Resource Protection Overlay Zones

Overlay zones can be used to apply special restrictions to areas with unique conditions such as rivers, lakes, floodplains, and associated riparian corridors and buffers. Parcels included within these zones retain their underlying zoning classification but are subject to additional requirements specified in the overlay zoning ordinance. It is important to note that if enacted correctly, riparian conservation zoning is not a "taking" because it doesn't inherently reduce development density or alter allowable uses otherwise specified. In preparing an overlay zone, it is first necessary to identify the geographic limits of the areas to be included. A riparian corridor map inventory is a critical component of the overlay process. The purpose for the zone and any use restrictions or development requirements must also be clearly stated.



Communities may sign environmentally sensitive areas included in their resource protection overlay zones.

The adoption of an overlay district can accomplish any of the following, depending upon how it is structured:

1. Require all parcels within the zone to be inventoried.

2. Alert developers that the parcel contains potentially significant resources, and development of the site would be subject to special restrictions.

3. Allow the community to identify priority protection areas that a developer must refrain from developing or develop with minimal site disturbance.

Parcels falling within a riparian overlay zone may be inventoried on a lot-by-lot basis or via a comprehensive survey. During the inventory process it is important that the full ecological significance of a parcel in relationship to its surroundings is considered. Communities are encouraged to adopt riparian-based conservation overlay zones that can be used to direct development away from sensitive riparian areas, require significant riparian buffers, and be coupled with conservation easements or land donations to preserve riparian lands in perpetuity.

Natural Features Setback Standards: Buffer Width Options

A natural features setback establishes a minimum setback (buffer width) from natural features to prevent physical harm or destruction of the feature. This ordinance recognizes the relationship that terrestrial and aquatic ecosystems have to one another and should be applied to both small streams and larger rivers. Each community establishes buffer width standards at their discretion. In general, the wider the buffer the greater the number of ecological functions the riparian zone will provide. Communities may choose to establish fixed or variable width buffers or a combination of the two.

Fixed-width Buffer

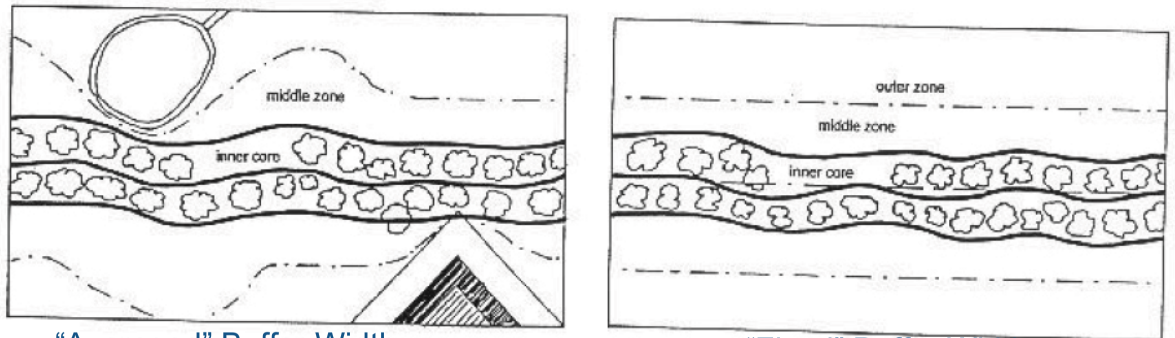
The community can establish a fixed-width riparian buffer similar to a utility right-of-way, whose width is determined before construction begins. The fixed width should be determined by selecting a distance that protects the community's most desired riparian functions. Fixed-width buffers are simplest to administer but may be ecologically inadequate in many situations.

Variable-width Buffer

While more difficult to administer, adopting a variable width buffer ordinance provides communities the opportunity to tailor riparian protection to the land, and eliminates a cookie-cutter approach to buffer management. Variable-width buffers are more ecologically-based, and address site-specific conditions such as slope and intensity of land use. Because the goal of variable-width buffers is to account for ecological variation in every stream and parcel, they require more site evaluation than fixed-width buffers.

Communities may opt to enact a combination of fixed and variable-width buffer standards by determining a standard width, and specifying criteria for expanding or contracting the buffer. Often this is achieved through buffer averaging that allows exceptions to the fixed-width standard to account for the 100-year floodplain, steepness of slope, adjacent wetlands, critical habitat, stormwater ponds, limited lot size, and pre-existing structures.

Stream Buffer: Averaging in the Middle Zone



"Averaged" Buffer Width

"Fixed" Buffer Width

(Reprinted with permission from "Site planning for Urban Stream Protection" (Schueler, 1995))



Fall colors along a well-vegetated portion of the Lake Angelus shoreline.
(Photo Credit: Oakland Land Conservancy)

Site Design & Review Standards

Riparian zoning ordinances, regulatory measures, and design standards should guide the placement of development, not prohibit it. When possible, specific sustainable site design, construction methods, and review standards should be outlined in the community's ordinances and other regulatory documents. This will help make the community's expectations for riparian preservation clear, and provide development professionals with a greater degree of certainty in the development and permitting process. Communities may enforce the riparian conservation techniques presented in their planning and regulatory documents by right or by special exception.

The site plan development and review process provides a forum for communities and developers to discuss possible development approaches, and for communities to determine developer compliance with riparian (and additional natural and water resource) protection provisions specified in community planning and regulatory documents.

Pre-Application Conference: Setting the Stage for Development

Communities can facilitate quality decision-making and collaboration by holding a pre-application conference with the developer. At the meeting, staff or consultant planners, engineers, and local officials familiarize the applicant with the policies and procedures of the community, and discuss the vision of the community as it relates to the piece of land in question. A site visit may also be scheduled early in the review process to assess and discuss the environmental sensitivity of the property, and to help the developer save time and expense designing around it. This is a good opportunity to discuss the value of riparian buffers and the reasons to implement site design measures for riparian corridor protection.



Community residents tour a CSO basin construction site.
(Photo Credit: SEMCOG)

Potential Ordinances and Regulatory Measures for Riparian Corridor Protection

1. Resource Protection Overlay Zones
2. Natural Feature Setbacks
3. Storm Water Ordinance
4. Impervious Surface Limitations
5. Soil Erosion and Sedimentation Control
6. Steep Slope Regulations
7. Trees & Woodland Protection Ordinance
8. Native Vegetation Ordinance
9. Establishing Wildlife Corridors & Greenways
10. Controls on Docks and Other Water Dependent Structures

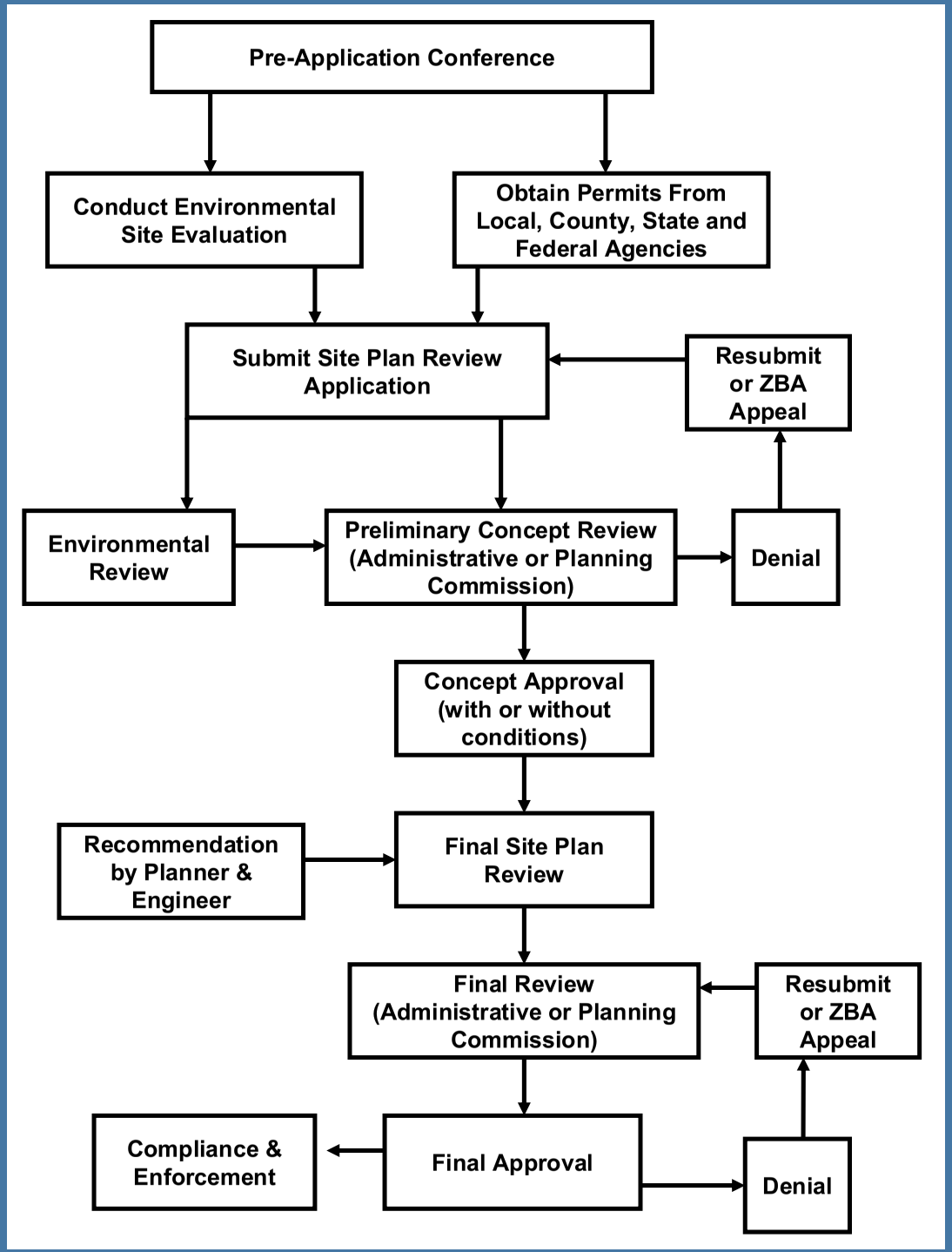
A Model Site Plan Review Process for Water and Natural Resource Protection

The following diagram outlines a model process that may be used to guide actions during site plan development and review. Not every step of the process may be necessary with every site plan decision; however the model process illustrates potential steps a community can take that may have a positive impact on the quality of decision-making.



During the site plan review process, careful consideration should be given to the potential impacts a proposed development may have on adjacent water resources and associated buffers.
(Photo Credit: SEMCOG)

Site Plan Review Process



Map of Existing Resources & Site Analysis

The most important documents to have in place for the pre-application conference are professional land surveys and GIS maps that delineate the property's riparian resources and related natural features. These documents should be used to guide ecologically-sound decisions regarding site-appropriate development design measures for riparian protection.

The following elements should be included in the land survey and/or GIS maps of the property. It may be useful to distribute this list to the applicant prior to the conference.

Proposed Development Information

- Available infrastructure (existing utilities)
- Special districts (resource overlay)
- Site topography (2-foot contours or less)
- General construction zone, building location, and orientation
- Professional tree and natural features survey
- Site improvements, building locations, and conceptual stormwater management plan
- Pre-development drainage area delineation (total area tributary to site)

Natural Features

- Sensitive headwaters area
- Lake, river, or stream
- Wetlands (note acreage, type, functional values of wetland)
- Floodplain
- Groundwater recharge and discharge areas
- Landmark trees
- Woodlands and tree rows
- Wildlife corridors
- Fragile land (high erosion areas)
- Unique geological features
- River valley features (bluffs, terraces, ravines)
- Sloped land
- Endangered or protected species present
- Wellhead protection area
- Natural drainage pathways
- Soil types

Heritage Features

- Designated agricultural/orchard area
- Human pathway/trail connection
- Cultural features
- Historic features
- Viewsheds or vistas

Site Description

- Property boundaries
- Existing zoning
- Master plan designation
- Current land use
- Adjacent property zoning
- Adjacent property land use
- Legal history (easements/deed restrictions)



This Clinton River Trail pedestrian bridge, over the Clinton River in Rochester Hills, represents an important heritage feature.

Based on the information gathered and discussed at the pre-application conference, the community may require the applicant to submit a professional environmental survey as part of the preliminary site plan preparation. At this time, the applicant should investigate necessary permits. Permits should be secured after preliminary site plan review and prior to final site plan approval. During site plan review, the community's staff planner or planning consultant, and planning commission should thoroughly review the proposed plan to evaluate potential impacts on riparian and related natural resources. The community should be mindful of opportunities to minimize environmental damage and leverage opportunities presented by the development project.



Conventional Subdivision Layout
(Conservation Design Forum, 2003)

Design Measures for Riparian Corridor Protection

The following elements represent a menu of design measures for riparian and natural resource protection that communities may choose to encourage or require developers to incorporate during the site plan review process.

Conservation Subdivision or Open Space Regulations:

- Can require a developer to prepare a natural features inventory on proposed project sites.
- Can require a certain percentage of total parcel acreage to be retained as open space.
- Can reference minimum buffer widths for riparian corridors and identify upland areas adjacent to riparian corridors as preferred green space designated for low-impact residential recreation activities.
- Can advocate cluster development that concentrates construction on land with less conservation value, and allows owners of house lots in the development to share undivided ownership of the portion of the property remaining in a scenic and natural condition.
- Can advocate lot averaging standards for retention of riparian resources and natural features on smaller sites.

Lot Size & Density Regulations:

- Provide flexible lot size and density standards to guide development away from a stream buffer or other sensitive land.
- Provide developers with density bonuses for land-conserving design and density and disincentives to actively discourage land-consuming layouts.

Minimum Frontage & Road Setback Regulations:

- Provide flexibility in frontage and road setback standards to minimize development intrusion on riparian buffers.



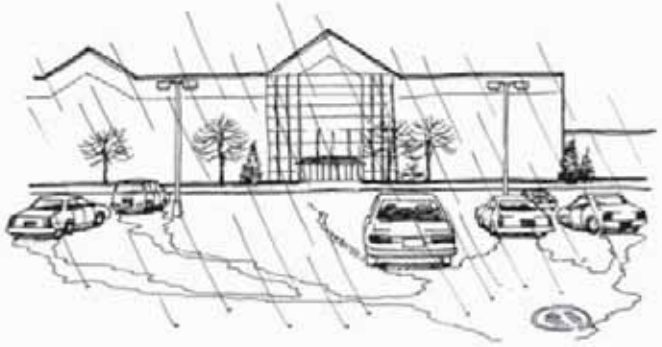
Conservation Subdivision Layout
(Conservation Design Forum, 2003)

Impervious Surface Reduction Regulations:

- Limit land disturbance and grading.
- Set standards that limit the overall area of impervious surfaces and suburban lawns.
- Encourage developers to use alternative materials that allow rain and snowmelt to soak in rather than run off, such as porous pavement, bioretention areas, filter strips, and/or vegetated swales.
- Set guidelines for designing roads, sidewalks, driveways, and other parking areas to minimum width standards.

Stormwater Management Guidelines:

- Regulate erosion control before, during, and after construction.
- Encourage developers to retain natural vegetation already at work protecting waterways.
- Create a variable-width, naturally vegetated buffer system along all perennial streams that also encompasses critical environmental features such as the 100-year floodplain, steep slopes, and wetlands.
- Limit clearing and grading of forests and native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.



Conventional Stormwater Conveyance System
(Photo Credit: Carlisle/Wortman Associates, Inc.)



Alternative Stormwater Conveyance System
(Photo Credit: Carlisle/Wortman Associates, Inc.)

- Promote forested buffers as part of stormwater management planning.
- Allow the pollution removal effectiveness of buffers and infiltration devices to be credited in stormwater plans and calculations.

Wastewater Management Specifications:

- Include erosion and sedimentation control, stormwater management, landscaping, and provisions for special investigative studies.

Important Planning & Regulatory Elements of a Local Riparian Corridor Protection Program*

- Provide ample set-backs for sanitary facilities on corridor areas
- Preserve a native vegetative buffer strip immediately adjacent to the watercourse. The wider the buffer strip, the greater the water quality protection and habitat value
- Establish structural setbacks from rivers and streams
- Regulate road placement adjacent to the riparian corridor
- Restrict clearing, construction, and development within the 100-year floodplain
- Zone areas adjacent to riparian corridors for low intensity development
- Establish minimum lot size, frontage, and width requirements
- Include reference to floodplain, soil, and sedimentation controls administered by other agencies in corridor regulations
- Screen new structures with native vegetation
- Limit industrial use along riparian corridors and regulate through special use permits subject to pre-designated standards
- Limit the amount of impervious surfaces allowed adjacent to the corridor
- Clearly outline appropriate and inappropriate use of riparian corridors (recreational activities, water access, etc.)
- Promote intergovernmental coordination of regulations among communities along the river corridor

** Adopted From Michigan Wetlands - Yours to Protect*

Southeast Michigan Model Ordinances for Riparian Resource Protection

The model ordinances listed here are intended to provide language and ideas that southeast Michigan communities can incorporate when developing their own ordinances. The sidebar of community resources provides additional references that address planning for riparian corridor and natural resource protection at the local level.

Storm Water Management Ordinance

- Canton Township
- Salem Township
- Washtenaw County
- Wayne County

Floodplain, Watercourse and Wetland Protection

- West Bloomfield Township
- Ann Arbor Township

Natural Features Setback Ordinance

- Waterford Township

Soil Erosion and Sedimentation Control

- Novi





Riparian Corridor Problems and Protection Measures

Comprehensive conservation and management of riparian corridors requires that communities address the following factors in their planning and ordinance documents:

Riparian Corridor Protection Measure	Problem	Action Steps	Applicable Planning & Regulatory Tools
Erosion & Sedimentation	Removing or reducing riparian buffer vegetation leads to bank erosion and associated sedimentation of surface waters. Erosion and sedimentation seriously impact water quality and aquatic ecosystems. Much of the erosion and sedimentation problem is associated with construction sites. With an anticipated 390,000 new and replacement households in the SE MI region by 2025, removal of riparian vegetation and associated erosion and sedimentation are serious threats to our resources.	Ensure that the agency responsible for enforcing soil erosion control permits has proper funding to administer regular inspections, and enforce permit compliance, if not conducted by the County. Educate riparian property owners on how they can prevent soil erosion on their property and report non-compliance.	Incorporate a riparian buffer system into master plans and zoning ordinances to prevent erosion and sedimentation into aquatic systems. Link development approvals to compliance with soil erosion protections. Reduce or limit the amount of impervious surfaces around the water resource through mechanisms such as overlay zoning. Assure that all erosion control permit requirements have been satisfied before issuing the local occupancy permit.
Habitat Protection	Riparian corridors provide high-quality habitat for a wide variety of wildlife, and often serve as protective corridors that facilitate wildlife movement and allow access to critical terrestrial and aquatic resources in urbanized landscapes. Land use that compromises the width and quality of riparian corridors can have far-reaching repercussions on local wildlife populations.	Inventory riparian corridors for native and non-native vegetation species. Advocate the use of native riparian vegetation and backyard conservation programs to riparian property owners. Contact a local land conservancy to discuss options for maintaining high-quality riparian corridor areas in perpetuity.	Advocate for a multi-community, watershed-based, riparian corridor greenway initiative in the community master plan. In the community master plan, include goals, policies, and objectives to remove invasive species from riparian corridors. Encourage use of native vegetation in the riparian planting guidelines of local zoning ordinances and prohibit use of invasives. Establish and require minimum riparian buffer widths in site design standards and development regulations.



Riparian Corridor Protection Measure	Problem	Action Steps	Applicable Planning & Regulatory Tools
Stream Corridor and Floodplain Protection	Riparian vegetation plays an especially critical role in protecting water quality and preventing flood damage to properties located adjacent to streams and floodplains.	Conduct a stream corridor inventory to identify opportunities to mitigate impacts of existing or future development on stream corridors and floodplains. Educate residents on the benefits of protecting stream corridors and floodplains and provide a mechanism to report those not complying with floodplain or stream buffer ordinances. Actively strive to achieve and maintain the natural land use in riparian zones. Advocate the use of native plants in stream corridor and floodplain restoration projects.	Incorporate measures into community master plans and ordinances to protect 100-year floodplain areas such that no building encroachments should be allowed that will significantly impact flood storage capacity, water quality, or wildlife habitat. Adopt a buffer ordinance for stream corridors. The wider the buffer, the more protective it will be. Many communities have adopted 25 foot buffers; however wider buffers may be more protective of very sensitive features. This buffer should be extended to include adjacent sensitive areas where present. Advocate the use of a variety of conservation development techniques to protect the ecological integrity of stream corridors and floodplains including: cluster development, transfer of development rights, land acquisition, land purchase, or conservation easement. Include an assessment of the impact of riparian areas as part of the site plan review process.

Volunteers removed invasive garlic mustard from areas bordering Johnson Creek. This event was sponsored by Visteon as part of Johnson Creek Day in 2005.
(Photo Credit: Johnson Creek Protection Group)





Pebble Creek Stabilization Project
(Photo Credit: Wayne County Department of Environment)

Riparian Corridor Protection Measure	Problem	Action Steps	Applicable Planning & Regulatory Tools
Watershed Management	Riparian corridors do not stop at municipal boundaries. Riparian corridors are often most effectively managed at the watershed level through multi-municipal partnerships coordinated to address concerns specific to upstream and downstream portions of the riparian corridor.	Contact neighboring communities concerning interest in watershed-wide and subwatershed planning for protecting and managing riparian corridors. Engage in watershed and subwatershed planning and implementation.	Local government ordinances that regulate private development should be protective of riparian corridor quality and quantity.
Public Education and Participation	Local riparian protection programs will not be successful without the support of the public. Public education and participation programs provide communities with an opportunity to build support and stewardship within their jurisdiction for riparian corridor protection initiatives.	List environmental education mechanisms that could be used within the community. Identify and prioritize opportunities for each mechanism. List environmental education partners with expertise in riparian corridor stewardship. Provide public education workshops that promote the identity and value of riparian corridors within the community and provide information on how citizens can become involved in riparian protection and stewardship activities at the local level.	Provide goals, policies, and objectives within the community master plan that advocate raising public awareness about the importance of a local riparian corridor protection program. Provide language in the master plan that advocates supporting the efforts of the local watershed councils.

Riparian Corridor Protection Measure	Problem	Action Steps	Applicable Planning & Regulatory Tools
Wetland Protection	Wetland health and function are intricately linked to the presence of riparian buffers. Wetland buffers function to maintain water quality by filtering stormwater run-off, preventing shoreline erosion control, and providing food and nesting habitat for wetland-dependent species. Impacting the integrity of riparian buffers can have far-reaching negative impacts on wetland systems.	Inventory and map the wetlands in your community. Identify wetland buffer restoration needs within the community. Educate residents about the benefits of wetlands and associated buffer zones and provide a mechanism to report non-compliance with the wetland and wetland set-back ordinance.	Include goals, policies, and objectives for preserving and restoring wetland buffer zones within the community master plan. Establish a wetland protection ordinance or set-back ordinance to protect wetland buffers. Provide a list of recreational activities that are acceptable within riparian buffer zones in the community's recreation plan.



Volunteers Participate in the Rouge Rescue in 2002
(Photo Credit: Friends of the Rouge)



Benthic Sampling Volunteer Training in Superior Township
(Photo Credit: Friends of the Rouge)

Non-Regulatory Options for Protecting Riparian Corridors

Communities can also employ a number of non-regulatory tools to promote riparian corridor protection at the local level.

Public Education

Successful implementation of a riparian corridor protection program will require community support. Involving the community in educational programs that provide instruction on the tools and techniques most appropriate for riparian corridor management can garner support for riparian protection, as well as facilitate corridor-friendly land use practices on privately-owned land.

Communities are encouraged to emphasize the following riparian conservation topics:

- Native landscaping education
- Riparian corridor management Education
- Downspout disconnection



Community members gather to support the launch of a public education poster for the Rouge Green Corridor.

Educate homeowners about the value of riparian resources. Emphasis should be placed on conveying the message that individual resident's conservation practices can have a positive, lasting effect on the region's riparian areas and water resources. Inform residents that activities such as unintentional encroachment, dumping, vegetation removal, or altering drainage can reduce buffer function.

Reduce Mowing

Encourage road agencies to avoid mowing vegetation in riparian buffers where roads are close to streams. Excessive mowing of riparian buffers and adjacent upland areas reduces the buffers ability to moderate stormwater run-off and keep trash, road pollutants, and excessive sediment out of the community's waterways.

Land Purchase or Conservation Easements

Work with a local land trust to acquire riparian development rights through purchased or donated conservation easements. An easement should include both the streambank and adjacent riparian buffer.

Guidance on timber harvesting, land conversion, construction, or road building within the buffer can be written into the easement. A conservation easement need not require the landowner to provide public access, and it can offer significant tax advantages.

Provide Recognition for BMPs

Recognize landowners who do maintain buffers: designate annual "watershed friendly residence, business, and development" awards from the planning commission, and provide publicity.

Land Protection Tax and Credits

Communities can also consider providing property tax incentives for landowners who set aside buffers, and can acquire especially sensitive waterfront lands for public space.



Students learn about benthic organisms found in the Rouge River. (Photo Credit: Friends of the Rouge)

Model Zoning Ordinance Language for Riparian Protection

Source: Conservation Design Resource Manual: Language and Guidelines for Updating Local Ordinances. Northeastern Illinois Planning Commission and Chicago Wilderness. March 2003. 102pp.

The [Municipality or County] recognizes the importance of riparian buffers that preserve, provide access to, or otherwise serve as necessary adjuncts to natural areas by protecting streams, lakes, and wetlands. Buffers include, but are not limited to, areas of predominantly deeply rooted native vegetated land adjacent to channels, wetlands, or lakes for the purpose of stabilizing banks, reducing contaminants including sediments in storm water that flows to such areas. The function of the buffer is to create a transition to the area targeted for protection. The buffer absorbs and withstands the impact of harming activity. For this reason, the ongoing healthy function of the buffer must be assured. Accordingly, the harmful activity cannot be allowed to overpower the buffer. Natural areas and buffers shall be preserved on the site, including, without limitation, native vegetation, wetlands, natural floodplain storage, or other valuable environmental and biological resources.

A. An area designated for natural area and buffer protection purposes may be:

    1. preserved or restored to its natural state

    2. designed and intended for the passive use and/or enjoyment of residents of the proposed development

    3. preserved in order to expand and extend the usefulness of existing preserved open space and natural areas

B. Dedicated buffers and natural areas shall be designed and located to conserve significant natural features located on the site.

C. Dedicated natural areas shall be interconnected with open space areas, greenways, and trails on abutting parcels where possible and appropriate.

Summary Guiding Principles for Protecting Riparian Corridors at the Local Level

Communities should strive for a balance between protecting riparian habitat and water quality and changing land use patterns, leading to a more sustainable region.

Communities should have natural features inventories performed and use this information to update master plans, zoning, and other ordinances.

Communities should work with other communities to develop greenway plans that connect valuable riparian habitat areas.

Communities should encourage preservation and restoration of riparian buffers through set-back and floodplain ordinances, and soil erosion and sedimentation standards.

Communities should incorporate native plants into riparian landscape practices and should require it as part of their site plan review process.

Communities and developers should work to promote and facilitate innovative design strategies such as open space or cluster developments that reflect the natural capacity of the land to support development, and conserve natural features such as riparian corridors.

Communities and businesses should work together to maintain riparian buffers and the natural drainage system when proposing and reviewing site plans.

Rights and Responsibilities of Riverfront Property Owners

General Guide to Waterfront Laws*

The rights of riparian land owners and the waters of Michigan are protected and regulated by a number of laws. Much of the general concepts for Michigan's water use laws developed through court cases and rulings given over the past 200 years. The State Legislature also has passed comprehensive laws, such as the Natural Resources and Environmental Protection Act, 1994, PA 451 which includes Part 301, Inland Lakes and Streams, and Part 303, Wetlands Protection. Both regulate certain uses of riparian areas. The Oakland County Drain Commissioner also has jurisdiction over certain drainage ways within Oakland County to minimize flooding and ensure conveyance of stormwater.

**Regulations about the use of water in the State are complex and continue to evolve. The information included here was gathered from a number of sources: Public Rights of Michigan Waters, published by the Law Enforcement Division of the State of Michigan, 1997; the Michigan Waterfront Alliance website, and the Michigan Lakes, Streams and Watersheds Association website. It should not be construed as legal advice, nor a comprehensive evaluation of the topics discussed.*

Jurisdictional Boundaries

There are several general concepts that form the basis for Michigan's riparian laws. Several are explained here:

- In general, the State of Michigan has jurisdiction over "navigable" waters, fish, and water-oriented construction operations, such as marinas, docks, canals, bridges, dredging, filling, and impoundments. The State uses the definition of navigable waters to determine if a lake or stream is public (navigable) or private (non-navigable). The definition of navigable has been developed through a series of judicial decisions, but there is significant uncertainty regarding the public or private character of most of the State's streams. Many streams are designated public or private after some type of litigation has been settled over the use of the stream by someone other than the riparian land owner.

- A riparian land owner (or Riparian) is one who owns land or property abutting water. The Riparian also owns the submerged lands adjacent to his or her property to the center of the lake or stream. However, a Riparian does not own the water, or in most cases, the fish. These are held in public trust for the benefit of all the people. The surface of a lake, whether open or frozen, is shared equally by all riparian property owners that abut the lake. They may fish or boat on any part of it.

- The Oakland County Drain Commissioner is given jurisdiction by municipalities to establish drainage districts and implement drain projects. Application is made by a community for both tasks. Once an application is made, it is evaluated by the Drain Commissioner's office and either accepted or denied. Natural drainage ways may be designated as a County Drain, and this designation may only cover portions of a natural stream, as opposed to the entire length of the stream. A drain also can be an underground pipe, retention pond, ditch or swale that conveys stormwater.

Rights of Passage within a Watercourse

If a stream is navigable, the public has the right to wade up a stream and fish, but cannot trespass on the uplands. However, if the stream is obstructed or in case of an emergency, the fisherman can make reasonable use of the upland to go around the obstruction or get help. An abutting property owner may not create obstructions to keep the public from wading, swimming or fishing a navigable stream. If the stream is not navigable, the public cannot wade up the stream, or access the stream by boat. Hunting, on the other hand, is a right that goes with land ownership and permission from the landowner is required.



Portions of the Shiawassee River may not be accessible during the hot summer months, when the high water mark is down.

Drawing Water for Irrigation

As indicated earlier, riparian land owners do not own waters adjacent to their lands, but do have the right to reasonable use of the water for their own purposes, including irrigation. However, the landowner cannot impair the water as it passes along or decrease the benefits of the water for other riparian landowners. Non-riparian owners are not entitled to similar water use rights, and extraction of water for their own purposes is considered trespassing against the rights of the riparian owner. Further, a riparian landowner cannot permit a non-riparian landowner to withdraw water.

Footbridges

The Inland Lakes and Streams laws do not allow property owners to structurally interfere with the natural flow of a stream, nor construct anything within the bottomland of a stream without a permit from the MDEQ. In addition, the Oakland County Drain Commissioner, who is charged with ensuring drainage of stormwater throughout Oakland County, prefers that homeowners refrain from constructing footbridges because of the possibility of debris collecting under these small bridges and obstructing the flow of the stream.



A footbridge over the Clinton River allows nearby residents entry into the Drayton Plains Nature Center.

Riparian Activities Requiring a Permit

The Inland Lakes and Streams legislation describes activities where a riparian land owner must obtain a permit from the Michigan Department of Environmental Quality (MDEQ). These include the following:

- Dredge or fill bottomland (Bottomland is the area that lies below the ordinary high-water mark and may or may not be covered by water)
- Construct, enlarge, extend, remove, or place a structure on bottomland, such as a permanent dock. Seasonal structures for noncommercial recreational use do not require a permit as long as they do not interfere with the use of the water by others entitled to use the water or interfere with water flow.
- Erect, maintain, or operate a marina
- Create, enlarge, or diminish an inland lake or stream
- Structurally interfere with the natural flow of an inland lake or stream

What Waters Are Considered Navigable or Public?

A navigable inland stream is:

1. Any stream declared navigable by the Michigan Supreme Court
2. Any stream included within the navigable waters of the United States by the U.S. Army Corps of Engineers
3. Any stream that floated logs during the lumbering days, or a stream of sufficient capacity for the floating of logs in the condition which it generally appears by nature, notwithstanding there may be times when it becomes too dry or shallow for that purpose
4. Any stream having an average flow of approximately 41 cubic feet per second, an average width of some 30 feet, an average depth of about one foot, capacity of flotage during spring seasonal periods of high water limited to loose logs, ties and similar products, used for fishing by the public for an extended period of time, and stocked with fish by the State
5. Any stream which has been or is susceptible to navigation by boats for the purposes of commerce or travel
6. All streams meandered by the General Land Office Survey in the mid 1800's. Note that the Michigan Supreme Court designated the Rouge River navigable from its mouth to 15 miles upstream from the mouth. Navigable is not whether a boat can be used in a lake or stream, but is based on the "floating log" test, which was a very useful tool during logging days in Michigan. If a log can float down a waterway, then it is considered navigable, and usable for commerce, travel, and trade. Navigable waters are considered public, which brings with it rights for public use. Even though we do not use rivers to float logs to market any more, this standard is still used as the legal test to define public waters.



- Construct, dredge, commence, extend, or enlarge an artificial canal, channel, ditch, lagoon, pond, lake, or similar waterway where the purpose is ultimate connection with an existing inland lake or stream, or where any part of the artificial waterway is located within 500 feet of the ordinary high-water mark of an existing inland lake or stream.

- Connect any natural or artificially constructed waterway, canal, channel, ditch, lagoon, pond, lake, or similar water with an existing inland lake or stream for navigation or any other purpose. Wetlands and floodplains are regulated in a similar way through Part 303, Wetlands Protection, of the Natural Resources Environmental Protection Act, 1994 PA 451. This law specifically applies to wetlands connected to an inland lake, pond, river or stream, or a wetland located within 500 feet of an inland lake, pond, river, or stream. Wetlands that are not connected and are greater than five acres in size are also protected, as are non-connected wetlands of any size that the MDEQ determines are essential for protection of the State's natural resources. The property owner must obtain a permit from the MDEQ for any of the following activities: deposit or permit the placing of fill material in a wetland; dredge, remove, or permit the removal of soil or minerals from a wetland construct; operate, or maintain any use or development in a wetland; drain surface water from a wetland. A guidebook, called the Permit and Licensing Guidebook, has been developed by MDEQ to explain the permit requirements for these activities. Refer to the MDEQ website or contact the Land and Water Management Division for more information.

Summary

Community planning plays an important role in the management of riparian resources. Planning policy tools include relevant background information, goals and objectives in community master plans, parks and recreations plans, and other planning documents. Master planning provides the legal basis for regulatory actions (such as zoning) and also provides a solid foundation and direction for non-regulatory community programs. Relevant regulatory measures to protect riparian corridors include resource overlay zones, natural features setbacks, and site design and review standards. A pre-application conference with developers is a useful way to influence site design without necessarily depending on regulatory measures. Pre-application meetings should include mapped information describing the natural resources of the site. Many design measures to reduce impacts on riparian resources may be employed, including open space cluster design, lot size flexibility, frontage and road setback requirements, impervious surface reductions, and stormwater and wastewater management. Other non-regulatory options for protecting riparian corridors include public education, reduced mowing, land acquisition, land protection, and best management practices.

Funding Riparian Initiatives



Chapter 7 Includes:

- **Local Funding: The Keystone to Conservation Financing**
- Local Funding Strategies
- Designing a Ballot Measure for Local Conservation Financing
- Crafting Successful Ballot Language: An Example from Rochester Hills, MI
- Federal Funding, Federal Grants, and State Grants
- Federal and State Cost-Share Programs
- Private Funding: The Role of Foundations and Non-profits
- Summary

A billion here and a billion there, and pretty soon you're talking real money.

Everett Dirksen

Funding Riparian Conservation Initiatives

Much of the information presented in this section is based on The Conservation Finance Handbook, published by The Trust for Public Land in 2004.

Communities that have created a comprehensive plan for local riparian conservation and restoration are faced with the challenge of identifying and securing funds to implement their vision. Often riparian conservation initiatives require substantial monetary support over time. Because the duration and cost of preserving and restoring riparian systems can be significant, it is important that communities develop a multi-faceted funding base that avoids reliance on a single, potentially unpredictable or easily exhaustible, source. Most communities have a variety of funding sources available to them at the federal, state, private, and local levels.



The Detroit Riverwalk along the Detroit River.

Local Funding: The Keystone to Conservation Financing

Federal, state, and private funds frequently serve as supplemental matches to primary funds raised at the local level. Therefore, consistent local funding is the keystone to effective conservation financing. Several incentives exist for pursuing conservation financing at the local level:

- Local funding means local commitment and local control of funds
- Local funds can be used to leverage federal, state, and private dollars
- Public awareness and support for local conservation initiatives can be elevated
- Successful measures set a precedent for future conservation financing proposals
- Securing local conservation funds strengthens a community's ability to attain supplemental funding from federal, state, and private sources

Many conventional and innovative tools exist for raising conservation revenues at the local level. Funding may be raised through traditional measures such as budget appropriation, sales and property taxes, or voter-approved conservation taxes and bond issues. Communities may also choose to pursue unconventional conservation financing options such as tapping local income and cell phone taxes. Innovative conservation financing measures, such as impact fees is also and option. The levying of a stormwater tax, based on the impermeable surface area of a property, is one example. In Michigan, this form of conservation financing is currently prohibited by the *Bolt* decision.

Local Funding Strategies

In general, conservation financing tools can be classified into one of two categories: 'pay-as-you-go' or 'borrowing'. Each funding approach has its own advantages and disadvantages. Pay-as-you-go measures provide funding from general appropriations or dedicated revenues. Funding sources can include property assessments, sales tax set-asides, real-estate transfer taxes, onetime environmental fines, and budget surpluses. Such financing can be appealing to debt-resistant voters and public officials because it entails year-by-year accountability and does not incur borrowing costs. On the downside, pay-as-you-go measures tend to generate relatively small annual revenues, and are vulnerable to changes in community politics.

Conservation financing through long-term borrowing can provide a community with substantial revenue and the ability to fund large-scale conservation initiatives on a multi-year basis. General obligation bonds comprise the most common source of borrowing. Additional borrowing measures include Revenue Bonds and Certificates of Participation. Challenges of passing bond measures for conservation funds include convincing voters of the merits of incurring debt and paying financing costs, and competing with other local programs in need of financing.



In an effort to improve the water quality of Johnson Creek and the Rouge River, Northville Township facilitated the creation of the Johnson Creek Protection Group. This advisory group of residents, businesses and local officials works together to identify actions in which the community can partake to preserve and restore water quality, as well as educate the public regarding their role in this on-going endeavor.

(Photo Credit: Johnson Creek Protection Group)

Table Source: Trust for Public Land Conservation Financing Department, 2003

Common Local Financing Options

Method	Definition	Pros	Cons
Property Tax	Tax on real property paid for by commercial and residential property owners	• steady source of revenue • relatively easily administered • tax burden fairly broadly distributed • small increases create substantial funding • popular with voters when focused on compelling land conservation needs	• competition for other public purposes • overall concern among taxpayers about high rates
Sales and Use Tax	Tax on the sales of goods or services	• relatively easily administered • low reporting costs • can generate large sums, even at small tax levels • may be paid in part by out-of town visitors • can tap into tourism profits generated by open space amenities • may include exemptions such as food and medicine	• revenues can drop when economy slows • considered regressive
Real Estate Transfer Tax	Tax on the sale of property, paid by either the buyer or seller	• funds can be substantial • nexus between taxing new development and protecting open space	• opposition from real estate/ development interests that makes passage difficult for some communities • less predictable revenue stream
Impact Fee	One-time fee paid by developer to offset costs of infrastructure caused by new development	• nexus between taxing new development and protecting open space	• parks and open space projects might require direct link to new development • may make housing development unaffordable
Special Assessment District	Special tax district for an area that benefits from an open space project	• users finance acquisition and management • predictable revenue stream • accountability in government spending • sense of ownership of and responsibility for area parks and services • taxable in small increments • ability to set own election date and process	• possibly time consuming to implement • overall concern over high rates among taxpayers
General Obligation Bond	Loan taken out by a city or county against the value of the taxable property	• allows for immediate purchase of open space, locking in land at current prices • distributes the cost of acquisition over time	• extra interest costs of borrowing • voter approval required, sometimes by supermajority levels
Revenue Bond	Loan paid from proceeds of a tax levied for a specific public project, or with proceeds of fees charged to those who use the financed facility	• not constrained by debt ceilings of general obligation bonds • voter approval rarely required	• more expensive than general obligation bonds

Designing a Ballot Measure for Local Conservation Financing

Creating sustainable funding for land conservation has been accomplished far more often via ballot measures for pay-as-you-go or borrowing options than through local legislation. Ballot measures give community voters an opportunity to make a judgment on the methods by which government will fund local conservation initiatives.

Conservation ballot measures should be designed around the results of background research and polling. Research to determine which local options and funding levels are economically prudent often takes the form of a feasibility assessment that includes thorough fiscal analysis. Public opinion polling is then used to determine the level of support for each viable option.

Questions to address in background research and community polls include:

Feasibility Questions:

- What types of financing options are legally permissible and historically used in the community?
- How much will each conservation financing option raise?
- What is the process for designing a measure and putting it on the ballot?
- Are there any controversies about the environment, land use, or the local government that could negatively impact a conservation financing measure at this time?
- Who are the most prominent and credible groups and individuals, including public officials, who might support or oppose a conservation funding measure?

Public Opinion Questions:

- Within the context of land and water conservation, what are community voters' top priorities?
- Is there community support for funding land conservation, and if so, how much are voters willing to spend?
- What are the arguments for and against increasing public funding for local land and water conservation?
- What other community priorities might be linked to conservation funding measures (for example smart growth, economic opportunities, linkages to tourism and recreation)?

If research and polling indicate that success of a conservation ballot measure is possible, it is time to design the specifics of the conservation measure (funding size and mechanism), craft the ballot language, and determine the best time to seek voter support. A community that takes time to build a successful conservation ballot measure will significantly strengthen its chance of becoming a successful applicant for matching funds from federal, state, and private sources.



Voters pick up their ballots at a polling place in the University of Michigan's Union in Ann Arbor. In 2003, Ann Arbor residents passed a half-mil, 30-year tax to preserve open space and farmland.

Photo Credit: Paul Jaronski, U-M Photo Services

Crafting Successful Ballot Language: An Example from Rochester Hills, MI



Michigan voters cast their ballots

Elements of Effective Ballot Language:

- A ballot title that clearly conveys the essence of the ballot measure
- Clear expression of voter priorities/public purpose as quickly as possible
- A funding level in line with voters' spending thresholds
- Fiscal safeguards that reassure voters that money will be spent wisely
- Simplified ballot language that easily communicates the terms of the millage to voters
- An absence of unnecessary technical jargon that is not required by law



MILLAGE PROPOSAL TO PROVIDE FUNDING TO PERMANENTLY PRESERVE GREEN SPACES AND NATURAL FEATURES WITHIN THE CITY OF ROCHESTER HILLS.

Shall the City of Rochester Hills permanently preserve natural green spaces, wildlife habitats and scenic views; protect woodlands, wetlands, rivers and streams; and expand the Clinton River Greenway and other trail corridors by funding the purchase of land and interests in land, and enable the City to seek matching grant funds by levying a new millage of up to 0.3 mills ($0.30 per $1000 of taxable value) for ten years, 2005 through 2014, inclusive. If approved, the estimated revenue the City will collect in the first year if the millage is authorized and levied in full is $1,020,593.

____ Yes
____ No

Communities throughout the country are showing a willingness to finance conservation initiatives with locally-raised revenues. In 2005, voters faced 63 state and local conservation ballot measures. Of these, 86 percent passed, generating more than $1 billion in new conservation funding nationwide.

From 1994 - 2005, Michigan voters passed 28 out of 43 proposed conservation measures, approving $715,196,433 in conservation funding. Source: www.landvote.org

Michigan 2005: Successful Conservation Financing Ballot Measures

Community	County	Finance Mechanism	Purpose	Funds Approved	% Yes	% No
Webster Township	Washtenaw	• Property Tax • 5-year • .5 mill.	Farmland, open space, habitat, watershed protection, and trails	$851,840	69%	31%
Rochester Hills	Oakland	• Property Tax • 10-year • 3 mill.	Open Space	$10,205,930	53%	47%
Grosse Ile Township	Wayne	• Property Tax • 3-year • 1 mill.	Open Space	$1,836,000	61%	39%

In 2005, Michigan voters passed 3 out of 5 conservation measures, approving $12,893,770 in conservation funding. (Source: Trust for Public Land LandVote)



Researching Grants: Questions to Consider

- Where is there geographical or programmatic convergence in funding?
- What grants could help fund your community's specific riparian conservation goals?
- What grants have been awarded to neighboring communities with similar riparian initiatives?
- Are there new legislative developments that impact potential funding?
- What political allies might support the community's grant application?
- Are there additional partners (conservation groups, land conservancies, non-profits) that could support the grant application by providing match?

Federal Funding

Federal conservation funds are made available to state and local governments and nonprofit organizations through grants and incentives. Many federal programs have a matching-funds requirement that can be met by using primary funds raised at the local level. Competition for federal conservation dollars is exceptional. Therefore, it is important to keep in mind that federal funds should play a supplemental rather than primary role in supporting local conservation initiatives.

In general, federal assistance with assembling a comprehensive funding program for local conservation efforts may fall into one of three categories:

1. Direct federal grants
2. State directed federal grants
3. Direct federal acquisition

State Directed Federal Grants

Grants within this category are awarded directly to states, which are given authority to determine how the federal funds are spent. States may in turn allocate the federal funds to local conservation initiatives on a competitive basis. State Directed Federal Grants include the Land and Water Conservation Fund "Stateside" program, the Transportation Efficiency Act; and Clean Water Act Funds (including Clean Water State Revolving Fund and Drinking Water State Revolving Fund).

Direct Federal Grants

Direct Federal Grants eliminate the State as a middle-man, and award funds directly to local communities and non-profit conservation organizations. Decision making in these programs is retained at the federal level. Direct Federal Grants that provide support for conservation-based initiatives vary greatly in their function and extent of funding. Examples include the Land & Water Conservation Fund; Farm and Ranch Land Protection Program; Forest Legacy Program; Coastal and Estuarine Land Conservation Program, National Coastal Wetlands Conservation Grants, and the North American Wetlands Conservation Act.



Direct Federal Acquisition

Occasionally, the federal government may make direct acquisitions of ecologically significant lands or natural resources for its own federal units. Local communities that harbor natural resources of regional, national, or global significance may find merit in lobbying for Federal acquisition and protection of the resource. Ecologically significant parcels located adjacent to national parks, national forests, wildlife refuges, or existing military bases, may make good candidates for federal acquisition.



Federal Funding for River Corridor & Wetland Restoration: The EPA 5-Star Restoration Challenge Grant

The Five Star Restoration Program brings together students, conservation corps, other youth organizations, citizen groups, corporations, landowners and government agencies to provide environmental education through projects that restore streambanks and wetlands. The program provides challenge grants, technical support, and opportunities for information exchange to enable community-based restoration projects.



The EPA Five Star Restoration Program provides challenge grants, technical support and opportunities for information exchange to enable community-based restoration projects for local wetlands and streams.



EPA Five Star Streambank Stabilization effort

The Five Star Restoration Program was established so the U.S. Environmental Protection Agency (EPA) can work with its partners for education through community-based wetlands restoration projects in watersheds across the U.S. The National Association of Counties, the National Fish and Wildlife Foundation, and the Wildlife Habitat Council have joined together with EPA for this effort. Funding for the program is provided by EPA's Office of Wetlands, Oceans and Watersheds, and by the National Marine Fisheries Service's Community-based Restoration Program for selected projects in coastal areas.

Michigan Natural Resources Trust Fund

The Michigan Natural Resources Trust Fund (MNRTF) provides financial assistance to local governments and the Department of Natural Resources (DNR) to purchase land or rights in land for public recreation, or protection of land because of its environmental importance or its scenic beauty. It also assists in the appropriate development of land for public outdoor recreation.

By law, no more than 25 percent of the Trust Fund revenues available for appropriation each year can be used for development, therefore the majority of funding is allocated for acquisition projects. The program is supported by annual revenues from the development of State-owned mineral resources (largely oil and gas), and is administered by the MNRTF Board of Trustees and the Grants Management office of the Michigan DNR.

Since 1980, a total of $42,619,119 has been allocated for acquisition and development projects in Oakland County.

Year	Amount Awarded
1980-1984	$2,883,750
1985-1989	$6,413,000
1990-1994	$10,989,600
1995-1999	$8,974,427
2000-2005	$13,358,342

State Funding

Although the responsibility for implementing conservation initiatives rests at the local level, the backbone of conservation financing rests at the State level. States play a key role in enabling local conservation financing and program implementation by encouraging or providing the following funding tools:

1. **Substantial State Funding**
   Constitutionally or statutorily dedicated conservation funds, and/or annual budget appropriations.

2. **Local enabling authority**
   States grant their local governments legislative authority to seek conservation funds through ballot measures.

3. **State incentives for local conservation finance**
   Provision of matching grants and low interest loans, encourage local governments and nonprofit conservation organizations to develop programs and create financing mechanisms to leverage state funds.

4. **Purchase of Development Rights**
   State-level PDR program for open space and natural resource protection.

5. **Public private partnerships**
   State facilitates public-private conservation partnerships.

6. **Federal partnerships**
   Active participation by state governments in federal conservation programs can promote land conservation partnerships between federal, state and local governments and with nonprofit partners.

7. **Tax credits (with careful design)**
   State laws can provide income or other tax credits to private landowners who donate land or easements to public or private, nonprofit entities for conservation purposes.

Federal and State Cost-Share Programs

Both federal and state agencies offer a number of cost-share incentive programs to assist private (mainly agricultural) landowners manage their land for the benefit of riparian resources. Such programs may assist communities in implementing their riparian conservation vision by providing individual landowners with the tools and incentives they need to join local conservation efforts.

The following websites provide more information on these programs:

Michigan Department of Natural Resources
www.michigan.gov/dnr

Farm Services Agency
www.fsa.usda.gov

Natural Resources Conservation Service
www.nrcs.usda.gov

Michigan Association of Conservation Districts
www.macd.org

Cost-Share Programs that Address Riparian Conservation on Private Lands

Program	Description	Contact Organization
Conservation Reserve Program (CRP)	Provides cost share for establishing permanent cover and conservation practices, and annual rental payments for land enrolled in 10 to 15-year contracts.	Natural Resources Conservation Service (NRCS) or Farm Service Agency (FSA)
Conservation Reserve Enhancement Program (CREP)	Designed to improve the water quality of Macatawa, River Raisin, and Saginaw Bay Watersheds. Practices eligible for cost share are: filter strips, riparian buffers, wetland restoration, field windbreaks, and planting of native grasses. Landowners can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible land.	Michigan Department of Natural Resources (MI DNR) and local NRCS Office
Environmental Quality Incentives Program (EQIP)	Provides up to 75% cost-share for conservation practices in accordance with 1 to 10-year contracts, and incentive payments for certain management practices.	Local NRCS or Conservation District Office
Landowner Incentive Program (LIP)	U.S. Fish and Wildlife Service program that supports: grasslands and wetlands in southern Michigan.	MI DNR Wildlife Division
Partners for Fish and Wildlife Program (PFW)	Up to 100% financial and technical assistance to restore wildlife habitat under minimum 10-year cooperative agreements.	Local office of the U.S. Fish and Wildlife Service (USFWS)
Private Stewardship Grants Program (PSGP)	Provides grants or other federal assistance to individuals and groups engaged in private conservation efforts that benefit species that are threatened or endangered, candidates for listing, or other at-risk species on private lands within the U.S.	Local office of the USFWS
USDA Stewardship Incentive Program (SIP)	Provides up to 65 percent cost share for forest management plan development, tree planting, riparian and wetland improvement, and recreation and wildlife habitat improvement. Participants must have at least one acre, but less than 1,000 acres of nonindustrial private forestland.	Local NRCS or Conservation District Office
Wetland Reserve Program (WRP)	Assists in restoring and protecting wetlands on retired agricultural land. Agreements can be 10-year, 30-year, or permanent.	Local NRCS or Conservation District Office
Wildlife Habitat Incentives Program (WHIP)	Provides up to 75% cost-share for conservation practices under 5 to 10-year contracts.	Local NRCS or Conservation District Office

Private Funding: The Role of Foundations and Non-profits

Private funds from foundations, corporations, and individuals can serve as an important supplementary component to a local conservation program. Foundations in particular can provide early funding and visioning support, help communities frame the conservation issue(s), study best practices, solicit community input, design conservation strategies, and leverage state and federal resources. Like federal and state funds, however, private dollars are best relied on as supplements to a significant and steady local funding stream.

Partnering with nonprofit land trusts is another sound strategy local governments can adopt when raising conservation dollars. Nonprofit land trusts may assist local communities with conservation financing by sponsoring private fundraising campaigns that raise money from corporations and individuals. In addition, nonprofits can solicit donations from foundations, many of which have policies against awarding grants directly to governmental agencies.



Volunteers help to stabilize an eroding streambank along the Johnson Creek in Northville Township. Volunteer efforts such as this augment funding and partnership support for preserving the stream's unique brown trout habitat.

Photo Credit: Michael Carr

Summary

Successful community conservation initiatives are based on a well-diversified funding mechanism that supplements consistent, local funding revenues with a variety of federal, state, and private financing measures. Because each community is unique, the combination of funding measures used to create successful conservation programs will vary. Nonetheless, the following checklist summarizes a generalized but useful approach communities should consider when securing funds to implement their local conservation programs.

Checklist for Securing Conservation Funds

1. Identify Local Funding Options ✓ Determine all available funding options, including pay-as-you-go and borrowing	**4. Identify Federal Funding Sources** ✓ Evaluate federal funding sources ✓ Determine the federal or state agency that distributes funds and the process by which funds are allocated
2. Design a Local Ballot Measure ✓ Assess funding options in detail, including various funding levels and corresponding costs to taxpayers ✓ Research legal constraints of referring a measure to the ballot ✓ Conduct a professional, public-opinion poll that tests voters' conservation priorities and spending tolerance ✓ Design a measure that reflects public opinion and addresses conservation challenges	**5. Evaluate a State's Conservation Funding Landscape** ✓ Assess a state's role in providing direct funding (grants and incentives) and authorizing local funding ✓ Consider the following best practices: • a substantial, dedicated state funding source • significant local enabling options • a program of incentives for local governments • a purchase of development rights program • public-private partnerships • conservation tax credits
3. Understand Community Values and Cost/Benefits of Open Space ✓ Design a greenprinting plan and secure a local funding source ✓ Research potential grant and incentive programs to determine where there is geographic or programmatic convergence ✓ Forge alliances with public- and private-sector leaders who can facilitate funding and champion local efforts	**6. Assess Private Funding Sources** ✓ Consider funding from foundations, corporations, and individuals ✓ Partner with nonprofit land trusts that can sponsor private fundraising campaigns and solicit foundation funds

Table Source: Trust for Public Land Conservation Financing Department, 2003

Case Study: Riparian Corridor Planning and Implementation in the Rouge Green Corridor



Chapter 8 Includes:

- The Rouge Green Corridor
- Building Partnerships
- Identity and Branding
- Conservation and Restoration
- Community Education: School Programs
- Poster and Brochure
- Managing Utilities as Assets
- Planning Policy Tools
- Volunteer Actions
- Funding
- Planning Approaches: Lessons Learned
- Summary

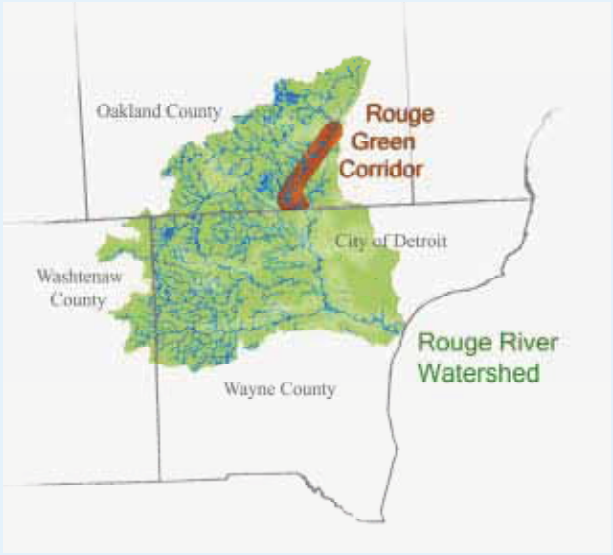
Modern society will find no solution to the ecological problem unless it takes a serious look at its lifestyle.

Pope John Paul II

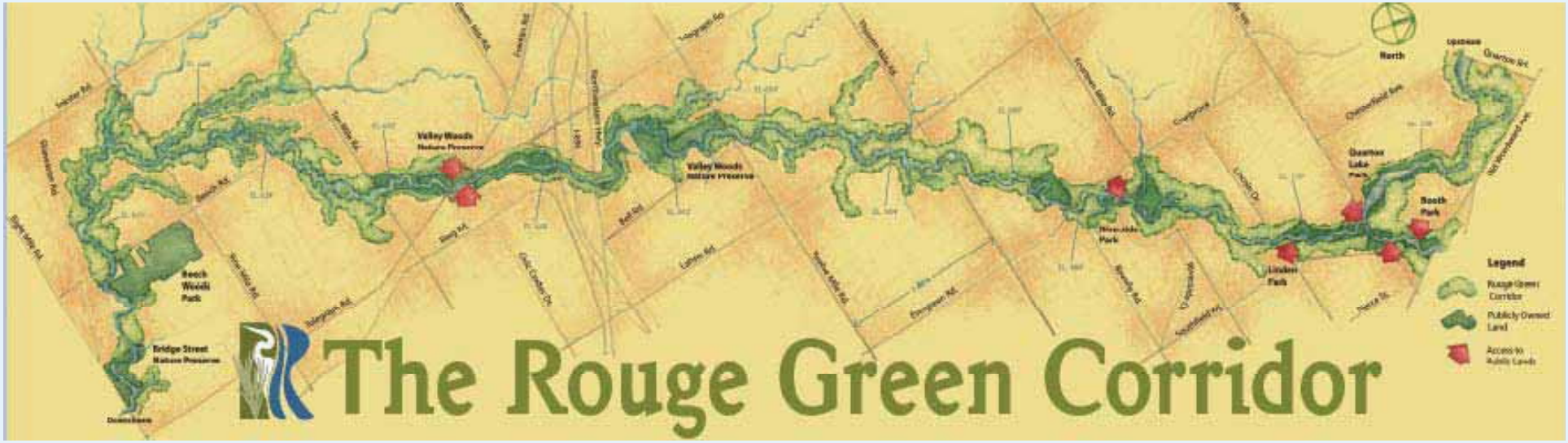
Case Study: Riparian Corridor Planning and Implementation in the Rouge Green Corridor

The Rouge Green Corridor

The Rouge Green Corridor is part of the headwaters of the Rouge River system in Oakland County and flows through the City of Birmingham, Village of Beverly Hills, and City of Southfield. The river valley is very steep and is influenced by episodic glacial lake level lowering and base level readjustment in the ancestral Rouge River, resulting in unique and beautiful river valley features such as bluffs, terraces, and ravines.



The steepness of the river valley combined with the very intense surrounding commercial and residential land uses result in the river being hidden from view in most locations. As such, it is truly a hidden jewel or oasis that flows through these developed communities. Public access is limited to a string of public parks and preserves, many of which have limited or no vehicular access.



Credits: Illustration: Janice Das, InSite Design
Graphic Design: Margot Campos, Margot Campos Design.

Threats along the Rouge Green Corridor are related to the extensive development that has occurred near the corridor and within the watershed. Issues include invasive species, erosion and sedimentation, water quality concerns, and stormwater runoff issues.

A unique opportunity exists along the Rouge Green Corridor to preserve and manage a significant natural amenity within an urban landscape. Because the land surrounding the Rouge Green Corridor is mostly developed, there is little threat of additional fragmentation of the existing natural vegetation. Opportunity exists to properly manage and expand the habitat while increasing public awareness of the resource and access in some areas.



A significant factor contributing to the integrity of the Rouge Green Corridor is the intact band of riparian vegetation that protects the river from the surrounding intensive development.



Mike Penskar of the Michigan Natural Features Inventory and Sally Petrella of Friends of the Rouge explore the Rouge Green Corridor by kayak.





Native plants and wildlife can be seen along the Rouge Green Corridor

Building Partnerships

The Rouge Green Corridor planning group came together to pursue various activities in support of the Rouge Green Corridor in 2004. Partners are comprised of local interests including the Southeastern Oakland County Water Authority, Friends of the Rouge, the Oakland Land Conservancy, Oakland County Office of the Drain Commissioner, Oakland County Planning & Economic Development Services, the City of Southfield, the Village of Beverly Hills, and the City of Birmingham.



Residents of the City of Southfield explore the Rouge Green Corridor.

The group proceeded to address one of the goals of the Rouge Main 1-2 Subwatershed Plan. Under this goal, the group addressed the following objectives in the plan:

1. Provide information to residents and public officials on existing access to public corridor lands and available uses

2. Encourage private riparian landowners to manage their waterfront in an ecologically-sustainable manner

3. Invest in improvements in existing publicly-owned lands, parks, and greenways to encourage nature study, wildlife viewing, and scenic enjoyment, land stewardship practices and water quality improvements, and other recreational uses as designated by municipalities

4. Identify areas where water quality improvements, habitat improvements, public acquisition of land, or conservation easements will benefit fish and wildlife values

5. Identify opportunities for collaboration and partnerships among municipalities and supporting organizations

Activities have included public information and visioning workshops, breakfast meetings targeted to raising the awareness of local public officials, multiple stewardship activities targeting invasive species management, analyses of land use opportunities, outdoor educational tours and outings, a biodiversity study, and an identity and branding study.

Business interests have partnered with the planning group, providing both financial contributions and assistance with events. Contributors have included DENSO Corporation and RaymondJames.

Oakland Land Conservancy

Multiple independent stakeholders have joined forces in support of the corridor.

Identity and Branding

The Rouge Green Corridor Identity Demonstration Project was a project funded by the Rouge River Wet Weather Demonstration Project through the United States Environmental Protection Agency. This initiative developed an identity concept for the Rouge Green Corridor and created an educational poster and self-guided tour map for riparian homeowners, businesses, and the general public.

A logo and a design for a sign appendage to the existing Rouge River Watershed road sign system were developed. In addition, the set of planning and communications guidelines that you are currently reading for riparian greenway corridor planning was developed.

Rouge Green Corridor

The Rouge Green Corridor road sign will be appended to the existing river crossing road signs that are installed at every road/river intersection in the entire watershed. This method will expose thousands of motorists and pedestrians to the rouge Green Corridor logo on a daily basis.





An array of communication tools were created to communicate and showcase the Rouge Green Corridor's Brand Identity.

Conservation

Conservation of a 16-acre parcel known as the "Rivers of Southfield" in the City of Southfield was achieved through a partnership effort between the City of Southfield and the Oakland Land Conservancy in 2004. The parcel was acquired by the city with the assistance of a Michigan Natural Resources Trust Fund Grant through the Michigan Department of Natural Resources and a GreenWays Initiative grant through the Community Foundation of Southeastern Michigan. The Oakland Land Conservancy continues to provide stewardship assistance for the site. The preserve contains scenic vistas atop steep bluffs and an intact floodplain forest including a special concern species twinleaf (*Jeffersonia diphylla*). The site is located at the confluence of the main branch of the Rouge and Franklin Rivers within the Valley Woods Nature Preserve.



A scenic vista atop a steep bluffs and an intact floodplain forest in the Valley Woods North "Rivers of Southfield" Nature Preserve.

Restoration

Quarton Lake is a 13.2 acre impoundment on the Rouge River situated at the northernmost end of the Rouge Green Corridor in the City of Birmingham. Over 30 years of sedimentation resulted in the lake filling with debris and polluted sediment. Water quality was severely degraded, lake oxygen levels depleted, and fish biodiversity in decline (carp exceeded 90% of all captured fish). In addition, shoreline erosion degraded the aesthetic quality of the lake and contributed further to the sediment load.

In 2003, the City of Birmingham successfully applied for a 1.5 million dollar federal EPA grant through the Rouge River Wet Weather Demonstration Project to restore the lake. The project included removal of sediments from the lake by dredging, installation of a sediment trap, removal of carp and stocking with game fish species, deterrence of waterfowl, stabilization of the shoreline using bio-engineering methods, wetlands creation, aeration of the lower level of water, and habitat enhancements.



Twinleaf (*Jeffersonia diphylla*) is a special concern species found in the "Rivers of Southfield" preserve.

The lake is "coming back to life", according to Bob Fox, assistant director of Public Services for the City of Birmingham. The project has sparked a renewed interest in the lake and the Rouge River within the City. Additional restoration projects within City of Birmingham parks along the Rouge Green Corridor have followed, including removal of invasive woody vegetation and restoration of native species, and bank stabilization projects implementing woody debris management.



Quarton Lake has undergone an extensive restoration and improvement program.

Community Education: School Programs

In order to promote the use of Rouge Green Corridor parks and preserves for classroom education, two projects were undertaken with high school classes between October 2003 and November 2004 under a grant from the USEPA through the Rouge River National Wet Weather Demonstration Project under the coordination of the Southeastern Oakland County Water Authority (SOCWA). The projects focused on science, community action, and communication skills. Students involved lived in Birmingham, Beverly Hills, and Southfield and most had never visited any of the Rouge Green Corridor parks or preserves.

The projects were organized as education partnerships between SOCWA and the lead teachers with the purpose of demonstrating how the Rouge Green Corridor landscape can help teachers address their curriculum requirements. Program planning meetings provided for brainstorming of options that met the needs of both partners. SOCWA provided resources and organization to the field studies; the teachers assisted with follow-up and in the classroom.



Schools visit the prairie restoration site at the Douglas Evans Nature Preserve to learn about the plants and animals that live there.

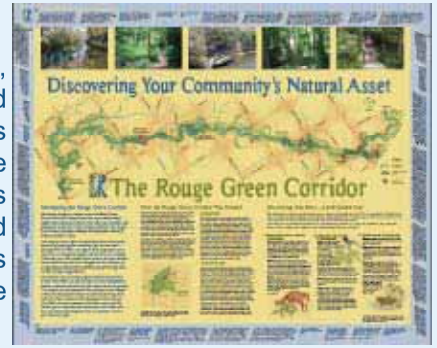
The following types of activities were organized:

- Classroom presentations
- Work days
- Nature journaling and photography
- Habitat scavenger hunt

The project also included public education action steps to make residents aware of Rouge Green Corridor parks and the problem of invasive species. Students prepared posters, logos and a website. Students articulated their concerns and recommendations at a public forum organized by SOCWA and the Rouge Green Corridor Group. The outcomes for the classrooms and SOCWA volunteers were positive and strong. For some students, the field trips were among the most meaningful of the school year. Teachers reported that the activities were particularly helpful for students who learn in non-traditional ways.

Poster and Brochure

In addition to the school programs, an educational poster about the Rouge Green Corridor was created as part of the Rouge Green Corridor Identity Demonstration Project. The poster includes a historical timeline, watercolor map of the corridor, overview and history, a self-guided tour, as well as information on challenges and opportunities facing the Corridor, guidance for riverfront property owners and general stewardship information, and additional resources. The project partners will disseminate the poster to local residents and Rouge Green Corridor stakeholders.



This colorful, double-sided poster was created to educate local residents and watershed stakeholders about the Rouge Green Corridor.



Managing Utilities as Assets

The Oakland County Drain Commissioner's Office (OCDC) has actively worked to maintain its utilities as assets to the community throughout Oakland County. For example, the Combined Sewer Overflow (CSO) facilities constructed in the Rouge Green Corridor were designed to blend into the existing area. OCDC-operated CSO facilities in the Rouge Green Corridor began operating in 1997 and are examples of how architectural detail can result in a beautiful building that blends well and adds value to a community while serving its primary function of improving water quality. The Birmingham and Acacia Park structures are two examples of integrating local community character into the architectural detail of a utilitarian structure. The Acacia Park CSO Basin is located in the Douglas-Evans Nature Preserve and was designed to look like a horse stable. The Birmingham basin is located in Linden Park and was designed to look like a grist mill. The buildings blend so well into their neighboring community, a local realtor once mistook one facility for a residential home and was interested in listing the property.





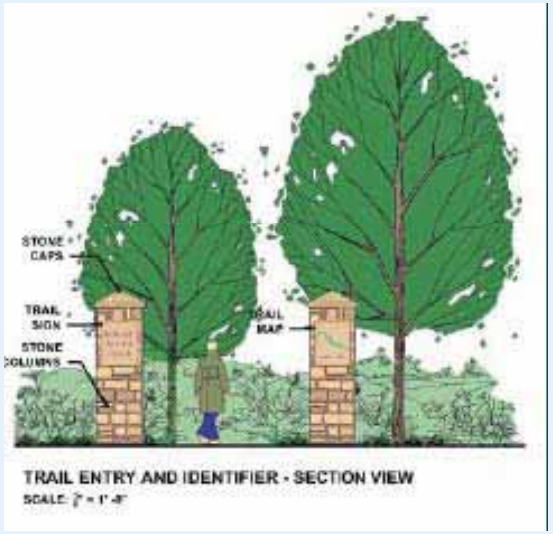
The Birmingham (left) and Acacia Park (right) Combined Sewer Overflow (CSO) facilities were constructed with the local community character in mind.

Another example is the Jacobs Drain project in West Bloomfield Township. As part of this detention basin enhancement project about 20 acres of diverse habitat will be planted and a half mile trail will be constructed around the detention pond. The detention basin will contain a variety of native grasses, flowering forbs, shrubs, and trees. The detention pond will serve as a place for quiet retreat and nature enjoyment while adding habitat value in addition to its utility as a stormwater detention structure.



The Jacobs Drain site plan.

In addition, OCDC looks for opportunities during county drain restoration projects to combine traditional flood control with improved environmental benefits in order to manage open drains as community assets. For example, the Edwards Relief Drain stream bank stabilization project in West Bloomfield Township restored over 1,100 feet of severely eroded stream banks with bio-engineered stabilization techniques. The project includes a 20-foot wide native buffer along each side of the drain in an area that was previously mowed to the waters edge. More than two acres of native plantings were added which significantly improved habitat.



Conceptual designs for trails throughout the Rouge Green Corridor in the City of Birmingham are included in the Rouge River Trail Master Plan.

Over the years, the City of Birmingham has seized opportunities to acquire property along the Rouge River to provide continuous public access, connect neighborhoods and downtown with the river, protect water quality, buffer development, and preserve ecosystems. The City prepared and adopted a "Rouge River Trail Master Plan". This plan details numerous capital improvements for city parks along the Rouge River designed to enhance public access to the Rouge Green Corridor and promote the city as a "walkable community". The total projected costs for the improvements exceed 2.4 million dollars and include paths, trails, boardwalks, sidewalks, overlooks, pedestrian bridges, signage, viewing shelters, benches, stream bank restoration, stormwater management, invasive vegetation removal, and restoration of native ecosystems. Funding for the improvements will be supplied through a successful bond measure voted in by Birmingham residents.

Public comment on the plan highlighted the need to balance public access with ecosystem protection. A dedicated cadre of volunteers is active in the removal of invasive species and restoration of native flora in the City's Rouge Green Corridor parks. This group in particular is concerned with "overdevelopment" of the Rouge Green Corridor. Other interests want to see improved public access, particularly in the form of trails and overlooks.



The Edwards Relief Drain before restoration in October 2004 (top). The Edwards Relief Drain after restoration in October 2005 (bottom).

Volunteer Actions

Volunteers are critical to the continued success of realizing the Rouge Green Corridor as a community asset through long-term stewardship and conservation. Volunteer efforts such as ecological gardening, invasive species removal, trash and debris clean up, and amphibian monitoring are actively coordinated by local non-profit partners in the Rouge Green Corridor.

The Southeastern Oakland County Water Authority (SOCWA) provides education to residents about water conservation, and has organized a large number of key volunteers in its Ecological Gardening class. The purpose of the course is to educate gardeners about ecological principles and the local ecology and eco-region as a first step leading toward creating and maintaining sustainable home landscapes. Areas of the Rouge Green Corridor were used as reference sites for the course. As part of the Ecological Gardening Sites, native plant garden demonstrations have been installed by SOCWA volunteers at numerous public and private sites along the Rouge Green Corridor. SOCWA volunteers are also active in invasive species removal programs and workdays. SOCWA annually recognizes these "Rouge Green Corridor Stewards" at an annual picnic luncheon.

Identifying and removing invasive species are vital to preserving the ecological integrity of the Rouge Green Corridor. The Oakland Land Conservancy (OLC) is a local land conservancy, and has coordinated several invasive species removal workshops and workdays on its preserves and other public lands in the Rouge Green Corridor. Topics have included "Buckthorn Busters" in which participants were educated about the invasive shrub *Rhamnus cathartica* and participated in its removal from a local natural area. Other workshops have included removal of the highly invasive Garlic Mustard (*Alliara petiolata*) from natural areas.



Volunteers in the annual Frog and Toad Survey in the Rouge Green Corridor learn about amphibians while documenting their occurrence in the watershed.

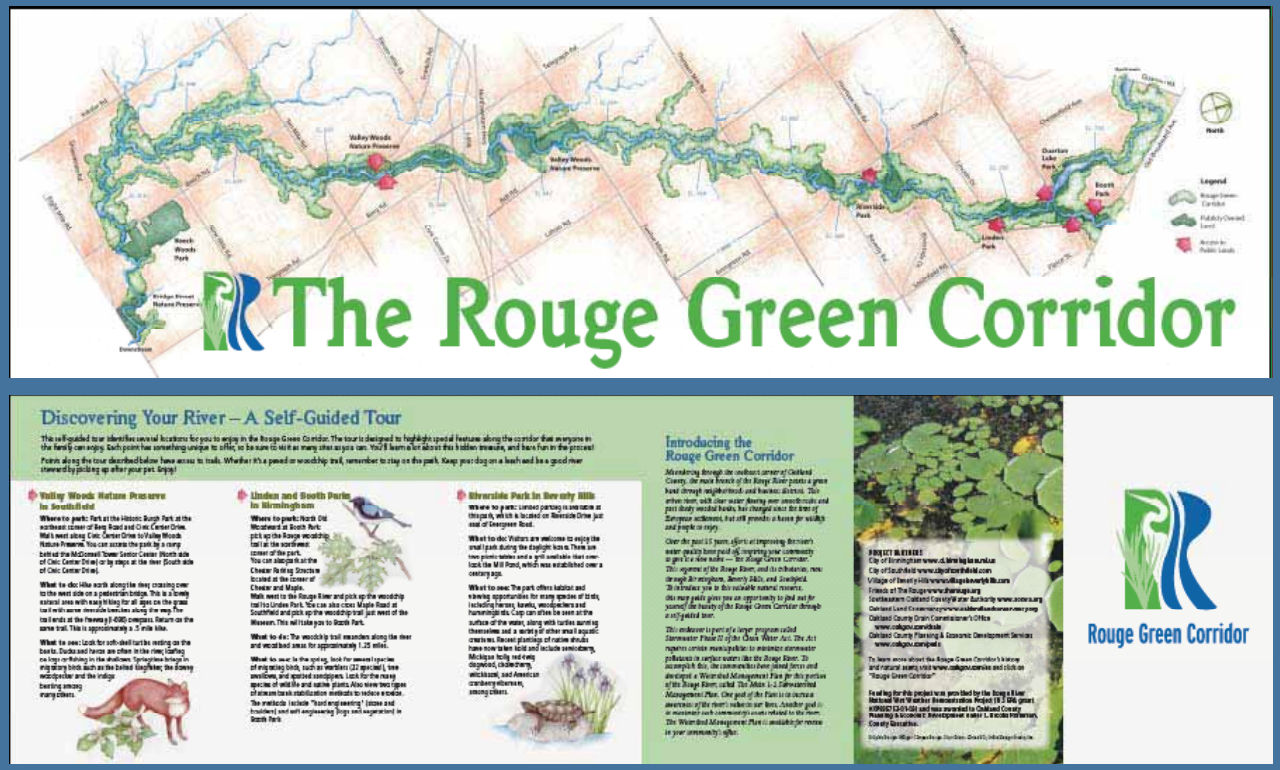
Friends of the Rouge (FOTR) is a non-profit organization dedicated to educating the public about the Rouge River Watershed and the need for public participation in watershed stewardship activities. Since the mid-1980s, watershed-wide events sponsored by FOTR have included participation in the Rouge Green Corridor. Initially geared toward engaging citizens in cleaning up trash and debris in the Rouge River, including removal of log jams, Rouge Rescue has shifted toward woody debris management and other stewardship activities such as native plantings.

In addition to Rouge Rescue, FOTR administers an annual Frog and Toad Survey that employs local residents to survey amphibian habitat in their own neighborhoods. Volunteers document frog and toad calls in an effort to assess the distribution, diversity, and health of amphibian populations in the Rouge Watershed. Since 2001, 225 volunteers have surveyed the Rouge Green Corridor communities and identified eight species present in Birmingham, Beverly Hills, and Southfield. To date, a total of eight species have been documented, including wood frogs, chorus frogs, spring peepers, American toads, leopard frogs, tree frogs, green frogs, and bull frogs.

Connecting People to the River

A self-guided tour map about the Rouge Green Corridor was created as part of the Rouge Green Corridor Identity Demonstration Project. The guide folds to pocket-size and includes information about access to public lands in the Rouge Green Corridor (left).

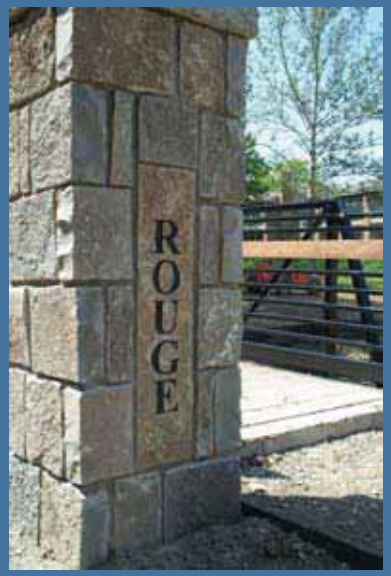
The City of Birmingham is connecting people to the river through the creation of trails and other public access amenities in their city parks within the Rouge Green Corridor (below).



This colorful self-guided tour map was created to encourage local residents and watershed stakeholders to explore the Rouge Green Corridor.



This bridge design in the City of Birmingham recognizes the Rouge River as a community asset by informing pedestrians and cyclists that they are crossing over the river.





This rain garden installed in the Village of Beverly Hills in the Rouge Green Corridor absorbs rainwater, preventing it from entering the storm drain system.

Funding

There is no formal entity to govern the Rouge Green Corridor; rather an ongoing committed, multi-jurisdictional partnership between county and local government and non-profit agencies provide initiative and direction. There is no direct funding source for Rouge Green Corridor activities. The diverse nature of interests, land uses, economic resources, ecological management, issues, and needs in the Rouge Green Corridor require a diversity of funding sources for projects and enhancements. Funding has been provided through federal, state, regional, local, public, and private channels. Federal EPA grants through the Rouge River Wet Weather Demonstration Project (for more information see www.rougeriver.com) have provided the largest share of funding for biodiversity studies, public visioning and workshops, school programs, and a branding and identity study.

State grants through the Michigan Natural Resources Trust Fund and regional grants through the Community Foundation for Southeast Michigan's GreenWays Initiative provided funding for the acquisition of the "Rivers of Southfield" preserve. Local funding provides the resources for local park management and improvement. Private contributions by local businesses such as DENSO Corporation have provided resources for public outreach by the Oakland Land Conservancy.



Rouge Green Corridor volunteers and experts kayak in Hidden Rivers Nature Preserve in the Village of Beverly Hills, as part of a federal grant to document the biodiversity of the corridor.

Planning Approaches: Lessons Learned

A comprehensive planning approach for managing the Rouge Green Corridor was not undertaken due to the significant differences in preferences, needs, and community resources among the three communities. The planning group found it feasible to work together on coordination and a guiding vision while addressing planning and implementation at the local municipal level according to local needs and resources.

The group embraced the Rouge Main 1-2 Subwatershed goal of maximizing community assets related to the river and its related objectives as their guide. Further corridor-wide vision statements were derived from public visioning work sessions and addressed habitat enhancement, walking and jogging, nature study, canoeing and kayaking, removal of invasive species, riparian landowner education, access via walking and cycling, and connecting to complementary land uses adjacent to the corridor. Planning beyond these general goals and vision statements was not undertaken as a group. This model is similar to the approach taken by communities under the watershed planning approach to Phase 2 Stormwater Regulations in which multiple communities come together to develop watershed-wide goals but implement those goals locally according to unique local needs and resources.

This flexible arrangement accommodated the differences between each municipality and allowed each community to progress towards implementing the Rouge Green Corridor concept at a speed appropriate to their own needs. For example, while the City of Birmingham committed substantial resources to increasing the public access and visibility of the Rouge Green Corridor, the City of Southfield has had fewer resources to contribute to such capital projects but has increased the amount of land preservation in the Corridor through grants. Meanwhile, the Village of Beverly Hills is primarily interested in maintaining the privacy of its residents and has avoided placing the names of several of its preserves on maps to discourage visitors in an effort to maintain a lower profile, but has embraced local neighborhood efforts to steward and educate residents about the river. Each community has experienced successes on their own terms throughout the duration of the project.

As a result of this work, the governing bodies of the Cities of Birmingham and Southfield have adopted resolutions in support of protecting and promoting the concept of the Rouge Green Corridor. The Village of Beverly Hills has not yet followed suit. Unfortunately, support for the Rouge Green Corridor concept by public officials has not been as uniform or consistent as the partners would like; the successes of this project were driven largely by municipal staff and local active citizens. Challenges to gaining political support have included coordinating schedules between the staff, volunteers, and political officials of three autonomous municipalities, as well as frequent turnover of political officials.

Although this flexible and adaptive planning arrangement has been beneficial in many ways, the lack of a comprehensive planning approach may challenge future efforts to identify and target funding sources for the ongoing conservation and management of natural resources. Several stakeholders have expressed an interest in developing a corridor-wide natural resources management plan. Ongoing challenges will include maintaining the cohesion and participation of the planning group and identifying next steps and attaining funding for projects.



Howard Knorr, local resident of the Village of Beverly Hills, describes the native plantings and wildlife of this wetland along the Rouge Green Corridor in the Village.

Summary

The Rouge Green Corridor is part of the headwaters of the Rouge River system in Oakland County and flows through the City of Birmingham, Village of Beverly Hills, and City of Southfield. A unique opportunity exists along the Rouge Green Corridor to preserve and manage a significant natural amenity within an urban landscape. The Rouge Green Corridor planning group came together to pursue various activities in support of the Rouge Green Corridor in 2004. The Rouge Green Corridor Identity Demonstration Project was a project funded by the Rouge River Wet Weather Demonstration Project through the United States Environmental Protection Agency.

This initiative developed an identity concept for the Rouge Green Corridor and created an educational poster and self-guided tour map for riparian homeowners, businesses, and the general public. Projects in the Rouge Green corridor have included conservation of high quality parcels, restoration of degraded ecosystems, community education, management of water utilities as community assets. Municipal planning and volunteer actions have contributed to the enhancement of the corridor. Funding has come from diverse sources.

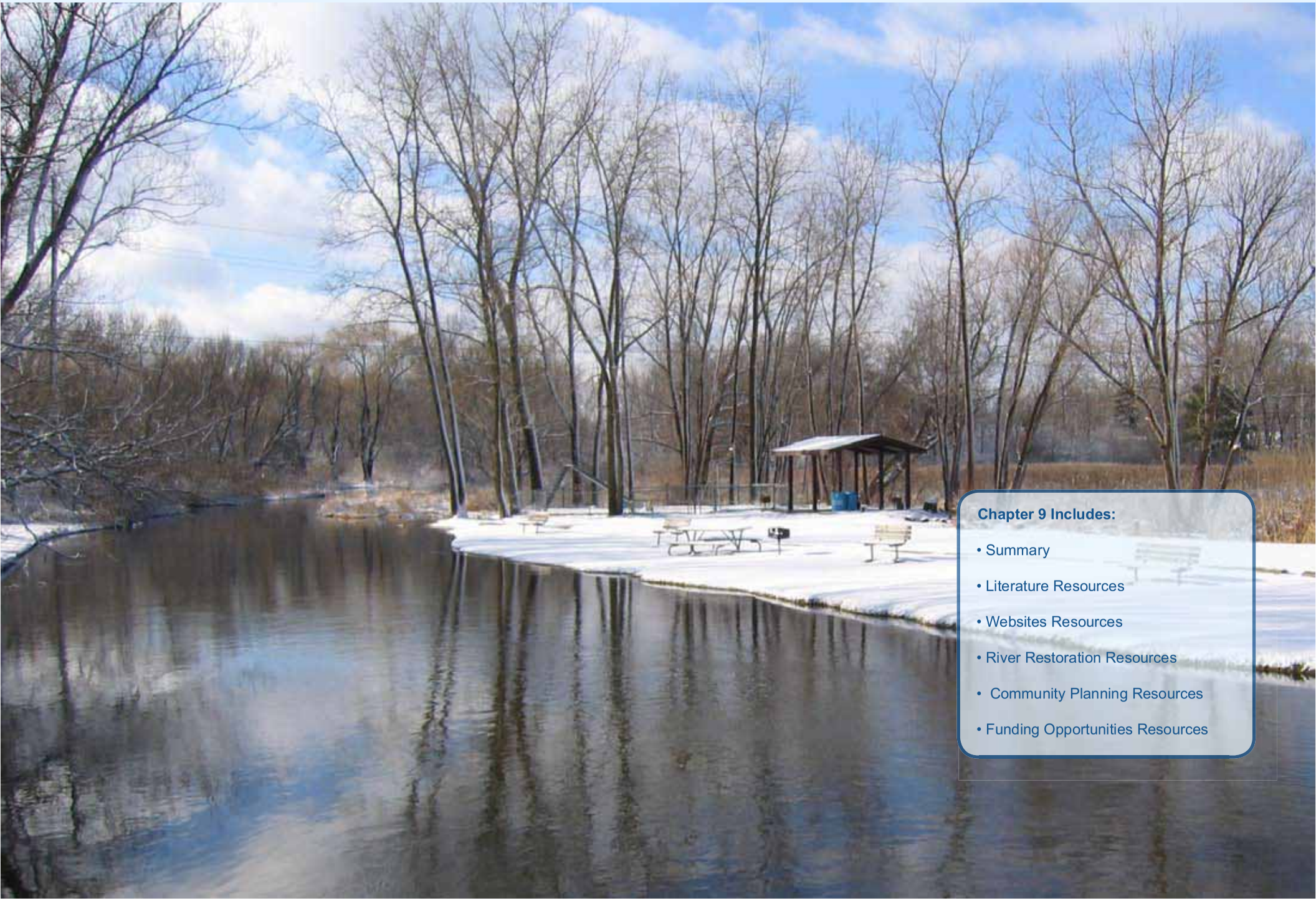








Summary & Additional Resources



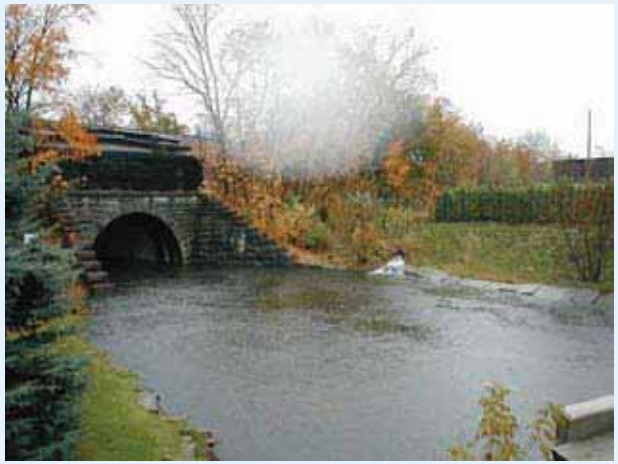
Chapter 9 Includes:

- Summary
- Literature Resources
- Websites Resources
- River Restoration Resources
- Community Planning Resources
- Funding Opportunities Resources

Summary

The guidelines contained within this document were designed to give the reader background about and ideas for planning the protection, restoration, and enhancement of riparian corridors in Southeast Michigan. The special opportunity for maximizing the community asset provided by riparian corridors through connecting people with the natural environment, regardless of whether a community is rural or urban, is emphasized. Information about the how rivers in the region were formed geologically and clues about how the landscape we see today tells us stories about the past is described, as is the landscape ecology of riparian corridors and how they interact with and are influenced by the regional landscape ecosystems of Southeast Michigan. A dual planning process combining planning for the landscape as well as creating an identity concept for the riparian corridor is presented. Implementation techniques including conservation, restoration, connecting with cultural amenities, and community planning are described. Funding opportunities are outlined. Finally, a case example is presented, reviewing the successes and challenges of a project to preserve, restore and enhance the Rouge Green Corridor in Southeast Oakland County.

It is the sincere hope of the authors of these guidelines that local stakeholders will use them and learn about the local rivers in their community, seeing them as special community assets and finding ways to maximize those assets into the future.



Urban, suburban, and natural rivers provide community assets that can be maximized with strong planning and communication.





Additional Resources

Literature:

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